



达力普石油专用管有限公司
DALIPAL PIPE COMPANY

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达力普石油专用管有限公司
DALIPAL PIPE COMPANY

Website: www.dalipal.com
[股票代码: 01921.HK]

企业宗旨

为客户创造价值 为员工创造机会
为企业创造实力 为社会创造和谐

服务观

想客户之所想 急客户之所急
满足客户的需求就是我们永远的目标

安全观

安全第一 预防为主 全员动员 关爱生命

质量观

一根管一口井 一根管一个市场
根根为用户 件件是市场 根根件件创品牌

Dalipal's moral is "producing profit to the society, providing service to the customer and offering opportunity to the employees."

Services
Think about what customers want and what customers need. Customer's demand is our goal.

Safety
Safety first, prevention first, mobilization of all staff and care for life.

Quality
One pipe, one well, one tube, one market. Each pipe for the customer, each piece for the market, each product establishes the brand.

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公司简介

INTRODUCTION DALIPAL PIPE COMPANY

达力普石油专用管有限公司始建于1998年，是一家集研发、制造、服务为一体的专业化、全产业链的石油专用管智能制造企业，隶属于达力普控股有限公司（股票代码：01921.HK）。达力普石油专用管有限公司（以下简称达力普公司或公司）位于国家级经济技术开发区沧州渤海新区，地处京津冀一小时经济圈内，是国家高新技术企业、沧州市科技创新龙头企业，建有河北省石油专用管技术创新中心，公司技术中心被认定为河北省企业技术中心，河北省工业企业研发机构（A级）。

达力普公司始终致力于专业产品的研发、制造与服务，公司装备精良，工艺技术先进，全产业链优势突出。公司拥有绿色环保的管坯生产、无缝钢管轧制、管端加厚、石油管热处理、石油专用管加工等智能生产线，建有国内首创的大型石油管智能周转库，实现了从原材料到终端产品制造全过程的信息互联互通和产品质量全过程监控，确保快捷、高效的向客户提供高质量产品，满足客户的需求。

公司的产品有优质合金圆坯、无缝钢管、石油专用管等三大类产品，可满足不同类型客户的产品需求。公司主导产品为API和非API系列石油专用管，涉及页岩气、天然气、煤层气开发用管以及风电、核电、水电、石化等高端能源装备配套产品，另外还生产流体输送管、结构管、汽车用无缝钢管、气瓶用无缝钢管、地质钻探管等多个行业需要的钢管产品。其中，耐高温、耐高压、耐腐蚀、高抗挤毁、高强韧、特殊螺纹等特殊用途的石油专用管和高钢级抗硫油气输送管的全流程制造技术达到国内先进水平，产品遍布大庆、新疆、华北、长庆等国内各大油田，并出口到多个国家和地区。

公司的工艺技术先进，检测手段齐全，配备了德国SLICKS超声波探伤机、全自动双工位水压机、德国蔡司场发射电子扫描显微镜、日本岛津的X射线荧光光谱仪、德国林赛斯热膨胀相变仪、美国力可氧氮分析仪等国际一流的高性能检测设备。公司检测实验中心获得了国家认可委实验室CNAS认证，公司先后取得了ISO9001质量管理体系认证、ISO14001环境体系认证、GB/T28001职业健康安全管理体系认证、中石油HSE体系认证、知识产权体系认证、测量管理体系认证、能源管理体系认证、美国石油学会API 5CT和5L产品认证和国家特种设备制造许可证（TS）。这些都为高质量、高性能产品的制造提供了质量保证，可满足客户定制化、个性化的产品需求。

公司坚持创新驱动发展战略，秉承精品发展之路，持续打造品牌竞争优势，充分运用各类先进技术，全面推行清洁生产、智能制造、绿色制造，提升核心竞争力和可持续发展能力。公司致力于成为一家以石油专用管（含天然气、页岩气、煤层气）为主的专业化制造服务商，为石油能源产业提供一流的一站式集成服务，为全球客户创造更大价值。

