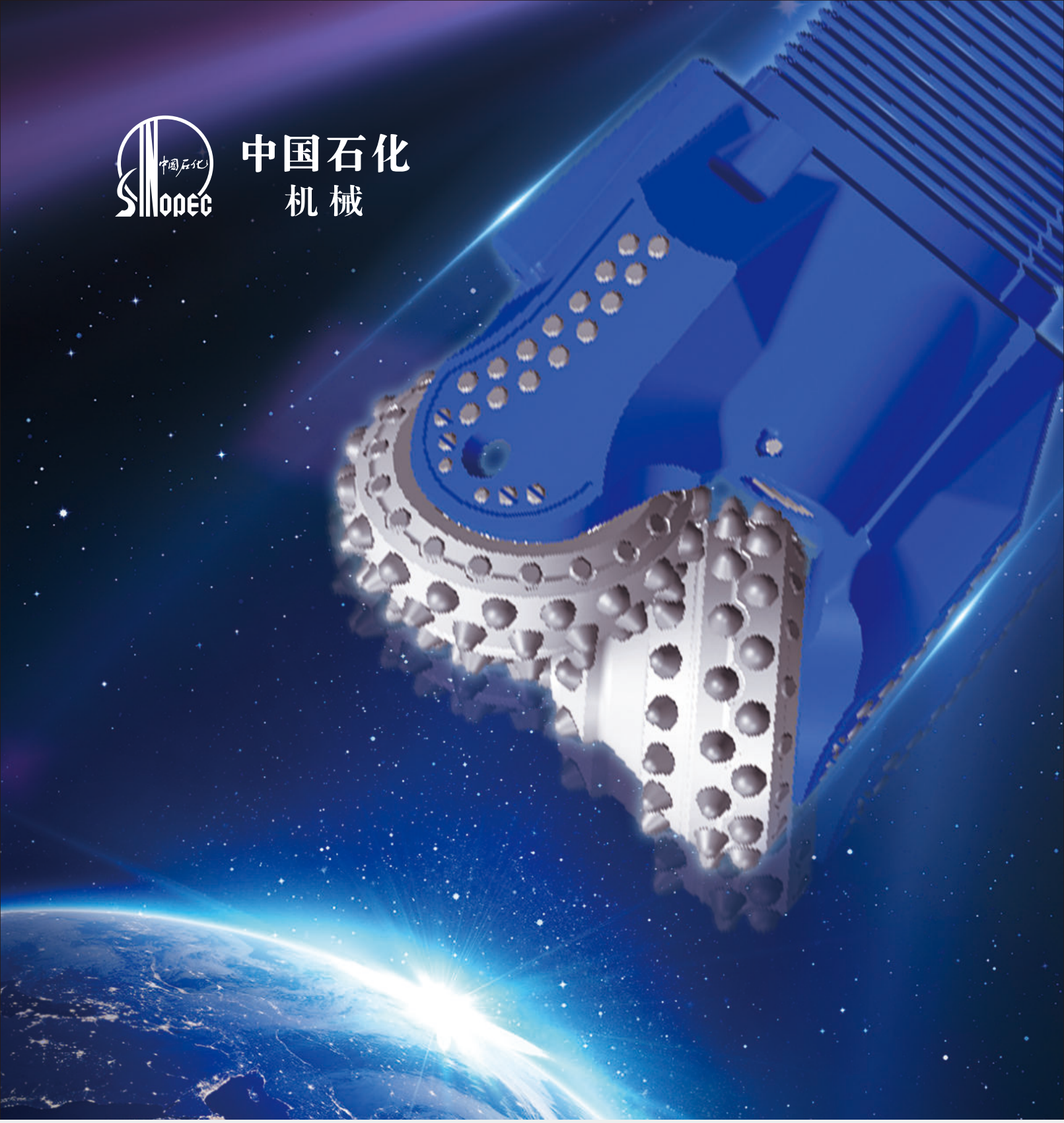


中国石化
机械

KINGDREAM 矿用钻头

Kingdream Mining Bits

中石化江钻石油机械有限公司
KINGDREAM PUBLIC LIMITED COMPANY

企业简介

COMPANY PROFILE



中石化江钻石油机械有限公司（以下简称江钻）是国家重点高新技术企业，国内领先、亚洲最大的石油钻头制造商。

江钻面向市场持续推进技术创新和产品进步，构建了具有自主知识产权、达到国际先进水平的技术体系，先后与30多家国内外院校和科研机构开展技术合作，在钻头切削齿材料技术、轴承结构及材料、钻头水力技术等方面的研究走在全国前列。

钻头生产线装备有代表当今世界先进水平的五轴加工中心等先进数控设备300多台（套），能生产3 1/2-36英寸的牙轮钻头，拥有等离子光谱仪、TC图

Kingdream Public Limited Company of Sinopec Oilfield Equipment Corporation (shortly referred to as Kingdream) is a backbone National High Tech. Enterprise, leading domestic and the largest oil bit manufacturer in Asia.

