

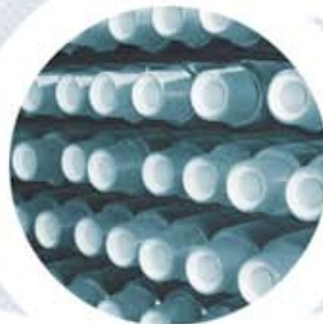


Drill pipe

**Product Manual**

钻杆

**产品手册**



[www.baosteel.com](http://www.baosteel.com)



宝山钢铁股份有限公司  
BAOSHAN IRON & STEEL CO., LTD.

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## Introduction

### 公司简介

宝山钢铁股份有限公司 (简称“宝钢股份”) 是中国最大、最现代化的钢铁联合企业。宝钢股份以其诚信、人才、创新、管理、技术诸方面综合优势, 奠定了在国际钢铁市场上世界级钢铁联合企业的地位。《世界钢铁业指南》评定宝钢股份在世界钢铁行业的综合竞争力为前三名, 认为也是未来最具发展潜力的钢铁企业。

公司钢管产业拥有 50 年的钢管制造经验, 包括中小口径热轧无缝管、特种合金无缝钢管、冷轧和冷拔无缝钢管、中大口径高频电阻焊管、大口径直缝埋弧焊管等产品, 集科研、产品开发、加工检验、产品销售于一体, 实行从炼铁、炼钢 (转炉、电炉)、热轧钢卷、厚板、条钢到制管及管加工的一贯制质量管理, 具有特大型钢铁联合企业综合生产的规模化优势, 目前已成为中国包括无缝、焊管的大型精品钢管研发生产基地。

公司以其先进技术、设备、管理、良好的信誉, 保证提供高质量的产品和服务, 令客户满意。

公司全体员工衷心感谢您对我们产品的关注和使用, 竭诚欢迎您对公司产品和服务提出宝贵意见。

如果您所需产品的品种、规格或者特殊要求在本手册中未覆盖, 请与我们联系, 我们将予以及时答复。

Baoshan Iron & Steel Co., Ltd. (“Baosteel Co., Ltd.” for short) is the largest and most modernized integrated steelmaker in China. Baosteel Co., Ltd. has secured its standing as a world class integrated steelmaker in the international steel market with its comprehensive strengths in credit standing, talent, innovation, management and technology, etc. World Steel Dynamics (WSD) ranks Baosteel Co., Ltd. within the top 3 places in terms of comprehensive competitiveness in the global steel industry, and also believes that Baosteel Co., Ltd. will be the most promising steelmaker in future.





The company's steel tube business has 50 years of steel tube manufacture experience. Its products include medium and small diameter hot-rolled seamless tube, specially alloyed seamless tube, cold-rolled and cold drawing seamless tube, medium and large diameter high frequency ERW pipe, large diameter SAWL pipe, etc. It integrates R&D, product development, processing and inspection, products sales, etc., implements the through-going quality control from iron-making, steel-making (BOF, EAF), hot-rolled coil, heavy plate, bar steel to tube making and processing, boasts the scale advantages due to the comprehensive production of a super-large integrated steelmaker and has become a large-sized

premium tube R&D and manufacture base for both seamless tube and welded pipes.

With its leading technologies, equipment, management and favorable reputation, the company can ensure the supply of quality products and services that satisfy the customers.

The staff of the company sincerely appreciates your attention and usage of our products, and welcomes your valuable opinions to our products and services.

Please contact us if the varieties, specifications or special requirements of the products you need are not covered in this brochure, and we will reply immediately.



## Manufacture quality guarantee

### 制造质量保证

宝钢股份采用国际先进的质量管理体系，主要产品均获得国际权威机构认可。公司获得了英国 BSI 公司颁发的质量、环保和安全综合管理体系证书 IMS ( ISO 9001、ISO/TS 16949、ISO 14001、ISO 18001 )、华夏认证中心 ( CCCI ) 颁发的 ISO14001 环境管理体系证书以及国家质量监督检验检疫总局颁发的完善计量检测体系证书并取得出口免验资格。钢管有关产品获得的认证证书主要有：

- 油管、套管、钻杆和管线管等油田用管材获得美国石油协会 API 颁发的 5CT、5D、Spec.7、5L 会标使用许可证；
- 船用管获得英国 LR、法国 BV、德国 GL、挪威 DNV、韩国的 KR 和中国 CCS 等六国船级社的认证证书；
- 锅炉管和结构管获得德国 TÜV 公司颁发的 TÜV 认证证书和 PED 认证证书；
- 结构管获得德国 TÜV 公司颁发的 Ü-Mark 证书。

Baosteel has been issued a registration certificate for its Integrated Management System as per TS 16949, BS EN ISO 9001:2000, BS EN ISO 14001:1996 and OHSAS 18001:1999 by British Standard Institution (BSI), a registration certificate of ISO14001 Environmental Management System by China Certification Center, Inc.(CCCI), a certificate for Perfecting the System of Inspection Measurement and Test by CSBTS.

Moreover, major tubular products of Baosteel Branch have gained certificates of registration as follows:

- Certificates of Authority to Use Official Monogram on its tubing, casing, drill pipe (with tool joint) and line pipe complying with API Specification 5CT, 5D, Spec.7 and 5L issued by American Petroleum Institute;
- Certificates of works and material approval given to tubes & pipes for ships by Lloyd's Register of Shipping (LR), Bureau Veritas France (BV), Germanischer Lloyd(GL), DET NORSKE VERITAS(DNV), KOREAN REGISTER OF SHIPPING(KR), and China Classification Society (CCS);
- A certificate according to AD-MERKBLATT W0/TRD100 and a certificate of Quality Assurance System in accordance with the Pressure Equipment Directive 97/23/EC (PED) issued to boiler tube and tube for structural purpose by TÜV SÜDDEUTSCHLAND;
- A Testing Certificate about Initial Type Testing of Construction Products (ÜHP) issued by TÜV.