公司坚持以促进经济增长、社会进步、环境保护三者协调、和谐发展为社会责任，努力为客户、员工、合作方、股东乃至社会各方创造价值，实现和谐共生，共同发展。



达济社会
力勤客户
普惠员工

Dalipal Pipe Company(Dalipal), founded in 1998 and affiliated Dalipal Holding Co.,Ltd.(Stock code:01921.HK), is a professional intelligent manufacturing enterprise for Oil Country Tubular Goods(OCTG). It has complete industrial chain integrating R&D, manufacturing and service for OCTG. The company is located in the state-level Economic and Technological Development Zone of Cangzhou Bohai New Area, located in "Beijing, Tianjin and Hebei one-hour economic circle". The company is a national high-tech enterprise and a leading scientific and technological innovation enterprise in Cangzhou City. It has established Hebei OCTG Technology Innovation Center which has been recognized as the Hebei Enterprise Technology Center and the Hebei Industrial Enterprise Research Development Organization(Level A).

The company has been committed to R&D, manufacturing and service based on professional products. The company has excellent technical equipment, advanced technology and outstanding advantages in the whole integrated industry chain. We also have many green intelligent production lines, such as pipe billet production, seamless tube rolling, tube end upsetting, heat treatment, processing of OCTG, and the large-scale intelligent turnover warehouse pioneered in China, which realizes the interconnection and intercommunication of information in the whole process of manufacturing and the whole-process monitoring of product quality from raw materials to terminal products, ensures fast and efficient delivery of high-quality products to customers to meet their needs.

The company's products are three categories of products, high-quality alloy round billet, seamless steel tube and OCTG, involving shale gas, natural gas, coalbed methane development pipes, wind power, nuclear power, hydropower, petrochemical and other high-end energy equipment supporting products, besides including tube for liquid service, structural, hydraulic prop, geological drilling, perforating gun and so on. Among them, the whole process manufacturing technology of OCTG and high-grade sulfur-resistant oil and gas pipelines for special purposes such as temperature resistance, pressure resistance, corrosion resistance, high collapse resistance and special threads has reached the domestic advanced level. Products are distributed in Daqing, Xinjiang, North China, Changqing and other major domestic oil fields, and exported to many countries and regions.

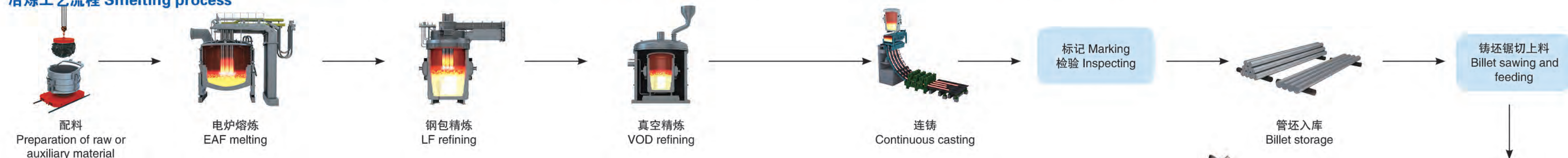
The company has complete testing measures and advanced technology. It is equipped with German SLICKS ultrasonic flaw detector, full-automatic dual-station hydraulic press, Zeiss field emission electron scanning microscope, Japan Shimadzu X-ray fluorescence spectrometer, Lindsay thermal expansion phase change instrument, Like oxygen-nitrogen-hydrogen analyzer and other world-class high-performance detection equipment. The company's testing and experiment center has been certified by the National Accreditation Commission Laboratory CNAS. The company has successively obtained ISO 9001 quality management system certification, ISO 14001 environmental system certification, GB/T 28001 occupational health and safety management system certification, CNPC HSE system certification, intellectual property system certification, measurement management system certification, energy management system certification, API 5CT and 5L product certification of American Petroleum Institute and national special equipment manufacturing license (TS). All of these provide a fundamental guarantee for the manufacture of high quality, high performance products and meet the customized and personalized needs of customers.