By continuously pushing forward technical innovation and product upgrading, Kingdream has formed its technical system with internationally advanced level and independent intellectual property rights. Technical cooperation has been carried out with more than 30 domestic and foreign universities and scientific research institutions. Researches in Kingdream regarding material technology for cutting elements used on oil-well drilling bits, bearing structure and material, and drill bit hydraulic technology are at the leading position domestically.

Our production line is equipped with more than 300 sets of advanced numerical control equipment, such as five axis machining center, which represents the world' s advanced level. It can produce 3-1/2 to 36 inch roller cone bit, with advanced

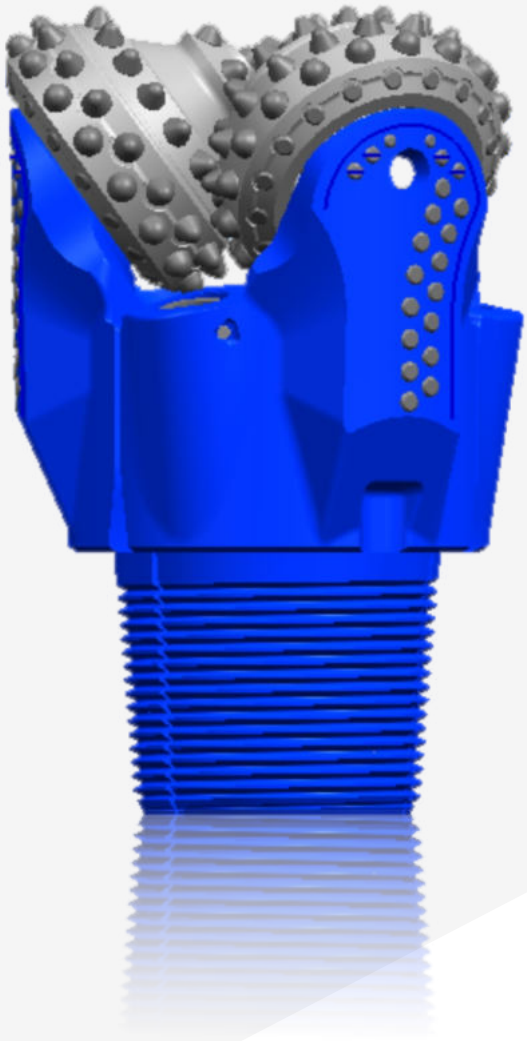


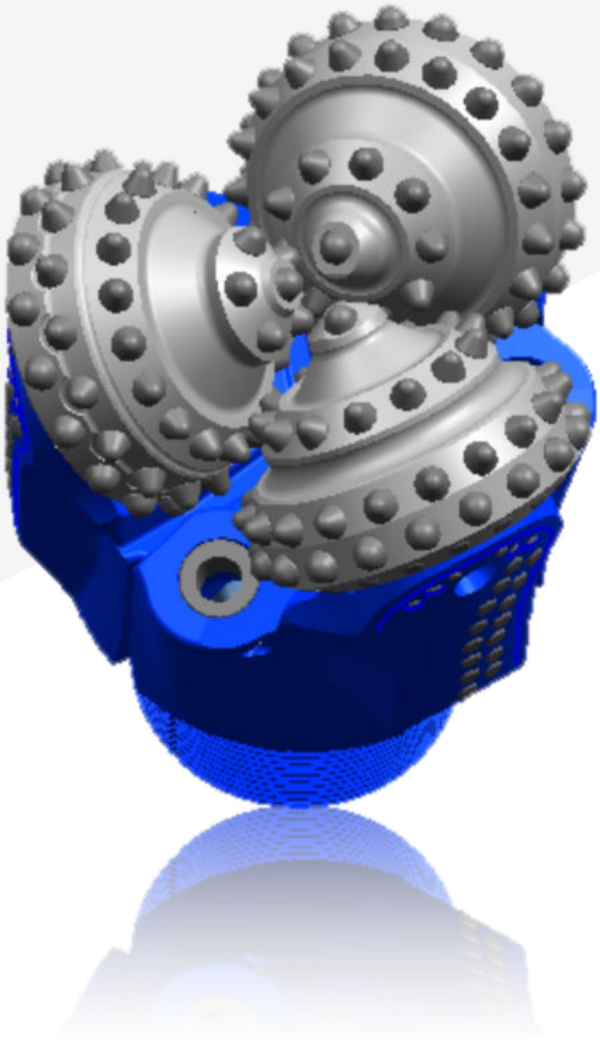
像仪、新型复合破岩试验机、600KN钻头试验台架等先进的检测、试验设备，大大提高了产品质量稳定性，公司连续通过API、ISO9001质量管理体系认证和国际HSE管理体系认证。