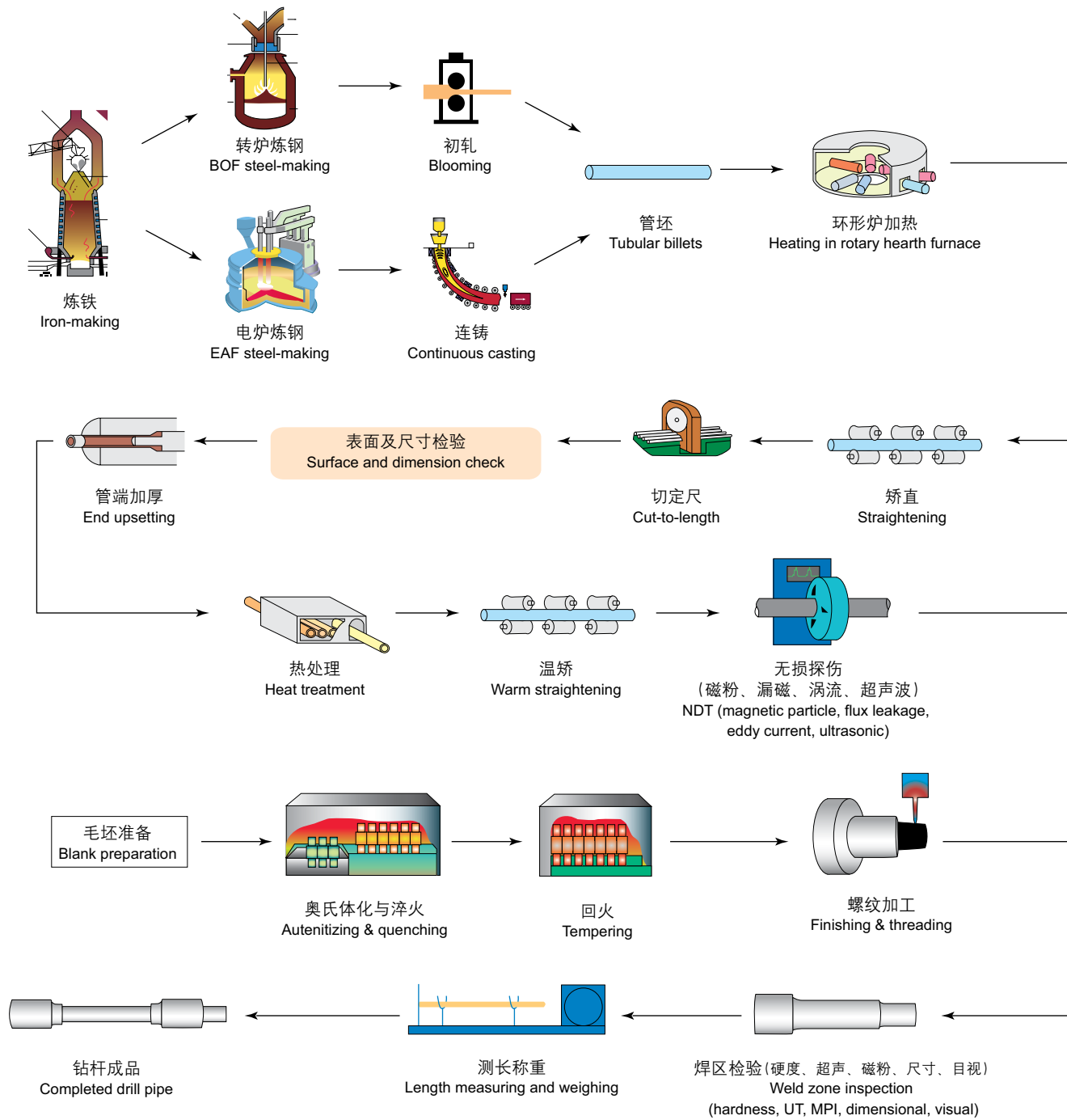


## Dril Pipe Product Manual

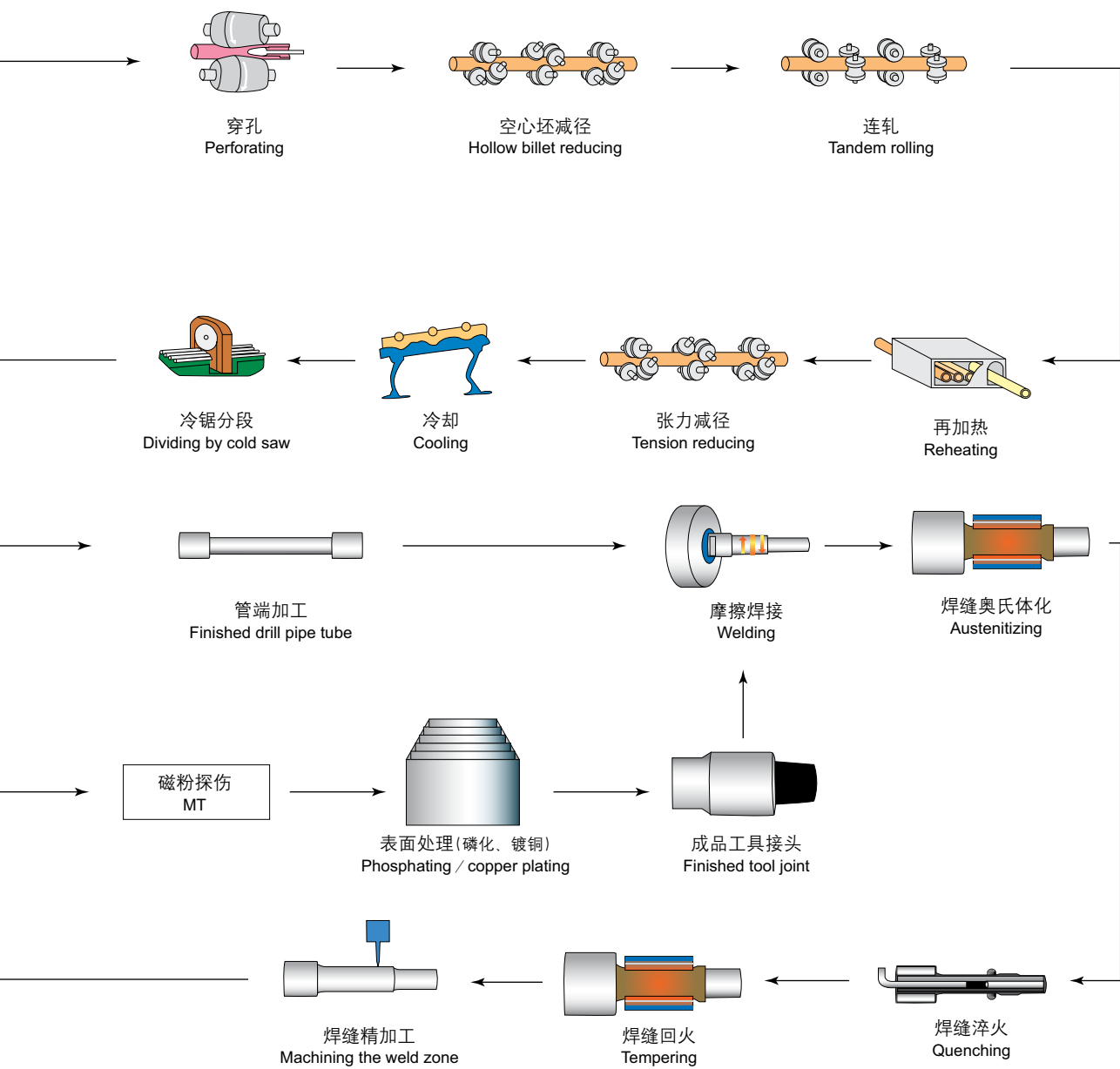


# Manufacture process

## 制造工艺流程









## Manufacture process characteristics

### 制造工艺特点

- 一体化生产

钻杆的生产工艺十分复杂,而从炼钢、连铸(模铸)、轧管、管端加厚、管体热处理、工具接头制造、摩擦对焊、焊缝热处理直至钻杆成品,全部由一个厂家完成的,国内仅宝钢一家。

#### Integrated production

The producing process of drill pipe is very complicated, and in China only Baosteel can complete the whole process from steel-making, continuous casting (die casting), tube rolling, pipe end upsetting, tube body heat treatment, tool joint manufacturing, friction welding, weld zone heat treatment till finished product of drill pipe in one manufacturer.

- 装备先进

#### State-of-the-art facilities



钻杆加厚  
Upsetting of drill pipe



钻杆热处理  
Heat treatment



钻杆摩擦焊  
Friction welding

- 钢质纯净

$S \leq 0.003\%$ ,  $P \leq 0.015\%$ , 实物质量达到纯净钢水平。

#### Pure steel quality

$S \leq 0.003\%$ ,  $P \leq 0.015\%$ , and the physical quality has reached pure steel level.

- 韧性优异

管体、加厚端、对焊区及公母接头冲击韧性均远高于 API 标准要求。

#### Excellent toughness

The absorbed energy of pipe body, upset end, weld zone, pin and box tool joint is far beyond the requirements of API standard.

- 优化的加厚结构

加厚过渡区 MIU 长度远大于 API 标准要求, 应力集中小, 疲劳寿命高。



长且平滑的内加厚过渡区  
Long and smooth taper of internal upset

#### Optimized upsetting structure

The MIU length of internal taper is far beyond the requirements of API standard, which provides small stress concentration and long lifetime.

- 直度严格

管体与加厚偏心度、管体与工具接头同轴度、钻杆全长直线度均远严于 API 标准要求。

#### Strict straightness

The eccentricity between the pipe body and upsetting part, the alignment between the pipe body and tool joint, and the full-length straightness of drill pipe are all far beyond the requirements of API standard.

# Product specification

## 产品规格

### 钢级规格

Available sizes and grades

外径 Size	名义重量 Nominal weight	壁厚的 名义值 Wall thickness	管体/Drill Pipe				接头/Tool Joint	
			加厚 形式 Upset	API 5D		BG系列 BG series	API	BGDS
				第1组 Group 1 E	第3组 Group 3 X G S			
in	lb/ft	in						
2 3/8	6.65	0.280	EU	*	*	*	NC26	BGDS26
2 7/8	10.40	0.362	EU	*	*	*	NC31	BGDS31
3 1/2	9.5	0.254	EU	*	*	*	NC38	BGDS38
	13.30	0.368	EU	*	*	*	NC38	BGDS38
	15.50	0.449	EU	*	*	*	NC40	BGDS40
4	14.00	0.330	IU	*	*	*	NC40	BGDS40
			EU	*	*	*	NC46	BGDS46
	15.70	0.380	IU	*	*	*	NC40	BGDS40
			EU	*	*	*	NC46	BGDS46
4 1/2	16.60	0.337	EU	*	*	*	NC50	BGDS50
			IEU	*	*	*	NC46	BGDS46
	20.00	0.430	EU	*	*	*	NC50	BGDS50
			IEU	*	*	*	NC46	BGDS46
5	19.50	0.362	IEU	*	*	*	NC50	BGDS50
							NC52	BGDS52
	25.60	0.500	IEU	*	*	*	5 1/2 FH	BGDS55
							NC50	BGDS50
5 1/2	21.90	0.361	IEU	*	*	*	5 1/2 FH	BGDS55
	24.70	0.415	IEU	*	*	*	5 1/2 FH	BGDS55
6 5/8	25.20	0.330	IEU	*	*	*	6 5/8 FH	BGDS65
	27.70	0.362	IEU	*	*	*	6 5/8 FH	BGDS65

### 接头互换性

Interchangeability of connections

数字接头/Number connection	等效接头/Equivalent connection
NC26	2 3/8 IF
NC31	2 7/8 IF
NC38	3 1/2 IF
NC40	4 FH
NC46	4 IF
NC50	4 1/2 IF



# Product chemical composition

## 产品化学成分

### 钻杆化学成分

Drill pipe chemical compositions

规范 Spec.	钢级 Grade	C	Si	Mn	P(Max.)	S(Max.)	Cr	Mo
API	E, X, G, S	-	-	-	0.015	0.003	-	-
	接头/Tool joint	-	-	-	0.015	0.003	-	-
BG系列 BG series	BGD150	-	-	-	0.015	0.003	-	-
	BGD95U	-	-	-	0.015	0.003	-	-
	BGD95MS	-	-	-	0.015	0.003	-	-
	BGD95SS	0.25~0.35	-	0.40~1.00	0.015	0.003	0.90~1.30	0.30~0.60
	BGD105MS	-	-	-	0.015	0.003	-	-
	BGD105SS	0.25~0.35	-	0.40~1.00	0.015	0.003	0.90~1.30	0.30~0.60
	BGD95SS							
	BGD105SS	0.25~0.35	-	≤1.00	0.015	0.003	0.70~1.30	0.40~0.70
	接头/Tool joint							
其余接头 Other tool joint	-	-	-	0.015	0.003	-	-	

# Product mechanical properties

## 产品机械性能

### 管体机械性能

#### Drill pipe mechanical properties

规范 Spec.	钢级 Grade		屈服强度 Yield strength		抗拉强度 Tensile strength	延伸率 Elongation	冲击韧性* Impact Value*	抗硫要求 SSC requirement
			Min.	Max.	Min.	Min.	Min.	
			ksi (MPa)	ksi (MPa)	ksi (MPa)	%	ft-lb (J)	
API 5D	第1组/Group 1	E-75	75 (517)	105 (724)	100 (689)	API formula	59 (80)	-
	第3组 Group 3	X-95	95 (655)	125 (862)	105 (724)	API formula	59 (80)	-
		G-105	105 (724)	135 (931)	115 (793)	API formula	59 (80)	-
		S-135	135 (931)	165 (1138)	145 (1000)	API formula	59 (80)	-
BG系列 BG series	高强度 High strength	BGD150	150 (1034)	165 (1138)	160 (1102)	API formula	59 (80)	-
	酸性环境 Sour Services	BGD95U	95 (655)	120 (827)	105 (724)	17%	74 (100)	-
		BGD95MS	95 (655)	110 (758)	105 (724)	17%	74 (100)	70%SMYS
		BGD95SS	95 (655)	110 (758)	105 (724)	17%	74 (100)	85%SMYS
		BGD105MS	105 (724)	120 (827)	115 (793)	17%	74 (100)	70%SMYS
		BGD105SS	105 (724)	120 (827)	115 (793)	17%	74 (100)	85%SMYS

\* 室温全尺寸纵向冲击韧性平均值

Minimum average impact energy of each set of three full size longitudinal specimens at room temperature.

### 接头机械性能

#### Tool joint mechanical properties

规范 Spec.	钢级 Grade		屈服强度 Yield strength		抗拉强度 Tensile strength	延伸率 Elongation	硬度 Hardness	冲击韧性* Impact Value*	抗硫要求 SSC requirement
			Min.	Max.	Min.	Min.		Min.	
			ksi (MPa)	ksi (MPa)	ksi (MPa)	%		ft-lb (J)	
API Spec 7	All		120 (827)	-	140 (965)	13	Min285HB	59 (80)	-
BG系列 BG series	高强度 High strength	BGD150	135 (931)	-	150 (1034)	13	Min285HB	59 (80)	-
	酸性环境 Sour Services	BGD95U	120 (827)	145 (1000)	130 (896)	13	Min285HB	66 (90)	-
		BGD95MS	110 (758)	125 (862)	125 (862)	13	Max32HRC	66 (90)	-
		BGD95SS	110 (758)	125 (862)	125 (862)	13	Max32HRC	66 (90)	65%SMYS
		BGD105MS	110 (758)	125 (862)	125 (862)	13	Max32HRC	66 (90)	-
		BGD105SS	110 (758)	125 (862)	125 (862)	13	Max32HRC	66 (90)	65%SMYS

\* 公接头：室温全尺寸纵向冲击韧性平均值

母接头：-10℃全尺寸横向冲击韧性平均值

\* Pin: Minimum average impact energy of each set of three full size longitudinal specimens at room temperature transverse specimens at -10℃ .