The company persists to innovation-driven development, upholds high-quality development, continuously builds brand competitive advantages, fully utilizes Internet technology, comprehensively promotes cleaner production, intelligent manufacturing and green manufacturing, and improves the core competitiveness and sustainable development capability. We are committed to becoming a professional manufacturing service provider for OCTG (including natural gas, shale gas, coalbed methane, etc.), providing first-class, one-stop integration services for the petroleum energy industry, and creating greater value for the global customers.

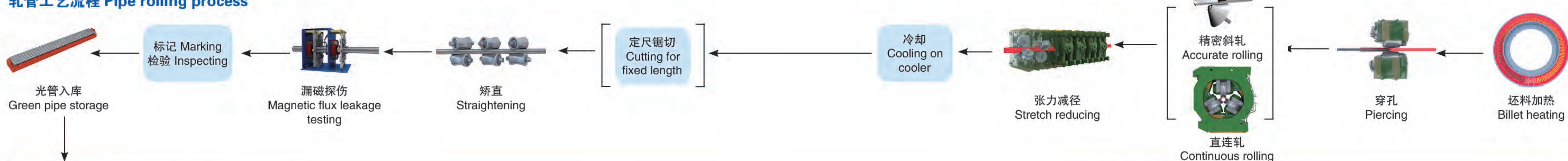
The company insists on taking the initiative to assume the social responsibility of promoting the coordinated and harmonious development of economic growth, social progress and environmental protection, strives to create value for customers, employees, shareholders and even social parties, so as to achieve harmonious coexistence and common development.

2 工艺流程图 DIAGRAM OF PRODUCTION PROCESS

冶炼工艺流程 Smelting process



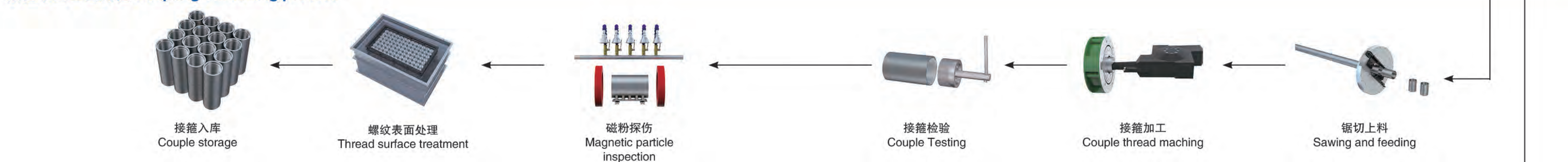
轧管工艺流程 Pipe rolling process



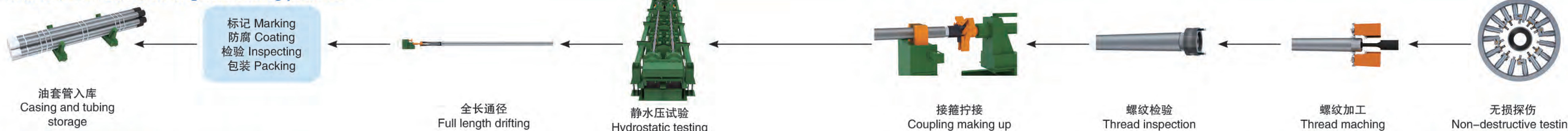
热处理工艺流程 Heat treatment process



接箍车丝工艺流程 Coupling Threading process



油套管加工工艺流程 Casing and tubing process



3 研发能力介绍 INTRODUCTION OF RESEARCH AND DEVELOPMENT

一、研发平台 R&D platform

公司设有专门的研发机构 – 技术中心，包括油套管研究室、特殊扣研究室、管坯研究室、无缝钢管研究室和检测实验中心。

The company possesses a special R&D organization – a technical center that includes the Casing and Tube Research Office, Premium Connection Research Office, the Billet Research Office, the Seamless Steel Pipe Research Office, and the Test Center.