江钻凭借雄厚的技术实力、先进的制造水平、完善的质量管理体系及丰富的石油钻头钻具的研发与生产经验，在工程掘进破岩工具的探索与开发方面取得了显著的成果。针对冶金、煤炭、矿山等工程领域，开发了K系列矿用三牙轮钻头。

detection and test equipment such as plasma spectrometer, TC imager, new composite rock breaking tester, 600kN bit test bench, greatly improved product quality stability, the company has passed API, ISO9001 quality management system certification and international HSE management system certification.

Relying on abundant technical strength, advanced manufacturing technology, perfect quality management system and ample experiences in regard to R&D and production of drill bits and drilling tools for oil and gas drilling applications, Kingdream company also made significant achievements in development and manufacture of drilling tools for construction and excavation. Aiming at metallurgy, coal, mining and other engineering fields, K series mining tri-cone bit is developed.





产品简介

PRODUCT INTRODUCTION

K系列矿用三牙轮钻头适用于冶金、煤炭、矿山等工程领域中穿凿炮孔施工。

K series mining tri-cone bit is suitable for the construction of blast holes in metallurgy, coal, mining and other engineering fields.

K系列钻头型号表示方法示例

Nomenclature of K series bit is as follows

江钻K系列钻头型号由直径代号、系列代号、分类号三部分组成。

The model of K series bit is composed of three parts: diameter code, series code and classification number.

9 7/8 K 642

分类号，表示IADC编码
classification number, which represents the IADC code
（最后一位数字表示轴承类型：2-非密封滚动5-密封滚动7-密封滑动）
(The last digit indicates the bearing type: 2- non-sealed roller bearing 5- sealedroller bearing 7- sealed journal bearing)

系列代号K，表示矿用三牙轮钻头
Series code K, for mining tri-cone bit

钻头直径（英寸）
Bit diameter (in.)

K系列结构特点

Structural Features of K Series

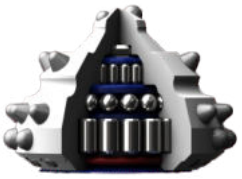
- 非密封滚动轴承：滚动轴承结构，轴承无密封件，轴承冷却形式为空气冷却，该轴承结构产品具备更高的经济性。

  Non-sealed roller bearing: Roller bearing structure with no seals, the bearing is air cooled. The bit product with such bearing structure has higher economy.



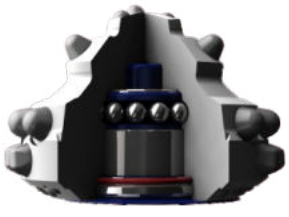
- 密封滚动轴承：滚动轴承结构，轴承采用橡胶圈密封，轴承腔内注润滑脂，可有效润滑轴承并起到冷却作用，该轴承结构产品具备更高的使用寿命。

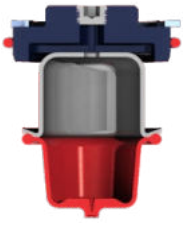
  Sealed roller bearing: Roller bearing structure with rubber ring seals, the bearing cavity is filled with grease, which can effectively lubricate and also cool the beraing. The bit product with such bearing structure has a longer service life.