Box: Minimum average impact energy of each set of three full size transverse specimens at -10℃ .

# Product dimension and weight

## 产品尺寸及重量

### 加厚钻杆尺寸和重量 (第1组)

#### Upset dimensions and weights (Group 1)

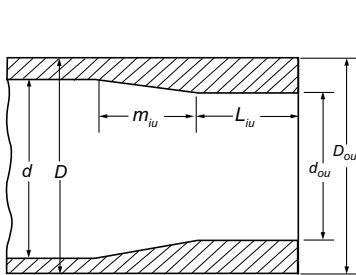
规格 Designations		管体 Pipe body			计算重量 Calculated weight		加厚尺寸 Upset dimensions								
外径 Size	名义重量 Nominal weight	外径 OD	壁厚 WT	内径 ID	平端 Plain end	加厚 Upset	外径 OD	管端 内径 ID at End of Pipe	内加厚 长度 Length of internal upset	内加厚 锥面长度 Length of internal taper	外加厚 长度 Length of external upset	外加厚 锥面长度 Length of external taper		管端至外加厚 消失处长度 Length end of pipe to taper fade out	
							+1/8 -1/32	±1/16	+1 1/2 - 1/2	Min.	Min.	Min.	Min.	Max.	
in	lb/ft	in	in	in	lb/ft	lb/ft	in	in	in	in	in	in	in	in	in
		D	t	d	w <sub>pe</sub>	e <sub>w</sub>	D <sub>ou</sub>	d <sub>ou</sub>	L <sub>iu</sub>	m <sub>iu</sub>	L <sub>eu</sub>	m <sub>eu</sub>	m <sub>eu</sub>	m <sub>eu</sub>	L <sub>eu</sub> +m <sub>eu</sub>
内加厚/Internal upset															
2 7/8	10.40	2.875	0.362	2.151	9.72	3.20	2.875	1 15/16	1 3/4	1 1/2	-	-	-	-	-
3 1/2	9.50	3.500	0.254	2.992	8.81	4.40	3.500	2 1/4	1 3/4	-	-	-	-	-	-
	13.30	3.500	0.368	2.764	12.31	4.40	3.500	1 15/16	1 3/4	1 1/2	-	-	-	-	-
	15.50	3.500	0.449	2.602	14.63	3.40	3.500	1 15/16	1 3/4	1 1/2	-	-	-	-	-
4	11.85	4.000	0.262	3.476	10.46	4.20	4.000	2 15/16	1 3/4	-	-	-	-	-	-
	14.00	4.000	0.330	3.340	12.93	4.60	4.250	2 3/4	1 3/4	2	-	-	-	-	-
4 1/2	13.75	4.500	0.271	3.958	12.24	5.20	4.750	3 3/8	1 3/4	-	-	-	-	-	-
5	16.25	5.000	0.296	4.408	14.87	6.60	5.000	3 3/4	1 3/4	-	-	-	-	-	-
外加厚/External upset															
2 3/8	6.65	2.375	0.280	1.815	6.26	1.80	2.656	1.815	-	-	1 1/2	1 1/2	-	-	4
2 7/8	10.40	2.875	0.362	2.151	9.72	2.40	3.219	2.151	-	-	1 1/2	1 1/2	-	-	4
3 1/2	9.50	3.500	0.254	2.992	8.81	2.60	3.938	2.992	-	-	1 1/2	1 1/2	-	-	4
	13.30	3.500	0.368	2.764	12.31	4.00	3.938	2.602	2 1/4	2	1 1/2	1 1/2	-	-	4
	15.50	3.500	0.449	2.602	14.63	2.80	3.938	2.602	-	-	1 1/2	1 1/2	-	-	4
4	11.85	4.000	0.262	3.476	10.46	5.00	4.500	3.476	-	-	1 1/2	1 1/2	-	-	4
	14.00	4.000	0.330	3.340	12.93	5.00	4.563	3.340	-	-	1 1/2	1 1/2	-	-	4
4 1/2	13.75	4.500	0.271	3.958	12.24	5.60	5.063	3.958	-	-	1 1/2	1 1/2	-	-	4
	16.60	4.500	0.337	3.826	14.98	5.60	5.063	3.826	-	-	1 1/2	1 1/2	-	-	4
	20.00	4.500	0.430	3.640	18.69	5.60	5.063	3.640	-	-	1 1/2	1 1/2	-	-	4



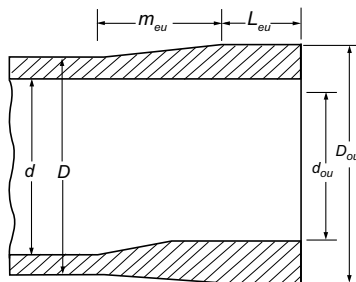
规格 Designations		管体 Pipe body			计算重量 Calculated weight		加厚尺寸 Upsetting dimension							
外径 Size	名义重量 Nominal weight	外径 OD	壁厚 WT	内径 ID	平端 Plain end	加厚 Upset	外径 OD	管端 内径 ID at End of Pipe	内加厚 长度 Length of internal upset	内加厚 锥面长度 Length of internal taper	外加厚 长度 Length of external upset	外加厚 锥面长度 Length of external taper	管端至外加厚 消失处长度 Length end of pipe to taper fade out	
							+1/8 -1/32	±1/16	+1 1/2 - 1/2	Min.	Min.	Min.	Min.	Max.
in	lb/ft	in	in	in	lb/ft	lb/ft	in	in	in	in	in	in	in	in
		D	t	d	w <sub>pe</sub>	e <sub>w</sub>	D <sub>ou</sub>	d <sub>ou</sub>	L <sub>iu</sub>	m <sub>iu</sub>	L <sub>eu</sub>	m <sub>eu</sub>	m <sub>eu</sub>	L <sub>eu</sub> +m <sub>eu</sub>

内外加厚/Internal-external upset

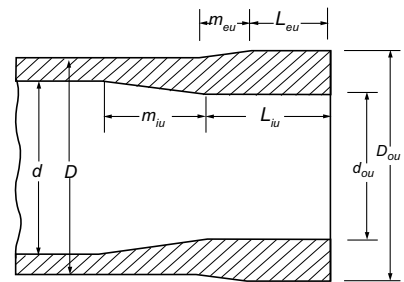
4 1/2	16.60	4.500	0.337	3.826	14.98	8.10	4.750	3 5/32	2 1/2	2	1 1/2	1	1 1/2	-
	20.00	4.500	0.430	3.640	18.69	8.60	4.781	3	2 1/4	2	1 1/2	1	1 1/2	-
5	19.50	5.000	0.362	4.276	17.93	8.60	5.188	3 11/16	2 1/4	2	1 1/2	1	1 1/2	-
	25.60	5.000	0.500	4.000	24.03	7.80	5.188	3 7/16	2 1/4	2	1 1/2	1	1 1/2	-
5 1/2	21.90	5.500	0.361	4.778	19.81	10.60	5.750	4	2 1/4	2	1 1/2	1	1 1/2	-
	24.70	5.500	0.415	4.670	22.54	9.00	5.750	4	2 1/4	2	1 1/2	1	1 1/2	-
6 5/8	25.20	6.625	0.330	5.965	22.19	25.87	7.000	5.315	4 1/2	2	3	-	-	5 1/2
	27.70	6.625	0.362	5.901	24.21	24.00	7.000	5.315	4 1/2	2	3	-	-	5 1/2



内加厚  
Internal upset



外加厚  
External upset



内外加厚  
Internal-external upset

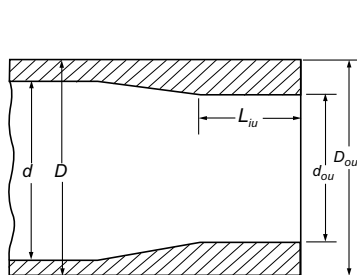
# Product dimension and weight

## 产品尺寸及重量

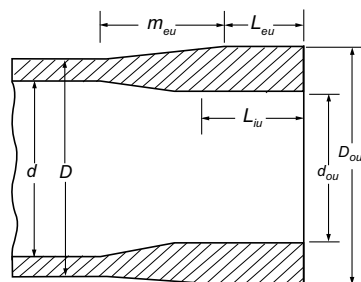
### 加厚钻杆尺寸和重量 (第3组)

#### Upset dimensions and weights (Group 3)

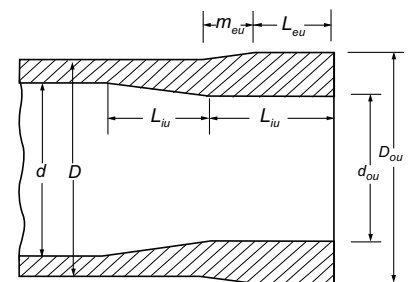
规格 Designations		管体 Pipe body			计算重量 Calculated weight		加厚尺寸 Upset dimensions					
外径 Size	名义重量 Nominal weight	外径 OD	壁厚 WT	内径 ID	平端 Plain end	加厚 Upset	外径 OD	管端内径 ID at End of Pipe	内加厚长度 Length of internal upset	内加厚 锥面长度 Length of internal taper	外加厚 锥面长度 Length of external taper	管端至外加厚 消失处长 Length end of pipe to taper fade out
							+1/8 -1/32	±1/16	+1 1/2 - 1/2	Min.	Min.	Max.
in	lb/ft	in	in	in	lb/ft	lb/ft	in	in	in	in	in	in
		D	t	d	w <sub>pe</sub>	e <sub>w</sub>	D <sub>ou</sub>	d <sub>ou</sub>	L <sub>iu</sub>	m <sub>iu</sub>	L <sub>eu</sub>	L <sub>eu</sub> +m <sub>eu</sub>
内加厚/Internal upset												
2 7/8	10.40	2.875	0.362	2.151	9.72	5.40	2.875	1 5/16	3 1/2	-	-	-
3 1/2	13.30	3.500	0.368	2.764	12.31	7.40	3.500	1 15/16	3 1/2	-	-	-
4	14.00	4.000	0.330	3.340	12.93	8.80	4.250	2 5/8	3 1/2	-	-	-
5	16.25	5.000	0.296	4.408	14.87	13.60	5.000	3 9/16	3 1/2	-	-	-
外加厚/External upset												
2 3/8	6.65	2.375	0.280	1.815	6.26	4.60	2.656	1 9/16	4 1/4	-	3	5 1/2
2 7/8	10.40	2.875	0.362	2.151	9.72	6.20	3.250	1 15/16	4 1/4	-	3	5 1/2
3 1/2	13.30	3.500	0.368	2.764	12.31	10.20	4.000	2 1/2	4 1/4	-	3	5 1/2
	15.50	3.500	0.449	2.602	14.63	8.20	4.000	2 1/2	4 1/4	-	3	5 1/2
4	14.00	4.000	0.330	3.340	12.93	14.40	4.625	3 1/16	4 1/4	-	3	5 1/2
4 1/2	16.60	4.500	0.337	3.826	14.98	17.20	5.188	3 9/16	4 1/4	-	3	5 1/2
	20.00	4.500	0.430	3.640	18.69	16.00	5.188	3 7/16	4 1/4	-	3	5 1/2
5	19.50	5.000	0.362	4.276	17.93	21.60	5.750	3 15/16	4 1/4	-	3	5 1/2
	25.60	5.000	0.500	4.000	24.03	21.20	5.875	3 13/16	4 1/4	-	3	5 1/2
内外加厚/Internal-external upset												
3 1/2	15.50	3.500	0.449	2.602	14.63	11.00	3.781	1 15/16	4 1/4	-	3	5 1/2
4 1/2	16.60	4.500	0.337	3.826	14.98	8.70	4.750	2 7/8	2 1/4	3	1 1/2	3
	20.00	4.500	0.430	3.640	18.69	17.60	4.781	2 13/16	4 1/4	3	3	5 1/2
5	19.50	5.000	0.362	4.276	17.93	16.80	5.188	3 9/16	4 1/4	3	3	5 1/2
	25.60	5.000	0.500	4.000	24.03	15.40	5.188	3 5/16	4 1/4	3	3	5 1/2
5 1/2	21.90	5.500	0.361	4.778	19.81	21.00	5.750	3 13/16	4 1/4	3	3	5 1/2
	24.70	5.500	0.415	4.670	22.54	18.40	5.750	3 13/16	4 1/4	3	3	5 1/2
6 5/8	25.20	6.625	0.330	5.965	22.19	25.87	7.000	5.315	4 1/2	3	3	5 1/2
	27.70	6.625	0.362	5.901	24.21	24.00	7.000	5.315	4 1/2	3	3	5 1/2