2013 年，开始筹建“河北省石油专用管技术创新中心”，并于 2016 年通过验收。

2014 年，检测实验中心通过了中国合格评定国家认可委员会认可，获得国家认可实验室证书。

2017 年，评为“河北省工业企业研发机构（A 级）”。

2017 年，评为“河北省企业技术中心”。

Preparations for the construction of the "Hebei Provincial Petroleum Tube Technological Innovation Center" began in 2013, and in 2016, the center had passed the acceptance test.

In 2014, the Test Center was recognized by the China National Accreditation Service for conformity assessment and won the certificate of nationally recognized laboratory.

In 2017, the center was rated the "Hebei Industrial Enterprise Research and Development Organization (Level A)."

In 2017, the center was rated the "Hebei Enterprise Technology Center."

我们的目标是搭建一流的管坯、无缝钢管、石油专用管技术创新平台，引领我国石油专用管制造技术的创新，并形成示范基地。

Our goal is to establish a first-class technology innovation platform for round billet, seamless steel pipe and OCTG, be a leader in the innovation of petroleum tube manufacturing technology in China, and setup a demonstration base.

重点针对石油专用管管体材料设计、绿色冶炼技术、高性能及特殊用途用钢、洁净钢冶炼技术、

高精度高效轧制及热处理技术、特殊扣设计和加工技术及制造装备进行研究开发，不断提高行业先进水平，提高生产力，降低能源资源消耗。应用先进的制造工艺技术，生产出生态环保、低成本高性能、高安全性的 API 系列和非 API 系列石油专用管产品。通过不断建设和发展，走出一条具有达力普特点的“市场 – 科研创新 – 现场创新 – 市场”的创新之路，满足客户不断增长的个性化产品需求。

The platform's objective is to carry out R&D of petroleum tube material design, green smelting technology, high performance and special purpose steel, clean steel smelting technology, high-precision and efficient rolling and heat treatment technology, premium connection design as well as processing technology and manufacturing equipment to continually improve industry level, improve productivity, and reduce energy and resource consumption. By virtue of advanced manufacturing process technology, API and non-API series petroleum tube products that feature environmental protection, low cost, high performance, and high safety are manufactured. Through continuous construction and development and an innovation roadmap of "market – technological innovation – site innovation – market" that reflect features of Dalipal is designed to meet the ever-growing personalized demands for products by customers.

二、研发团队 R&D team

在研发团队建设方面，公司拥有技术研发人员 150 余人，聘请行业专家 10 余人。涵盖了钢铁冶金、金属材料、压力加工、机械制造及自动化等各个专业。

For the formation of the R&D team, the company has nearly 100 technological R&D employees, with over 20 persons with a master's degree or higher and over 30 technicians in a mid-level and/or senior position. In addition, the company has recruited more than 10 industry experts, covering all fields including iron and steel metallurgy, metal materials, pressure processing, mechanical manufacturing, and automation.

三、产学研合作 Industry-university-research cooperation

公司高度重视对外交流及产学研合作，多年来与中国石油集团石油管工程技术研究院、北京科技大学、东北大学、西安建筑科技大学、宝武集团、科大智能科技股份有限公司等多个院校和企业建立合作关系，签订了战略合作协议，在产品开发、工艺开发、资源循环利用、装备智能化自动化等多方面开展了合作。

The company attaches much importance to external exchange and industry-university-



research cooperation. Over the years, the company has established several positive working relationships with universities and enterprises, including CNPC Tubular Goods Research Institute, the University of Science and Technology (Beijing), Northeastern University, Xi'an University of Architecture and Technology, Baowu Group, CSG, etc. In addition, we have signed strategic cooperation agreements and carried out collaborations with some units in areas like product development, processing development, resource recycling, equipment intelligence, automation, etc.