- 密封滑动轴承：滑动轴承结构，轴承采用金属密封，适应高钻压、高钻速工况，配合精密设计加工的储油润滑系统，更好的保护轴承密封系统，有效提高产品使用寿命。

  Sealed journal bearing: Journal bearing structure with metal seal, which is suitable for the drilling conditions of high WOB and high ROP. In additional, precisely designed and processed compensator system can better protect the bearing sealing system and effectively improve the service life of the product.

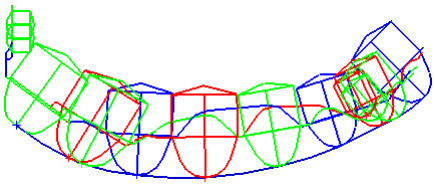




- 采用高强度、高韧性硬质合金齿，优化齿材提高齿的抗断韧性和耐磨性；针对不同地层，选用相适应的齿形，包括锥球齿、球头齿、卵形齿等；优化设计的齿排数、齿数、露齿高度等，充分发挥钻头切削能力和切削速度，使钻头具备更高的攻击性，提高机械钻速。

  Adopt tungsten carbide insert with high strength and toughness, optimize the insert material to improve the fracture toughness resistance and wear resistance of the insert; According to the different formation, the appropriate insert shape is selected, including conical-spherical insert, spherical head insert, oval insert, etc. The optimized design of insert row, insert number and exposure height of insert, etc. gives full play to the cutting ability and cutting speed of the bit, so as to make the bit more aggressive and increase ROP.





- 掌尖及掌背镶嵌耐磨硬质合金齿强化保护，提高掌尖和牙掌整体耐磨性，有效保护轴承，防止钻头缩径，延长钻头使用寿命。

  The shirttail and head O.D.are reinforced by wear-resistant tungsten carbide insert to enhance the overall wear resistance,so that it can effectively protect the bearing, prevent the diameter shrinkage and extend the service life of the bit.



- 牙掌前进侧敷焊耐磨合金，提高牙掌耐磨性，延长钻头使用寿命。

  Wear resistant alloy is applied to the forward side of the head to improve the wear resistant of the head and prolong the service life of the bit.

- 防回流阀装置：安装在钻头浆孔入口处的单向阀装置，可避免空气回流时夹带的岩屑进入轴承腔，延长钻头使用寿命。

  Anti-back flow valve: the one-way valve device installed at the entrance of the bit slurry hole, which can avoid the drilling cuttings into the bearing cavity when the air flows back and extend the service life of the bit.



- 空气管装置：用于引导空气进入轴承腔冷却轴承，同时对空气进行过滤，减少其中夹杂的岩屑进入轴承，提高轴承寿命。

  Air filter tube: The air filter tube guides air into the bearing cavity to cool the bearing and the air can also be filtered at the same time to reduce the inclusion of rock debris into the bearing cavity so that bearing life is extended.





产品型号表 Product model list

钻头尺寸 Bit size		钻头型号 Bit type	
英寸 (inches)	毫米(mm)	软地层 ⟷ 硬地层 Soft formation — Hard formation	
		岩石抗压强度 Compressive strength of rock (Mpa)	0—100—200——300—400
6 3/4	171	K442 K542 K742	
7 7/8	200	K432 K542 K642 K742	
9	229	K722	
9 7/8	251	K432 K515 K542 K625 K642 K722	
10 5/8	270	K532 K632 K642 K722	
12 1/4	311	K542 K617 K642 K625 K645	
13 3/4	346	K532	
15	381	K535	

说明：上表为部分产品型号，我公司也可以根据用户需要开发其他型号的产品。
Note: the above table shows some product models. Our company can also develop other products according to users' needs.

产品使用推荐钻压和钻速 Recommended WOB and ROP are used

钻头尺寸 Bit size		产品型号 Product type	推荐钻压 Recommended WOB (lbs)	推荐钻速 Recommended ROP (r/min)
英寸 (inches)	毫米 (mm)			
6 3/4	171	K442	13000～35000	120～60
		K542	16000～40000	100～70
		K742	25000～48000	90～60
7 7/8	200	K432	14000～32000	125～60
		K542	20000～50000	110～60
		K642	25000～53000	85～55
		K742	25000～53000	85～55
9	229	K722	32000～73000	90～60
9 7/8	251	K432	15000～45000	125～60
		K515	17000～47000	115～60
		K542	20000～50000	105～60
		K625	25000～55000	100～60
		K642	30000～60000	95～60
		K722	35000～80000	90～60
10 5/8	270	K532	23000～53000	110～60
		K632	30000～60000	100～60
		K642	32000～70000	95～65
		K722	34000～85000	90～60
12 1/4	311	K542	30000～70000	105～60
		K617	35000～90000	110～60
		K625	37000～90000	100～60
		K642	37000～90000	95～60
		K645	37000～90000	95～60
13 3/4	346	K532	35000～80000	110～60
15	381	K535	36000～85000	110～60