内加厚  
Internal upset



外加厚  
External upset



内外加厚  
Internal-external upset

工具接头尺寸 (第1组和第3组)

Tool joint dimensions (Groups 1 & 3)

工具接头规格 Tool joint designation	管体 Drill Pipe		钢级 Grade	公母接头外径 OD of pin and box	公接头内径 ID of pin	公母接头台肩倒角直径 Bevel DIA. of pin and box shoulder	公接头长度 Total length tool joint pin	公接头大钳长度 Pin tong space	母接头大钳长度 Box tong space	公母接头组合长度 Combined length of pin and box	公接头焊接端直径 Dia. of pin at elevator upset	母接头焊接端直径 Dia. of box at elevator upset	公接头与钻杆管体的扭转强度比 Torsional ratio, pin to drill pipe	
	外径和加厚类型 Size and style	名义重量 Nominal weight		±1/32	+1/64 - 1/32	±1/64	+1/4 - 3/8	±1/4	±1/4	±1/2	Max.	Max.		
	in	lb/ft		in	in	in	in	in	in	in	in	in		
	D			D	d	D <sub>F</sub>	L <sub>P</sub>	L <sub>PB</sub>	L <sub>B</sub>	L	D <sub>PE</sub>	D <sub>TE</sub>		
NC26	2 3/8 EU	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 7/8 EU	10.40	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 1/2 EU	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	3 1/2 EU	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	
	4 IU	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	4 EU	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 1/2 IU	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 1/2 IEU	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	



# Product dimension and weight

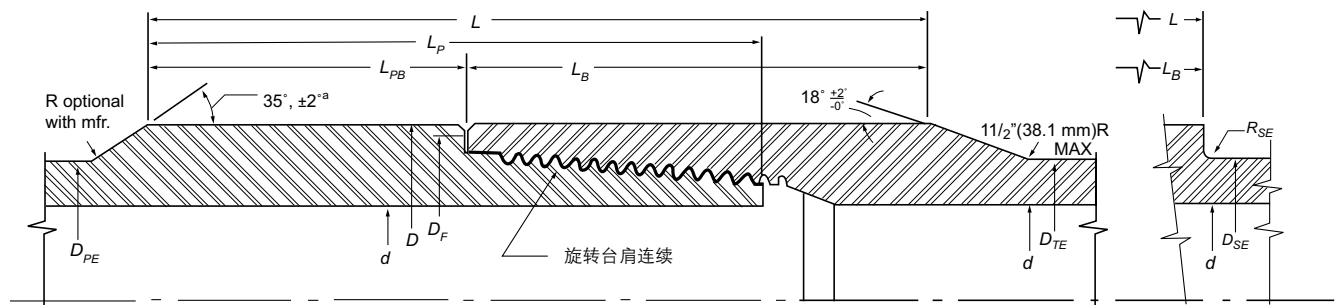
## 产品尺寸及重量

工具接头尺寸 (第1组和第3组)

Tool joint dimensions (Groups 1 & 3)

工具接头规格 Tool joint designation	管体 Drill Pipe		钢级 Grade	公母接头外径 OD of pin and box	公接头内径 ID of pin	公母接头台肩倒角直径 Bevel DIA. of pin and box shoulder	公接头长度 Total length tool joint pin	公接头大钳长度 Pin tong space	母接头大钳长度 Box tong space	公母接头组合长度 Combined length of pin and box	公接头焊接端直径 Dia. of pin at elevator upset	母接头焊接端直径 Dia. of box at elevator upset	公接头与钻杆管体的扭转强度比 Torsional ratio, pin to drill pipe
	外径和加厚类型 Size and style	名义重量 Nominal weight		±1/32	+1/64 - 1/32	±1/64	+1/4 - 3/8	±1/4	±1/4	±1/2	Max.	Max.	
	in	lb/ft		in	in	in	in	in	in	in	in	in	
	D			D	d	D <sub>F</sub>	L <sub>P</sub>	L <sub>PB</sub>	L <sub>B</sub>	L	D <sub>PE</sub>	D <sub>TE</sub>	
NC46	4 1/2 IEU	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
NC50	4 1/2 EU	13.75	E75	6 5/8	3 7/8	6 1/16	11 1/2	7	10	17	5	5	1.32
			X95	6 5/8	3 3/4	6 1/16	11 1/2	7	10	17	5	5	1.23
		16.60	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
	20.00	S135	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5	5	0.81	
		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	
	5 IEU	19.50	S135	6 5/8	3	6 1/16	11 1/2	7	10	17	5	5	0.87
			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
25.60		S135	6 5/8	2 3/4	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.86	
		E75	6 5/8	3 1/2	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.86	
5 1/2FH	5 IEU	19.50	X95	6 5/8	3	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.86
			G105	6 5/8	2 3/4	6 1/16	11 1/2	7	10	17	5 1/8	5 1/8	0.87
		25.60	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
	5 IEU	19.50	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
5 IEU	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	

工具接头规格 Tool joint designation	管体 Drill Pipe		钢级 Grade	公母接头外径 OD of pin and box	公接头内径 ID of pin	公母接头台肩倒角直径 Bevel DIA. of pin and box shoulder	公接头长度 Total length tool joint pin	公接头大钳长度 Pin tong space	母接头大钳长度 Box tong space	公母接头组合长度 Combined length of pin and box	公接头焊接端直径 Dia. of pin at elevator upset	母接头焊接端直径 Dia. of box at elevator upset	公接头与钻杆管体的扭转强度比 Torsional ratio, pin to drill pipe
	外径和加厚类型 Size and style	名义重量 Nominal weight		$\pm 1/32$	$+1/64 - 1/32$	$\pm 1/64$	$+1/4 - 3/8$	$\pm 1/4$	$\pm 1/4$	$\pm 1/2$	Max.	Max.	
	in	lb/ft		in	in	in	in	in	in	in	in	in	
	D			D	d	D <sub>F</sub>	L <sub>P</sub>	L <sub>PB</sub>	L <sub>B</sub>	L	D <sub>PE</sub>	D <sub>TE</sub>	
5 1/2 FH	5 IEU	25.60	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
	5 1/2 IEU	21.90	E75	7	4	6 23/32	13	8	10	18	5 11/16	5 11/16	1.11
			X95	7	3 3/4	6 23/32	13	8	10	18	5 11/16	5 11/16	0.98
			G105	7 1/4	3 1/2	6 23/32	13	8	10	18	5 11/16	5 11/16	1.02
			S135	7 1/2	3	7 3/32	13	8	10	18	5 11/16	5 11/16	0.96
		24.70	E75	7	4	6 23/32	13	8	10	18	5 11/16	5 11/16	0.99
			X95	7 1/4	3 1/2	6 23/32	13	8	10	18	5 11/16	5 11/16	1.01
			G105	7 1/4	3 1/2	6 23/32	13	8	10	18	5 11/16	5 11/16	0.92
			S135	7 1/2	3	7 3/32	13	8	10	18	5 11/16	5 11/16	0.86
6 5/8 FH	6 5/8 IEU	25.20	E75	8	5	7 45/64	13	8	11	19	6 15/16	6 15/16	1.04
			X95	8	5	7 45/64	13	8	11	19	6 15/16	6 15/16	0.82
			G105	8 1/4	4 3/4	7 45/64	13	8	11	19	6 15/16	6 15/16	0.87
			S135	8 1/2	4 1/4	7 45/64	13	8	11	19	6 15/16	6 15/16	0.86
	6 5/8 IEU	27.70	E75	8	5	7 45/64	13	8	11	19	6 15/16	6 15/16	0.96
			X95	8 1/4	4 3/4	7 45/64	13	8	11	19	6 15/16	6 15/16	0.89
			G105	8 1/4	4 3/4	7 45/64	13	8	11	19	6 15/16	6 15/16	0.81
			S135	8 1/2	4 1/4	7 45/64	13	8	11	19	6 15/16	6 15/16	0.80



# Technical guide to application

## 用户使用技术指南

### 新钻杆使用性能(第1组与第3组)

New drill pipe torsional, tensile, collapse and internal pressure (Groups 1&3)