四、检测设备 Test equipment

公司检测实验中心通过“中国合格评定国家认可委员会”实验室认可（证书编号：CNAS L7371）。

China National Accreditation Service has recognized the company's Test Center for conformity assessment (certificate No.: CNAS L7371).

检测实验中心拥有各类检测设备和系统总共 300 多台套，包括场发射扫描电镜、热膨胀相变仪、自动多功能硬度计、直读光谱仪、氧氮氢气体分析仪、X 射线荧光光谱仪等各类先进设备，精度高，性能稳定，测量结果准确，能很好地满足技术研发的需要。中心配套建设了实验室信息管理系统（LIMS），使检测管理更加规范，检测效率更高。

The test center has more than 300 sets of testing equipment and systems. This includes a field emission scanning electron microscope, thermal expansion phase change instruments, automatic

multi-function durometers, direct- reading spectrometers, oxygen-nitrogen-hydrogen analyzers, X-ray fluorescence spectrographs, etc. The above-mentioned advanced equipment is characterized by high precision, stable performance, and accurate measurement results to meet the high-demands of technological R&D. The test center is equipped with a laboratory information management system (LIMS) to make testing management more standardized and testing efficiency higher.

五、自主知识产权 Independent intellectual property rights

公司坚持以市场为导向，以客户为中心，瞄准行业先进技术，坚持实施创新驱动战略，着力推进专利结构优化和专利布局，加快自主创新的步伐。公司在电弧炉熔炼方法、夹杂物控制、微合金化控制、轧制控制、管加工等领域，在耐腐蚀管、耐热管、高抗挤管、特殊扣等产品开发方面拥有多项专利。

The company adheres to the market-oriented, customer centered, aims at the advanced technology in the industry, persists in the implementation of innovation driven strategy, focuses on the optimization of patent distribution and patent layout, and accelerates the pace of independent technological innovation. In the fields of electric arc furnace melting method, inclusion control, micro-alloying control, rolling control, pipe processing and other fields, the company has a number of patents layout in product development of corrosion-resistant pipe, heat-resistant pipe, high collapse resistance pipe, premium connections, etc.

通过创新发展战略的实施，有效推动了公司在制造技术和产品研发方面的进展。如高抗挤、高强高韧、抗 CO₂、H₂S 等油套管开发取得突破，满足了用户需求，取得了良好的经济和社会效益。

Through the implementation of innovation driven strategy, effectively promote the company's progress in manufacturing technology and product research and development. Breakthroughs have been made in the development of tubing and casing, such as high collapse resistance, high strength and high toughness, CO₂ resistance and H₂S resistance, etc., which meet the user's needs and achieve good economic and social benefits.



扫描电子显微镜
Scanning electron microscope



热膨胀相变仪
Thermal dilatometer



直读光谱仪
Optical emission spectrometer



X 射线荧光光谱仪
X-ray fluorescence spectrometer

专利号 Patent number	专利名称 Patent name	类型 Type
ZL201610544655.4	高强度抗硫化氢腐蚀无缝管线管及其制备方法	发明
ZL201410844767.2	一种气井套管密封连接结构	发明
ZL201610549035.X	一种调质态 X52 抗硫化氢腐蚀无缝管线管及其制备方法	发明
ZL201710150631.5	一种正火态 X52 抗硫无缝管线管及其制备方法	发明
ZL201710775726.6	一种深井用石油套管及其制备方法	发明
ZL201711404174.4	一种 L80-1 钢级石油套管的生产方法	发明
ZL201810821808.4	一种控制中碳锰钢连铸圆坯中大型夹杂物的生产方法	发明