喷嘴型号对照表 Comparison table of nozzle type

钻头尺寸 Bit size (in)	喷嘴外径 Nozzle O.D. (mm)	喷嘴出口直径 Diameter of nozzle outlet (mm)																				
		8	9	10	11	12	13	14	15	16	17	18	19	20	20.5	21	22	23	24	25	29	31	33
6 3/4	23.5						●	●	●														
7 7/8	29.74	●	●	●	●	●	●	●	●	●	●	●	●	●									
9	33	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
9 7/8																							
10 5/8																							
12 1/4																							
13 3/4	40.9																				●	●	●
15	40.84											●		●									

钻头连接螺纹对照表 Comparison table of bit connection threads

钻头尺寸 Bit size (in)	连接螺纹尺寸 Connection threads size (in)
6 3/4	3 1/2REG API
7 7/8	4 1/2REG API
9	
9 7/8	6 5/8REG API
10 5/8	
12 1/4	6 5/8REG API 6 BECO
13 3/4	6 5/8REG API
15	7 5/8REG API

使用案例 Application cases

9 7/8 K542钻头在美国亚利桑那州的现场使用；钻头总进尺、机械钻速和性价比均较高，获得矿区用户的好评。

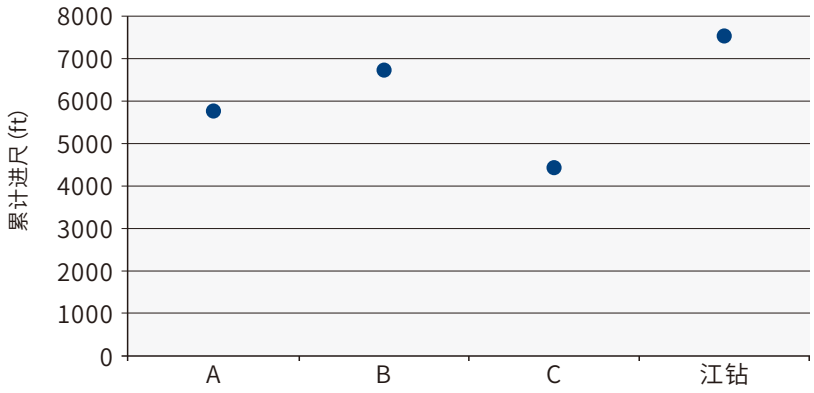
9 7/8 K542 bit used on site in Arizona, USA; The total footage of the bit, the ROP and the cost performance are all high, which have won the praise of users in the mining area.

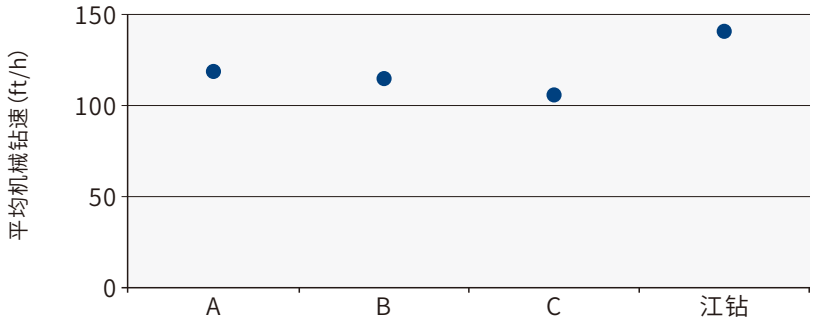






钻头型号 Bit type	累计进尺（ft） Accumulated footage (ft)	累计使用时间（h） Accumulated using time (h)	机械钻速（ft/h） ROP (ft/h)
9 7/8 K542(江钻) 9 7/8 K542(Kingdream)	7374.03	56.01	131.65
厂家A Factory A	5745.79	48.71	117.95
厂家B Factory B	6753.42	58.89	114.69
厂家C Factory C	4405.13	41.98	104.94
说明：表中数据为平均值。Note: the data in the table are averages.			







$$\text{总钻进成本 (TDC) Total drilling cost (TDC)} = \frac{\text{钻头价格 (\$) Bit price (\$)}}{\text{累计进尺 (ft) Accumulated footage (ft)}} + \frac{\text{钻机使用成本 (\$/h) Using cost of rig (\$/h)}}{\text{机械钻速 (ft/h) ROP (ft/h)}}$$

10 5/8"K722

Non-sealed roller bearing

Non-sealed roller bearing structure, drilling fluid can enter the bearing cavity directly to cool the bearing, and it is suitable for geothermal drilling.