外径 Size	名义重量 Nominal weight	钢级 Grade	平端重量 Plain end weight	壁厚 Wall thickness	内径 ID	管体截面积 Section area of pipe body	截面模量 Polar sectional modulus	扭转屈服强度 Torsional yield strength	拉伸屈服强度 Tensile yield strength	外挤 Collapse pressure	内压 Internal pressure
in	lb/ft		lb/ft	in	in	sq in	cu in	lb/ft	lb	psi	psi
2 3/8	6.65	E75	6.26	0.280	1.815	1.8429	1.733	6250	138210	15600	15470
		X95	6.26	0.280	1.815	1.8429	1.733	7920	175070	19760	19600
		G105	6.26	0.280	1.815	1.8429	1.733	8750	193500	21840	21600
		S135	6.26	0.280	1.815	1.8429	1.733	11250	248790	28080	27850
2 7/8	10.40	E75	9.72	0.362	2.151	2.8579	3.204	11550	214340	16510	16530
		X95	9.72	0.362	2.151	2.8579	3.204	14640	271500	20910	20930
		G105	9.72	0.362	2.151	2.8579	3.204	16180	300080	23110	23140
		S135	9.72	0.362	2.151	2.8579	3.204	20800	385820	29720	29750
3 1/2	9.5	E75	8.81	0.254	2.992	2.5902	3.923	14150	194260	10000	9530
		X95	8.81	0.254	2.992	2.5902	3.923	17920	246070	12080	12070
		G105	8.81	0.254	2.992	2.5902	3.923	19800	271970	13060	13340
		S135	8.81	0.254	2.992	2.5902	3.923	25460	349680	15740	17150
	13.30	E75	12.31	0.368	2.764	3.6209	5.144	18550	271570	14110	13800
		X95	12.31	0.368	2.764	3.6209	5.144	23500	343990	17880	17480
		G105	12.31	0.368	2.764	3.6209	5.144	25970	380200	19760	19320
		S135	12.31	0.368	2.764	3.6209	5.144	33390	488820	25400	24840
	15.50	E75	14.63	0.449	2.602	4.3037	5.847	21090	322770	16770	16840
		X95	14.63	0.449	2.602	4.3037	5.847	26710	408850	21250	21300
		G105	14.63	0.449	2.602	4.3037	5.847	29520	451880	23480	23570
		S135	14.63	0.449	2.602	4.3037	5.847	37950	580990	30190	30310
4	14.00	E75	12.93	0.330	3.340	3.8048	6.458	23290	285360	11350	10830
		X95	12.93	0.330	3.340	3.8048	6.458	29500	361450	14380	13720
		G105	12.93	0.330	3.340	3.8048	6.458	32600	399500	15900	15160
		S135	12.93	0.330	3.340	3.8048	6.458	41920	513650	20140	19490



外径 Size	名义重量 Nominal weight	钢级 Grade	平端重量 Plain end weight	壁厚 Wall thickness	内径 ID	管体截面积 Section area of pipe body	截面模量 Polar sectional modulus	扭转屈服强度 Torsional yield strength	拉伸屈服强度 Tensile yield strength	外挤 Collapse pressure	内压 Internal pressure
in	lb/ft		lb/ft	in	in	sq in	cu in	lb/ft	lb	psi	psi
4	15.70	E75	14.69	0.380	3.240	4.3216	7.157	25810	324120	12900	12470
		X95	14.69	0.380	3.240	4.3216	7.157	32690	410550	16340	15790
		G105	14.69	0.380	3.240	4.3216	7.157	36130	453770	18050	17460
		S135	14.69	0.380	3.240	4.3216	7.157	46460	583410	23210	22440
4 1/2	13.75	E75	12.24	0.271	3.958	3.6005	7.184	25910	270030	7170	7900
		X95	12.24	0.271	3.958	3.6005	7.184	32820	342040	8410	10010
		G105	12.24	0.271	3.958	3.6005	7.184	36270	378050	8960	11070
		S135	12.24	0.271	3.958	3.6005	7.184	46630	486060	10280	14230
	16.60	E75	14.98	0.337	3.826	4.4074	8.543	30810	330560	10390	9830
		X95	14.98	0.337	3.826	4.4074	8.543	39020	418710	12760	12450
		G105	14.98	0.337	3.826	4.4074	8.543	43130	462780	13820	13760
		S135	14.98	0.337	3.826	4.4074	8.543	55450	595000	16770	17690
	20.00	E75	18.69	0.430	3.640	5.4981	10.232	36900	412360	12960	12540
		X95	18.69	0.430	3.640	5.4981	10.232	46740	522320	16420	15890
		G105	18.69	0.430	3.640	5.4981	10.232	51660	577300	18150	17560
		S135	18.69	0.430	3.640	5.4981	10.232	66420	742240	23330	22580
5	16.25	E75	14.87	0.296	4.408	4.3743	9.718	35040	328070	6940	7770
		X95	14.87	0.296	4.408	4.3743	9.718	44390	415560	8110	9840
		G105	14.87	0.296	4.408	4.3743	9.718	49060	459300	8620	10880
		S135	14.87	0.296	4.408	4.3743	9.718	63080	590530	9830	13990
	19.50	E75	17.93	0.362	4.276	5.2746	11.415	41170	395590	9960	9500
		X95	17.93	0.362	4.276	5.2746	11.415	52140	501090	12020	12040
		G105	17.93	0.362	4.276	5.2746	11.415	57630	553830	13000	13300
		S135	17.93	0.362	4.276	5.2746	11.415	74100	712070	15670	17100

# Technical guide to application

## 用户使用技术指南

外径 Size	名义重量 Nominal weight	钢级 Grade	平端重量 Plain end weight	壁厚 Wall thickness	内径 ID	管体截面积 Section area of pipe body	截面模量 Polar sectional modulus	扭转屈服强度 Torsional yield strength	拉伸屈服强度 Tensile yield strength	外挤 Collapse pressure	内压 Internal pressure
in	lb/ft		lb/ft	in	in	sq in	cu in	lb/ft	lb	psi	psi
5	25.60	E75	24.03	0.500	4.000	7.0686	14.491	52260	530140	13500	13130
		X95	24.03	0.500	4.000	7.0686	14.491	66190	671520	17100	16630
		G105	24.03	0.500	4.000	7.0686	14.491	73160	742200	18900	18380
		S135	24.03	0.500	4.000	7.0686	14.491	94060	954260	24300	23630
5 1/2	21.90	E75	19.81	0.361	4.778	5.8282	14.062	50710	437120	8410	8610
		X95	19.81	0.361	4.778	5.8282	14.062	64230	553680	10020	10910
		G105	19.81	0.361	4.778	5.8282	14.062	70990	611960	10750	12060
		S135	19.81	0.361	4.778	5.8282	14.062	91280	786810	12670	15510
	24.70	E75	22.54	0.415	4.670	6.6296	15.688	56570	497220	10460	9900
		X95	22.54	0.415	4.670	6.6296	15.688	71660	629810	12930	12540
		G105	22.54	0.415	4.670	6.6296	15.688	79200	696110	14010	13860
		S135	22.54	0.415	4.670	6.6296	15.688	101830	895000	17020	17830
6 5/8	25.20	E75	22.19	0.330	5.965	6.5262	19.572	70580	489460	4790	6540
		X95	22.19	0.330	5.965	6.5262	19.572	79400	619990	5320	8280
		G105	22.19	0.330	5.965	6.5262	19.572	98810	685250	5500	9150
		S135	22.19	0.330	5.965	6.5262	19.572	127040	881040	6040	11770
	27.70	E75	24.21	0.362	5.901	7.1227	21.156	76300	534200	5890	7170
		X95	24.21	0.362	5.901	7.1227	21.156	96640	676650	6760	9080
		G105	24.21	0.362	5.901	7.1227	21.156	106810	747880	7100	10040
		S135	24.21	0.362	5.901	7.1227	21.156	137330	961560	7810	12910

新钻杆和工具接头使用性能(第1组)

New drill pipe and tool joint mechanical properties (Group 1)

钻杆管体 Drill pipe body				工具接头 Tool joint			通径 Drift diameter	机械性能 Mechanical properties			
名义外径 Nominal size	名义重量 Nominal weight	大约重量 Approx. weight	加厚类型 Upset type	扣型 Connection	外径 OD	内径 ID		拉伸屈服强度 Tensile yield		扭转屈服强度 Torsional yield	
								管体 Pipe	工具接头 Tool joint	管体 Pipe	工具接头 Tool joint
in	lb/ft	lb/ft			in	in	in	lb	lb	ft-lb	ft-lb
2 3/8	6.65	6.99	EU	NC26	3 3/8	1 3/4	1.625	138214	313681	6250	6875b
2 7/8	10.40	10.87	EU	NC31	4 1/8	2 1/8	1.963	214344	447130	11554	12053p
3 1/2	9.5	10.58	EU	NC38	4 3/4	2 11/16	2.563	194264	587308	14146	18107p
	13.30	13.93	EU	NC38	4 3/4	2 11/16	2.457	271569	587308	18551	18107p
	15.50	16.54	EU	NC38	5	2 9/16	2.414	322775	649158	21086	20326p
4	14.00	15.04	IU	NC40	5 1/4	2 13/16	2.688	285359	711611	23288	23487p
	15.70	16.80	IU	NC40	5 1/4	2 11/16	2.563	324118	776406	25810	25673p
4 1/2	13.75	15.36	EU	NC50	6 5/8	3 3/4	3.625	270034	939096	25907	37676p
	16.60	17.95	EU	NC50	6 5/8	3 3/4	3.625	330558	939096	30807	37676p
		18.37	IEU	NC46	6 1/4	3 1/4	3.125	330558	901164	30807	33993p
	20.00	21.59	EU	NC50	6 5/8	3 5/8	3.452	412358	1025980	36901	41235p
		22.09	IEU	NC46	6 1/4	3	2.875	412358	1048426	36901	39659p
5	19.50	22.28	IEU	5 1/2 FH	7	3 3/4	3.625	395595	1448407	41167	60338b
		20.85	IEU	NC50	6 5/8	3 3/4	3.625	395595	939095	41167	37676p
	25.60	28.27	IEU	5 1/2 FH	7	3 1/2	3.375	530144	1619231	52257	60338b
		26.85	IEU	NC50	6 5/8	3 1/2	3.375	530144	1109920	52257	44673p
5 1/2	21.90	23.78	IEU	5 1/2 FH	7	4	3.875	437116	1265802	50710	56045p
	24.70	26.30	IEU	5 1/2 FH	7	4	3.875	497222	1265802	56574	56045p
6 5/8	25.20	27.28	IEU	6 5/8 FH	8	5	4.875	489464	1447697	70580	73620p
	27.70	29.06	IEU	6 5/8 FH	8	5	4.875	534198	1447697	76295	73620p

# Technical guide to application

## 用户使用技术指南

### 新钻杆和工具接头使用性能(第3组)

New drill pipe and tool joint mechanical properties (Group 3)