专利号 Patent number	专利名称 Patent name	类型 Type
ZL201810963077.7	一种提高钒氮微合金化钢中氮回收率的方法	发明
ZL201811283856.9	非调质 N80 钢级石油套管及其制备方法	发明
ZL201811391799.6	一种提升电炉钢水收得率的方法	发明
ZL201910222980.2	一种耐腐蚀高抗挤石油套管及其制备方法	发明
ZL201910222327.6	一种钛微合金化无缝管线管及其制备方法	发明
ZL201910222340.1	一种高性能无缝管线管及其制备方法	发明
ZL201610490248.X	抗硫化氢腐蚀油套管及其制造方法	发明
ZL201911054924.9	一种 110KSI 耐热石油套管及制造方法	发明
ZL201510010582.6	一种油气集输用抗硫管线钢圆坯的生产方法	发明
ZL201510457677.2	一种熔炼 38CrMoAl 钢的高效合金化方法	发明
ZL201510429527.0	一种经济型 L485Q 无缝管线管及其制备方法	发明
ZL201810765102.0	斜轧穿孔机用顶头及斜轧穿孔机	发明
ZL201811252417.1	油套管接箍生产物料流转工艺	发明
ZL201811406567.3	穿孔机定心辊开口度调整装置及穿孔机	发明
ZL201911054921.5	一种油套管接箍螺纹处理全自动上下料工艺	发明
ZL201911053611.1	一种 Ti 微合金化钢 Ti 含量窄范围控制方法	发明
ZL2020103020642	一种用于芯棒的检测装置	发明
ZL201410620903.X	适量配碳大用电量控制用氧电炉炼钢法	发明
ZL201910841792.8	一种提高内喷外淋淬火系统淬火均匀性的方法	发明
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4 生产线介绍 INTRODUCTION OF PRODUCTION LINE

达力普公司拥有从管坯生产、钢管轧制、管端加厚、热处理到石油专用管加工的全流程生产线，主要装备自动化信息化水平行业领先。产线具有全流程质量自动跟踪和信息管理系统，产品质量可靠，生产周期短，可以满足用户个性化、定制化的服务需求。

Dalipal has the whole process production line from billet production, steel tube rolling, tube end upsetting, heat treatment to tubing and casing processing, and the equipment level of each production line is in the advanced level. The whole production line has the whole process automatic tracking and information management system, the product quality is reliable, the production cycle is short, meet the diverse and customized service needs of users.

铸坯生产线 Round billet production line

管坯生产线 Billet production line	
设备 Equipment	超高功率电弧炉 Ultra-high power electric arc furnace 钢包精炼炉 Ladle furnace refining VOD 真空精炼炉 Vacuum oxygen degassing 弧形圆坯连铸机 Round billet continuous casting machine
产品规格 Product size	直径 $\phi 160-\phi 600\text{mm}$ Diameter $\phi 160-\phi 600\text{mm}$