Cutting structure

Highly wear resistance and high toughness cutting and optimized cutting structure can obtain highly effective cutting capability. The wear-resistance and anti-breakage ability of inserts can help to keep constant aggressiveness and increase ROP.

Head OD enhancement

Unique compacts layout on head OD can protect the shirttail and seal to effectively improve the bit' s ability to prevent diameter shrinkage.

Special inserts on shirttail

This feature can provide better protection for seal and bearing to extend the bit' s service life.

Air filter tube

The air filter tube guides air into the bearing cavity to cool the bearing, and the air can also be filtered at the same time to prevent contaminants in the air from entering the bearing cavity so that bearing life is extended.

Anti-backflow valve

The anti-backflow valve can avoid drilling cuttings entrained in the air entering the bearing cavity when the air flows back, so that working life of the bit is effectively prolonged.

Technical specifications

IADC	7-2-2
Bearing and seal	Ball locked and Non-sealed roller bearing
Number of rows	5-5-4
Number of cutters	182
Main cutter shape / Cutter exposure	Conical compacts//8.31mm
Gage row cutter shape	Conical compacts
Type of nozzle	Air jet
Type of center nozzle	None
Shank	6 5/8 REG
Recommended makeup torque	37.9～43.4(KN.m)

Recommended operating parameters

WOB：34000 to 85000 lbs　　Ideal WOB range：45000 to 80000 lbs
Rotary speed：90～60 rpm　　Ideal Rotary speed range：80～65 rpm
Air Back Pressure：0.3～0.4 MPa
The above parameters are only for reference. Optimized parameters are determined by drilling process and lithology of formations on site.

Applicable formations

Hard formation with high abrasiveness, such as hard limestone, dolomite, hard sandstone and chert, etc .

12 1/4"K645

Roller bearing and rubber seal

Roller bearing design suitable for middle to low WOB and high RPM is used. Bearing 'O' ring seal adopts high saturation nitrile butadiene rubber(NBR) which can bear high abrasiveness, larger seal ring has decreased sealing force, and protruding part on the outside of seal has increased the reliability of sealing.

Cutting structure

Highly wear resistance and high toughness cutting and optimized cutting structure can obtain highly effective cutting capability. The wear-resistance and anti-breakage ability of inserts can help to keep constant aggressiveness and increase ROP.

Head OD enhancement

Unique compacts layout on head OD can protect the shirttail and seal to effectively improve the bit's ability to prevent diameter shrinkage.

Hardfacing and Special inserts on shirttail

This feature can provide better protection for seal and bearing to extend the bit's service life.

Anti-backflow valve

The anti-backflow valve can avoid drilling cuttings entrained in the air entering the bearing cavity when the air flows back, so that working life of the bit is prolonged effectively.

Technical specifications

IADC Code	6-4-5
Bearing and seal	Ball locked and Roller bearing, O-ring seal
Number of rows	5-4-4
Number of cutters	164
Main cutter shape / Cutter exposure	Conical compacts // 10.1mm
Gage row cutter shape	Conical compacts
Layout of diamond enhanced inserts	/
Type of nozzle	Air jet
Type of center nozzle	N/A
Shank	6 5/8 REG
Recommended makeup torque	37.9～43.4(KN.m)

Recommended operating parameters

WOB：37,000 to 90,000 lbs　　Ideal WOB range：50,000 to 75,000 lbs
Rotary speed：95～60 rpm　　Ideal Rotary speed range：90～70 rpm
Air Back Pressure：0.3～0.4 MPa
The above parameters are only for reference. Optimized parameters are determined by drilling process and lithology of formations on site.

Applicable formations

Medium hard with high compressive strength and high abrasiveness, such as limestone, dolomite, sandstone and chert, etc.



中国石化
机械

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