钻杆管体 Drill pipe body				工具接头 Tool joint			通径 Drift diameter	机械性能 Mechanical properties			
名义外径 Nominal size	名义重量 Nominal weight	大约重量 Approx. weight	加厚类型 与钢级 Upset type & grade	扣型 Connection	外径 OD	内径 ID		拉伸屈服强度 Tensile yield		扭转屈服强度 Torsional yield	
								管体 Pipe	工具接头 Tool joint	管体 Pipe	工具接头 Tool joint
in	lb/ft	lb/ft			in	in	in	lb	lb	ft-lb	ft-lb
2 3/8	6.65	7.11	EU X95	NC26	3 3/8	1 3/4	1.625	175072	313681	7917	6875b
		7.11	EU G105	NC26	3 3/8	1 3/4	1.625	193500	313681	8751	6875b
2 7/8	10.40	11.09	EU X95	NC31	4 1/8	2	1.875	271503	495726	14635	13389p
		11.09	EU G105	NC31	4 1/8	2	1.875	300082	495726	16176	13389p
		11.55	EU S135	NC31	4 3/8	1 5/8	1.500	385820	623844	20798	17170p
3 1/2	13.30	14.62	EU X95	NC38	5	2 9/16	2.438	343988	649158	23498	20326p
		14.71	EU G105	NC38	5	2 7/16	2.313	380197	708603	25972	22213p
		14.92	EU S135	NC38	5	2 1/8	2.000	488825	842440	33392	26515p
	15.50	16.82	EU X95	NC38	5	2 7/16	2.313	408848	708063	26708	22213p
		17.03	EU G105	NC38	5	2 1/8	2.000	451885	842440	29520	26515p
		17.57	EU S135	NC40	5 1/2	2 1/4	2.125	580995	979996	37954	32943p
4	14.00	15.34	IU X95	NC40	5 1/4	2 11/16	2.563	361454	776406	29498	25673p
		16.19	EU X95	NC46	6	3 1/4	3.125	361454	901164	29498	33625p
		15.91	IU G105	NC40	5 1/2	2 7/16	2.313	399502	897161	32603	30114p
		16.19	EU G105	NC46	6	3 1/4	3.125	399502	901164	32603	33625p
		16.19	IU S135	NC40	5 1/2	2	1.875	513646	1080135	41918	36363p
		16.42	EU S135	NC46	6	3	2.875	513646	1048426	41918	39229p
	15.70	17.52	IU X95	NC40	5 1/2	2 7/16	2.313	410550	897161	32692	30114p
		17.80	EU X95	NC46	6	3 1/4	3.125	410550	901164	32692	33625p
		17.52	IU G105	NC40	5 1/2	2 7/16	2.313	453765	897161	36134	30114p
		17.80	EU G105	NC46	6	3 1/4	3.125	453765	901164	36134	33625p
		18.02	EU S135	NC46	6	3	2.875	583413	1048426	46458	39229p
4 1/2	16.60	18.36	EU X95	NC50	6 5/8	3 3/4	3.625	418707	939095	39022	37676p
		18.79	IEU X95	NC46	6 1/4	3	2.875	418707	1048426	39022	39659p
		18.36	EU G105	NC50	6 5/8	3 3/4	3.625	462781	939095	43130	37676p
		18.79	IEU G105	NC46	6 1/4	3	2.875	462781	1048426	43130	39659p
		18.62	EU S135	NC50	6 5/8	3 1/2	3.375	595004	1109920	55453	44673p
		19.00	IEU S135	NC46	6 1/4	2 3/4	2.625	595004	1183908	55453	44871p



钻杆管体 Drill pipe body				工具接头 Tool joint			通径 Drift diameter	机械性能 Mechanical properties			
名义外径 Nominal size	名义重量 Nominal weight	大约重量 Approx. weight	加厚类型 与钢级 Upset type & grade	扣型 Connection	外径 OD	内径 ID		拉伸屈服强度 Tensile yield		扭转屈服强度 Torsional yield	
								管体 Pipe	工具接头 Tool joint	管体 Pipe	工具接头 Tool joint
in	lb/ft	lb/ft			in	in	in	lb	lb	ft-lb	ft-lb
4 1/2	20.00	22.08	EU X95	NC50	6 5/8	3 1/2	3.375	522320	1109920	46741	44673p
		22.67	IEU X95	NC46	6 1/4	2 3/4	2.625	522320	1183908	46741	44871p
		22.08	EU G105	NC50	6 5/8	3 1/2	3.375	577301	1109920	51661	44673p
		22.86	IEU G105	NC46	6 1/4	2 1/2	2.375	577301	1307608	51661	49630p
		23.03	EU S135	NC50	6 5/8	3	2.875	742244	1416225	66421	57800p
		23.03	IEU S135	NC46	6 1/4	2 1/4	2.125	742244	1419527	66421	53936p
5	19.50	22.62	IEU X95	5 1/2 FH	7	3 3/4	3.625	501087	1448407	52144	60338b
		21.45	IEU X95	NC50	6 5/8	3 1/2	3.375	501087	1109920	52144	44673p
		22.62	IEU G105	5 1/2 FH	7	3 3/4	3.625	553833	1448407	57633	60338b
		21.93	IEU G105	NC50	6 5/8	3 1/4	3.125	553833	1268963	57633	51447p
		23.48	IEU S135	5 1/2 FH	7 1/4	3 1/2	3.375	712070	1619231	74100	72627p
		22.61	IEU S135	NC50	6 5/8	2 3/4	2.625	712070	1551706	74100	63406p
	25.60	28.59	IEU X95	5 1/2 FH	7	3 1/2	3.375	671515	1619231	66192	60338b
		27.87	IEU X95	NC50	6 5/8	3	2.875	671515	1416225	66192	56984b
		29.16	IEU G105	5 1/2 FH	7 1/4	3 1/2	3.375	742201	1619231	73159	72627b
		28.32	IEU G105	NC50	6 5/8	2 3/4	2.625	742201	1551706	73159	63406b
29.43		IEU S135	5 1/2 FH	7 1/4	3 1/4	3.125	954259	1778274	94062	76156b	
5 1/2	21.90	24.53	IEU X95	5 1/2 FH	7	3 3/4	3.625	553681	1448407	64233	60338b
		25.38	IEU G105	5 1/2 FH	7 1/4	3 1/2	3.375	611963	1619231	70994	72627p
		26.50	IEU S135	5 1/2 FH	7 1/2	3	2.875	786809	1925536	91278	87341p
	24.70	27.85	IEU X95	5 1/2 FH	7 1/4	3 1/2	3.375	629814	1619231	71660	72627p
		27.85	IEU G105	5 1/2 FH	7 1/4	3 1/2	3.375	696111	1619231	79204	72627p
		27.77	IEU S135	5 1/2 FH	7 1/2	3	2.875	894999	1925536	101833	87341p
6 5/8	25.20	27.15	IEU X95	6 5/8 FH	8	5	4.875	619988	1448416	89402	73661p
		28.20	IEU G105	6 5/8 FH	8 1/4	4 3/8	4.625	685250	1678145	98812	86237p
		29.63	IEU S135	6 5/8 FH	8 1/2	4 1/4	4.125	881035	2102260	127044	109226p
	27.70	30.11	IEU X95	6 5/8 FH	8 1/4	4 3/4	4.625	676651	1678145	96640	86237p
		30.11	IEU G105	6 5/8 FH	8 1/4	4 3/4	4.625	747250	1678145	106813	86237p
		31.54	IEU S135	6 5/8 FH	8 1/2	4 1/4	4.125	961556	2102260	137330	109226p

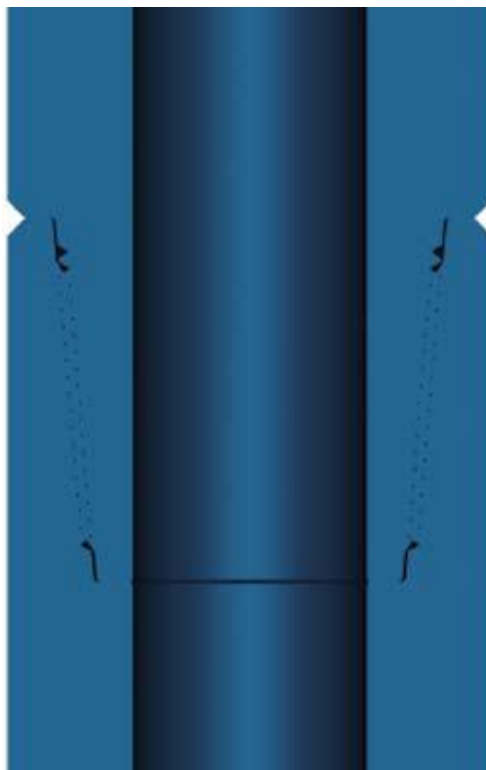


## BGDS high torque tool joint

### BGDS 高抗扭接头

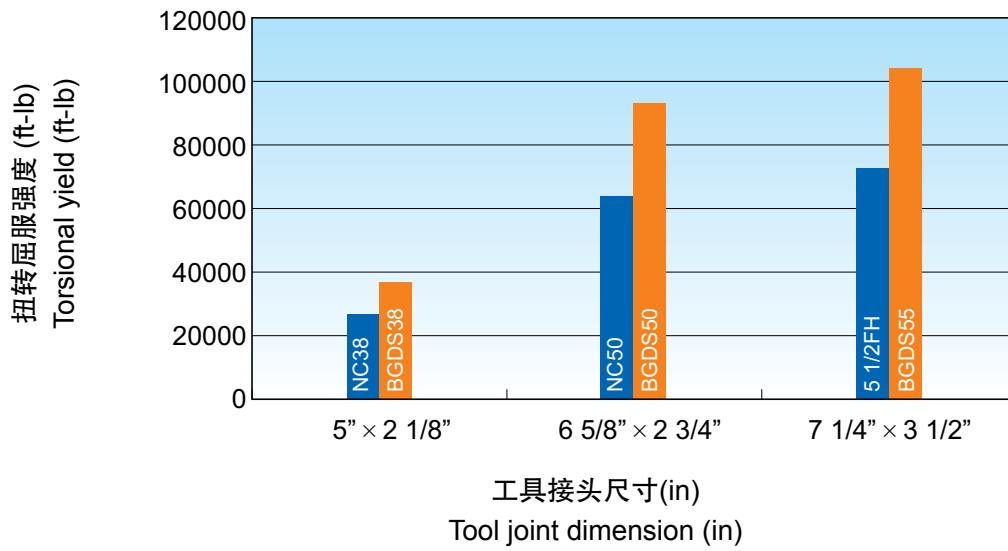
BGDS 是一种高抗扭钻杆接头。它采用双台肩设计，可以与 API 接头互换使用。BGDS 接头的抗扭强度比 API 接头提高 30% 左右，主要用于定向井、水平井、深井及超深井等苛刻井的钻探施工。

BGDS is a high torque connection, fully interchangeable with API connection but incorporating a double-shoulder design. The additional torsional strength provided by the high torque connection design, offers improvements in difficult well conditions.