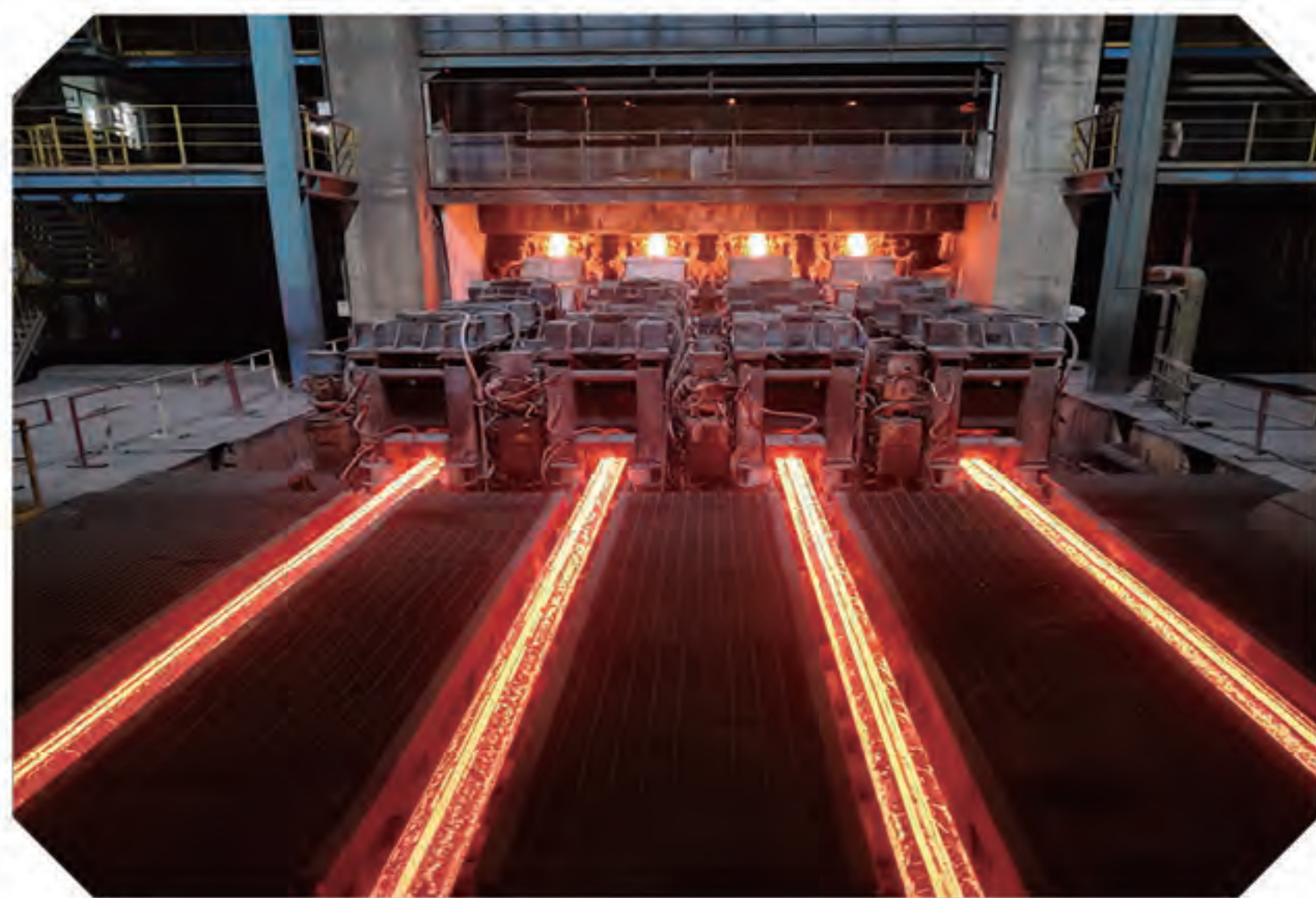
超高功率电弧炉
Ultra-high power electric arc furnace



钢包精炼炉
Ladle furnace refining



VOD 真空精炼炉
Vacuum oxygen degassing



弧形圆坯连铸机
Round billet continuous casting machine

◎特点 Features

1、该产线是一条全废钢冶炼短流程管坯生产线，可生产油井管、管线管、高压锅炉管、高压气瓶管、机械结构管用连铸圆管坯。可根据产品的要求选择工艺路线：

①电弧炉熔炼 -LF 精炼 - 圆坯连铸，②电弧炉熔炼 -LF 精炼 -VD 真空精炼 - 圆坯连铸。

It is a short-process line, which can produce round billet of OCTG, line pipes, high-pressure boiler tubes, high-pressure gas cylinder tubes, and structural tubes. The process route can be selected according to the following product requirements:

① EAF smelting – LF refining – round billet continuous casting; ② EAF smelting – LF refining – VD vacuum refining – round billet continuous casting.

2、该产线是国内少有采用全废钢冶炼生产管坯的生产线，具有 CO₂ 排放量少、能耗低，绿色环保的特点。

This is one of few production line that produces billets with 100% scrap in China. The process is characterized by less emission of CO₂, low energy consumption, and environmental protection.