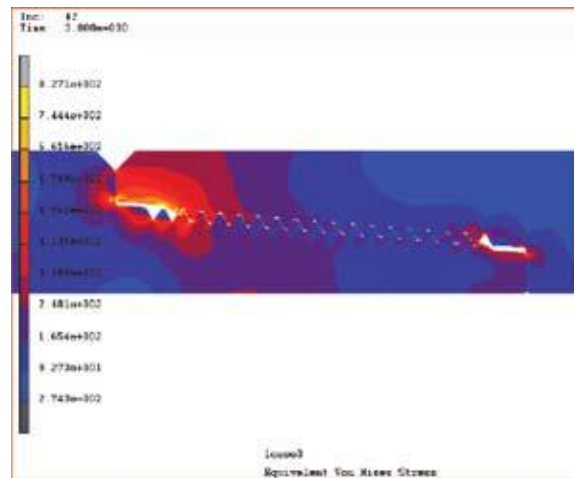
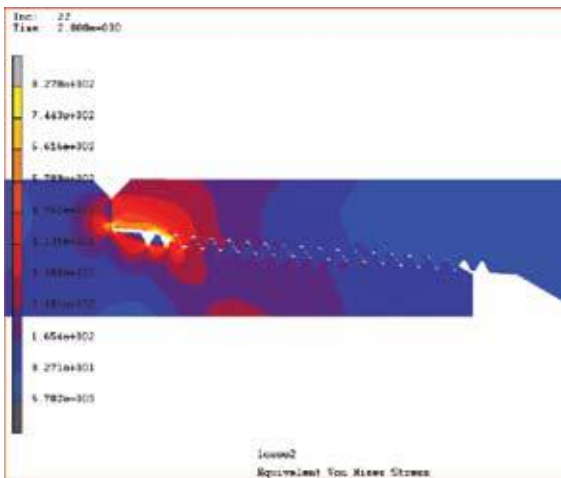


- 可以与 API 接头互换使用
- 抗扭强度比 API 接头更高
- 与 API 接头上扣速度一致
- 抗扭强度与 API 接头相同的条件下，循环压耗更小
- 降级前可允许更多的外径磨损
- 真正的公母内表齐平接头
- Interchangeability with API
- High torque resistance compared to API
- Same handling speed as API
- Less pressure drop for same torque capacity than API
- More OD wear before down grading
- Flush ID connector

扭转屈服强度 BGDS 与 API 工具接头对比  
Torsional yield strength BGDS vs API tool joint



有限元分析  
FEA



# BGDS high torque tool joint

## BGDS高抗扭接头

### 扭转强度、拉伸强度与上扣扭矩

Torsional strength, tensile strength and make-up torque

#### BGDS26

内径 ID	数据 Data	外径 OD			
		3 3/4	3 5/8	3 1/2	3 3/8
1 1/2	扭转强度(ft-lb) Torque (ft-lb)	12570	12490	12300 B	10330 B
	拉伸强度(lb) Tension (lb)	390300	390300	390300	390300
	上扣扭矩(ft-lb) Make-up (ft-lb)	7600	7500	7400	6200
1 9/16	扭转强度(ft-lb) Torque (ft-lb)	11820	11740	11670	10010 B
	拉伸强度(lb) Tension (lb)	372200	372200	372200	372200
	上扣扭矩(ft-lb) Make-up (ft-lb)	7100	7000	7000	6000
1 5/8	扭转强度(ft-lb) Torque (ft-lb)	11030	10960	10890	9670 B
	拉伸强度(lb) Tension (lb)	353400	353400	353400	353400
	上扣扭矩(ft-lb) Make-up (ft-lb)	6600	6600	6500	5800
1 3/4	扭转强度(ft-lb) Torque (ft-lb)	9350	9280	9220	8940 B
	拉伸强度(lb) Tension (lb)	313700	313700	313700	313700
	上扣扭矩(ft-lb) Make-up (ft-lb)	5600	5600	5500	5400

注：表中接头强度数据是按API标准120钢级计算的。如果选用110钢级接头，需将表中数据乘以0.917的系数。如果选用135钢级接头，需将表中数据乘以1.125的系数。

Remarks: Joint strength data in the table above is calculated according to steel grade 120 of API standard. If joint with steel grade 110 is applied, the data should multiply a coefficient of 0.917. If joint with steel grade 135 is applied, the data in the table should multiply a coefficient of 1.125.



BGDS31

内径 ID	数据 Data	外径 OD			
		4 3/8	4 1/4	4 1/8	4
1 7/8	扭转强度(ft-lb) Torque (ft-lb)	20140	20030	19920 B	16970 B
	拉伸强度(lb) Tension (lb)	541400	541400	541400	541400
	上扣扭矩(ft-lb) Make-up (ft-lb)	12100	12000	11900	10200
2	扭转强度(ft-lb) Torque (ft-lb)	17920	17820	17720	16010 B
	拉伸强度(lb) Tension (lb)	495700	495700	495700	495700
	上扣扭矩(ft-lb) Make-up (ft-lb)	10800	10700	10600	9600
2 1/16	扭转强度(ft-lb) Torque (ft-lb)	16750	16650	16560	15500 B
	拉伸强度(lb) Tension (lb)	471800	471800	471800	471800
	上扣扭矩(ft-lb) Make-up (ft-lb)	10100	10000	9900	9300
2 1/8	扭转强度(ft-lb) Torque (ft-lb)	15530	15440	15350	14970 B
	拉伸强度(lb) Tension (lb)	447100	447100	447100	447100
	上扣扭矩(ft-lb) Make-up (ft-lb)	9300	9300	9200	9000

注：表中接头强度数据是按API标准120钢级计算的。如果选用110钢级接头，需将表中数据乘以0.917的系数。如果选用135钢级接头，需将表中数据乘以1.125的系数。

Remarks: Joint strength data in the table above is calculated according to steel grade 120 of API standard. If joint with steel grade 110 is applied, the data should multiply a coefficient of 0.917. If joint with steel grade 135 is applied, the data in the table should multiply a coefficient of 1.125.

# BGDS high torque tool joint

## BGDS高抗扭接头

### BGDS38

内径 ID	数据 Data	外径 OD			
		5	4 7/8	4 3/4	4 5/8
2 1/8	扭转强度(ft-lb) Torque (ft-lb)	37690	34080 B	30350 B	26750 B
	拉伸强度(lb) Tension (lb)	842400	842400	842400	842400
	上扣扭矩(ft-lb) Make-up (ft-lb)	22600	20500	18200	16100
2 5/16	扭转强度(ft-lb) Torque (ft-lb)	33290	32200 B	28460 B	24870 B
	拉伸强度(lb) Tension (lb)	764000	764000	764000	764000
	上扣扭矩(ft-lb) Make-up (ft-lb)	20000	19300	17100	14900
2 7/16	扭转强度(ft-lb) Torque (ft-lb)	30120	29980	27080 B	23490 B
	拉伸强度(lb) Tension (lb)	708100	708100	708100	708100
	上扣扭矩(ft-lb) Make-up (ft-lb)	18100	18000	16200	14100
2 9/16	扭转强度(ft-lb) Torque (ft-lb)	26750	26620	25600 B	22000 B
	拉伸强度(lb) Tension (lb)	649200	649200	649200	649200
	上扣扭矩(ft-lb) Make-up (ft-lb)	16100	16000	15400	13200

注：表中接头强度数据是按API标准120钢级计算的。如果选用110钢级接头，需将表中数据乘以0.917的系数。如果选用135钢级接头，需将表中数据乘以1.125的系数。

Remarks: Joint strength data in the table above is calculated according to steel grade 120 of API standard. If joint with steel grade 110 is applied, the data should multiply a coefficient of 0.917. If joint with steel grade 135 is applied, the data in the table should multiply a coefficient of 1.125.

BGDS40

内径 ID	数据 Data	外径 OD			
		5 1/2	5 3/8	5 1/4	5 1/8
2 7/16	扭转强度(ft-lb) Torque (ft-lb)	41260	41080	40500 B	36230 B
	拉伸强度(lb) Tension (lb)	897200	897200	897200	897200
	上扣扭矩(ft-lb) Make-up (ft-lb)	24800	24700	24300	21700
2 9/16	扭转强度(ft-lb) Torque (ft-lb)	37730	37560	37380	34700 B
	拉伸强度(lb) Tension (lb)	838300	838300	838300	838300
	上扣扭矩(ft-lb) Make-up (ft-lb)	22600	22500	22400	20800
2 11/16	扭转强度(ft-lb) Torque (ft-lb)	33980	33820	33660	33070 B
	拉伸强度(lb) Tension (lb)	776400	776400	776400	776400
	上扣扭矩(ft-lb) Make-up (ft-lb)	20400	20300	20200	19800
2 13/16	扭转强度(ft-lb) Torque (ft-lb)	30030	29880	29740	29590
	拉伸强度(lb) Tension (lb)	711600	711600	711600	711600
	上扣扭矩(ft-lb) Make-up (ft-lb)	18000	17900	17800	17700

注：表中接头强度数据是按API标准120钢级计算的。如果选用110钢级接头，需将表中数据乘以0.917的系数。如果选用135钢级接头，需将表中数据乘以1.125的系数。

Remarks: Joint strength data in the table above is calculated according to steel grade 120 of API standard. If joint with steel grade 110 is applied, the data should multiply a coefficient of 0.917. If joint with steel grade 135 is applied, the data in the table should multiply a coefficient of 1.125.

# BGDS high torque tool joint

## BGDS高抗扭接头

### BGDS46

内径 ID	数据 Data	外径 OD			
		6 1/4	6 1/8	6	5 7/8
2 1/4	扭转强度(ft-lb) Torque (ft-lb)	79420	76160 B	70450 B	64910 B
	拉伸强度(lb) Tension (lb)	1419500	1419500	1419500	1419500
	上扣扭矩(ft-lb) Make-up (ft-lb)	47700	45700	42300	38900
2 1/2	扭转强度(ft-lb) Torque (ft-lb)	72070	71800	67410 B	61870 B
	拉伸强度(lb) Tension (lb)	1307600	1307600	1307600	1307600
	上扣扭矩(ft-lb) Make-up (ft-lb)	43200	43100	40300	37100
2 3/4	扭转强度(ft-lb) Torque (ft-lb)	63820	63580	63340	58380 B
	拉伸强度(lb) Tension (lb)	1183900	1183900	1183900	1183900
	上扣扭矩(ft-lb) Make-up (ft-lb)	38300	38100	38000	35000
3	扭转强度(ft-lb) Torque (ft-lb)	54650	54430	54220	54000
	拉伸强度(lb) Tension (lb)	1048400	1048400	1048400	1048400
	上扣扭矩(ft-lb) Make-up (ft-lb)	32800	32700	32500	32400
3 1/4	扭转强度(ft-lb) Torque (ft-lb)	44540	44350	44170	43980
	拉伸强度(lb) Tension (lb)	901200	901200	901200	901200
	上扣扭矩(ft-lb) Make-up (ft-lb)	26700	26600	26500	26400

注：表中接头强度数据是按API标准120钢级计算的。如果选用110钢级接头，需将表中数据乘以0.917的系数。如果选用135钢级接头，需将表中数据乘以1.125的系数。

Remarks: Joint strength data in the table above is calculated according to steel grade 120 of API standard. If joint with steel grade 110 is applied, the data should multiply a coefficient of 0.917. If joint with steel grade 135 is applied, the data in the table should multiply a coefficient of 1.125.



BGDS50

内径 ID	数据 Data	外径 OD			
		6 5/8	6 1/2	6 3/8	6 1/4
2 3/4	扭转强度(ft-lb) Torque (ft-lb)	94060	87640 B	81140 B	74820 B
	拉伸强度(lb) Tension (lb)	1681000	1681000	1681000	1681000
	上扣扭矩(ft-lb) Make-up (ft-lb)	56400	52600	48700	44600
3	扭转强度(ft-lb) Torque (ft-lb)	94310	83500 B	77000 B	70680 B
	拉伸强度(lb) Tension (lb)	1534200	1534200	1534200	1534200
	上扣扭矩(ft-lb) Make-up (ft-lb)	56600	50100	46200	42400
3 1/4	扭转强度(ft-lb) Torque (ft-lb)	73570	73310	72340 B	66020 B
	拉伸强度(lb) Tension (lb)	1374700	1374700	1374700	1374700
	上扣扭矩(ft-lb) Make-up (ft-lb)	44100	44000	43400	39600
3 1/2	扭转强度(ft-lb) Torque (ft-lb)	61810	61680	61350	60840 B
	拉伸强度(lb) Tension (lb)	1202400	1202400	1202400	1202400
	上扣扭矩(ft-lb) Make-up (ft-lb)	37100	37000	36800	36500
3 3/4	扭转强度(ft-lb) Torque (ft-lb)	49020	48820	48630	48440
	拉伸强度(lb) Tension (lb)	1017400	1017400	1017400	1017400
	上扣扭矩(ft-lb) Make-up (ft-lb)	29400	29300	29200	29100

注：表中接头强度数据是按API标准120钢级计算的。如果选用110钢级接头，需将表中数据乘以0.917的系数。如果选用135钢级接头，需将表中数据乘以1.125的系数。

Remarks: Joint strength data in the table above is calculated according to steel grade 120 of API standard. If joint with steel grade 110 is applied, the data should multiply a coefficient of 0.917. If joint with steel grade 135 is applied, the data in the table should multiply a coefficient of 1.125.

# BGDS high torque tool joint

## BGDS高抗扭接头

### BGDS55

内径 ID	数据 Data	外径/OD			
		7 1/4	7 1/8	7	6 7/8
3	扭转强度(ft-lb) Torque (ft-lb)	120290 B	112280 B	104480 B	96870 B
	拉伸强度(lb) Tension (lb)	1925500	1925500	1925500	1925500
	上扣扭矩(ft-lb) Make-up (ft-lb)	72170	67400	62700	58100
3 1/4	扭转强度(ft-lb) Torque (ft-lb)	115390 B	107380 B	99580 B	91970 B
	拉伸强度(lb) Tension (lb)	1778300	1778300	1778300	1778300
	上扣扭矩(ft-lb) Make-up (ft-lb)	69200	64400	59800	55200
3 1/2	扭转强度(ft-lb) Torque (ft-lb)	103700	101920 B	94120 B	86520 B
	拉伸强度(lb) Tension (lb)	1619200	1619200	1619200	1619200
	上扣扭矩(ft-lb) Make-up (ft-lb)	62200	61200	56500	51900
3 3/4	扭转强度(ft-lb) Torque (ft-lb)	89920	89620	88090 B	80490 B
	拉伸强度(lb) Tension (lb)	1448400	1448400	1448400	1448400
	上扣扭矩(ft-lb) Make-up (ft-lb)	54000	53800	52900	48300
4	扭转强度(ft-lb) Torque (ft-lb)	75020	74760	74500	73870 B
	拉伸强度(lb) Tension (lb)	1265800	1265800	1265800	1265800
	上扣扭矩(ft-lb) Make-up (ft-lb)	45000	44900	44700	44300

注：表中接头强度数据是按API标准120钢级计算的。如果选用110钢级接头，需将表中数据乘以0.917的系数。如果选用135钢级接头，需将表中数据乘以1.125的系数。

Remarks: Joint strength data in the table above is calculated according to steel grade 120 of API standard. If joint with steel grade 110 is applied, the data should multiply a coefficient of 0.917. If joint with steel grade 135 is applied, the data in the table should multiply a coefficient of 1.125.

## Attachment and directions

### 附录及说明

在文中有些数据采用了英制单位。英制与米制单位的换算系数如下：

1 in=25.4 mm (准确值)  
 1 in<sup>2</sup>=645.16 mm<sup>2</sup> (准确值)  
 1 ft=0.3048 m (准确值)  
 1 lb=0.454 kg  
 1 lb/ft= 1.4895 kg/m  
 1 psi=0.0703kg/cm<sup>2</sup>=0.006895MPa (应力)  
 1 ft-lb=1.355818 J (冲击功)  
 =1.355818 N m (扭矩)

Some data are USC units. The conversion procedure between USC units & SI units is as follows:

1 in=25.4 mm (Accurate value)  
 1 in<sup>2</sup>=645.16 mm<sup>2</sup> (Accurate value)  
 1 ft=0.3048 m (Accurate value)  
 1 lb=0.454 kg  
 1 lb/ft= 1.4895 kg/m  
 1 psi=0.0703kg/cm<sup>2</sup>=0.006895MPa (Stress)  
 1 ft-lb=1.355818 J (Absorbed-in-fracture energy)  
 =1.355818 N m (Torque)

# References

## 用户使用业绩

2005年7月，宝钢Φ139.7×10.54mm IEU S-135 BGDS55高抗扭钻杆在舟山群岛成功地进行了外钓岛—册子岛跨海定向钻穿越工程的施工，创造了穿越长度2350米的世界纪录。

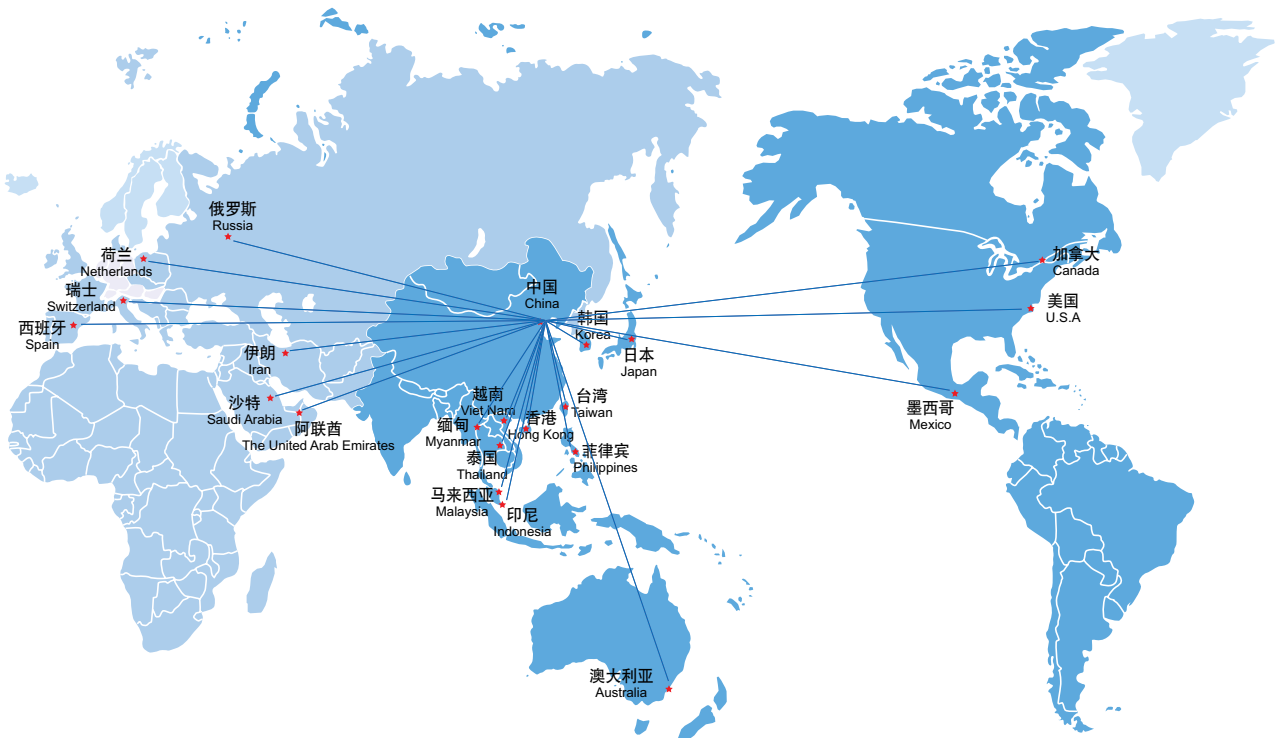
2008年1月，宝钢Φ127×9.19mm IEU S-135 NC52非标钻杆在塔里木油田钻探成功7620米的中石油最深井—轮东1井。

宝钢供塔里木油田的两套6000米Φ127×9.19mm IEU S135钻杆经过四年使用，一套已钻成LG201、TZ40-H7、TZ40-H5、LG208、TZ621、HD171等十余口6000米的超深井及水平井，另一套已钻成雀马1、却勒101、英买16、玉东3等十余口6000米的超深井（却勒101、英买16为中国乃至世界钻井难度最高的山前井）。其中，单根最大进尺6.53万米、单根使用最多井次13井次、单根最长纯钻时间7608小时。

In July 2005, Baosteel's  $\phi 139.7 \times 10.54$ mm IEU S-135 BGDS55 high torsion resistant drill pipe was successfully applied in the oriented ocean-span drilling project between Waidiaodao Island and Cezidao Island in the Zhoushan archipelago with a world record of 2350m crossing length achieved.

In January 2008, Baosteel's  $\phi 127 \times 9.19$ mm IEU S-135 NC52 premium drill pipe was successfully utilized in the drilling of China National Petroleum Corporation's deepest oil well—Lundong No.1 of 7620m in the Tarim Oil Field.

During 4 years' service in Tarim Oil Field, two sets of  $\phi 127 \times 9.19$ mm IEU S135 drill pipes (6000m) have achieved the following records. One set has been used for the drilling more than 10 wells of 6000m and horizontal wells including LG201, TZ40-H7, TZ40-H5, TZ40-H5, LG208, TZ621, HD171 and etc. The other set has been applied in the drilling more than 10 wells of 6000m Quema1, Quele 101, Yingmai 16, Yudong 3 and etc., (Quele 101, Yingmai 16 are the wells located in the thrust belt, the most difficult ones worldwide.). Among them, the maximum drilling footage of single pipe is 65,300m and the maximum well service record of single pipe is 13 well. The maximum pure drilling time of single pipe reached as long as 7608 hours.



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