3、经过数十年的攻关，达力普公司形成了独有的全废钢电弧炉冶炼工艺技术，其中耐腐蚀管坯的制造技术获得了省技术发明奖。

After decades of years of technical efforts, Dalipal has finally developed a unique EAF technology that can manufacture billets using 100% scrap. The company's corrosion resistant billet manufacturing technology has won the Hebei Technological Innovation Prize.

159 连轧管生产线 159 Rolling tube production line

159 连轧管生产线 159 Rolling tube production line	
设备 Equipment	环形加热炉 Rotary Heating Furnace 穿孔机 Piercing mill 五机架三辊连轧机 5 stands 3-roll continuous rolling mill 20 机架张力减径机 20-stand slight-stretch reducing mill 矫直机 Straightening mill 漏磁探伤机 Magnetic flux leakage flaw detector 测长称重喷标设备 Length measuring and weighing marking equipment
产品规格 Product size	外径 Diameter: Φ48-159mm 壁厚 Thickness: 3.68-20mm



25 米环形加热炉
25m Rotary heating furnace



穿孔机
Piercing mill



五机架三辊连轧机
5 stands 3-roll continuous rolling mill



微张力减径机
Slight-stretch reducing mill

◎特点 Features

本生产线采用当今世界上最先进的限动芯棒五机架三辊连轧机，自动化程度高，穿孔、连轧、张力减径三大主机均配备数字化工艺模型，可实现全线工艺参数自动计算、下发执行、记录与存储；生产过程，产品的外径和壁厚可智能控制，几何尺寸精度和表面质量高，可大批量、低成本生产高端油套管。

This production line adopts the world's most advanced 5 stands 3-roll retained mandrel mill, which features high automation. The piercing, continuous rolling, and stretch reducing mills are equipped with a digital process model – automatic calculation, release & execution, recording, and storage of parameters of the entire line are performed. During production, the outer diameter and the wall thickness of products can be controlled using AI technology, so the geometric dimensions are of high precision and the surface quality is high, and high-end tubing and casing can be produced large batches and at a low cost.

219 Accu-Roll 轧管生产线 219 Accu-Roll Rolling tube production line

219 Accu-Roll 轧管生产线 219 Accu-Roll Rolling tube production line	
设备 Equipment	环形加热炉 Rotary Heating Furnace 穿孔机 Piercing mill Accu-Roll 轧管机 Accu-Rolling mill 微张力减径机 Slight-stretch reducing mill 矫直机 Straightening mill 漏磁探伤机 Magnetic flux leakage flaw detector 测长称重喷标设备 Length measuring and weighing marking equipment
产品规格 Product size	外径 Diameter: $\Phi 114 \sim 339\text{mm}$ 壁厚 Thickness: 4.0 ~ 35mm



18 米环形加热炉
18m Rotary heating furnace



穿孔机
Piercing mill



Accu-Roll 轧管机
Accu-Roll Rolling mill



微张力减径机
Slight-Stretch Reducing Mill

● 特点 Features

自主开发了轧管机后台四辊定心技术，大幅度提高了轧制速度和产品的表面质量，特别适合制造高抗挤毁的套管、中厚壁无缝钢管，处于国内领先水平；生产组织灵活，适用于小批量、多品种的生产方式。

Four-roller centering technology on the rolling mill backstage has been independently developed, which significantly improves the rolling speed and the product surface quality. This technology is particularly suitable for the manufacturing of high anti-collapse tubing and casing and medium-thick seamless steel tubes. This technology is quite advanced in China. The production organization is flexibly and suitable for small-batch and multi-type production.

管端加厚线 Tube end upsetting line

管端加厚线 Tube end upsetting line	
设备 Equipment	管端加厚机 Upsetting equipment 感应加热炉 Induction heating furnace
产品规格 Product size	外径 Diameter: $\Phi 48.26\sim 114.3\text{mm}$ 壁厚 Thickness: 3.68 ~ 9.52mm



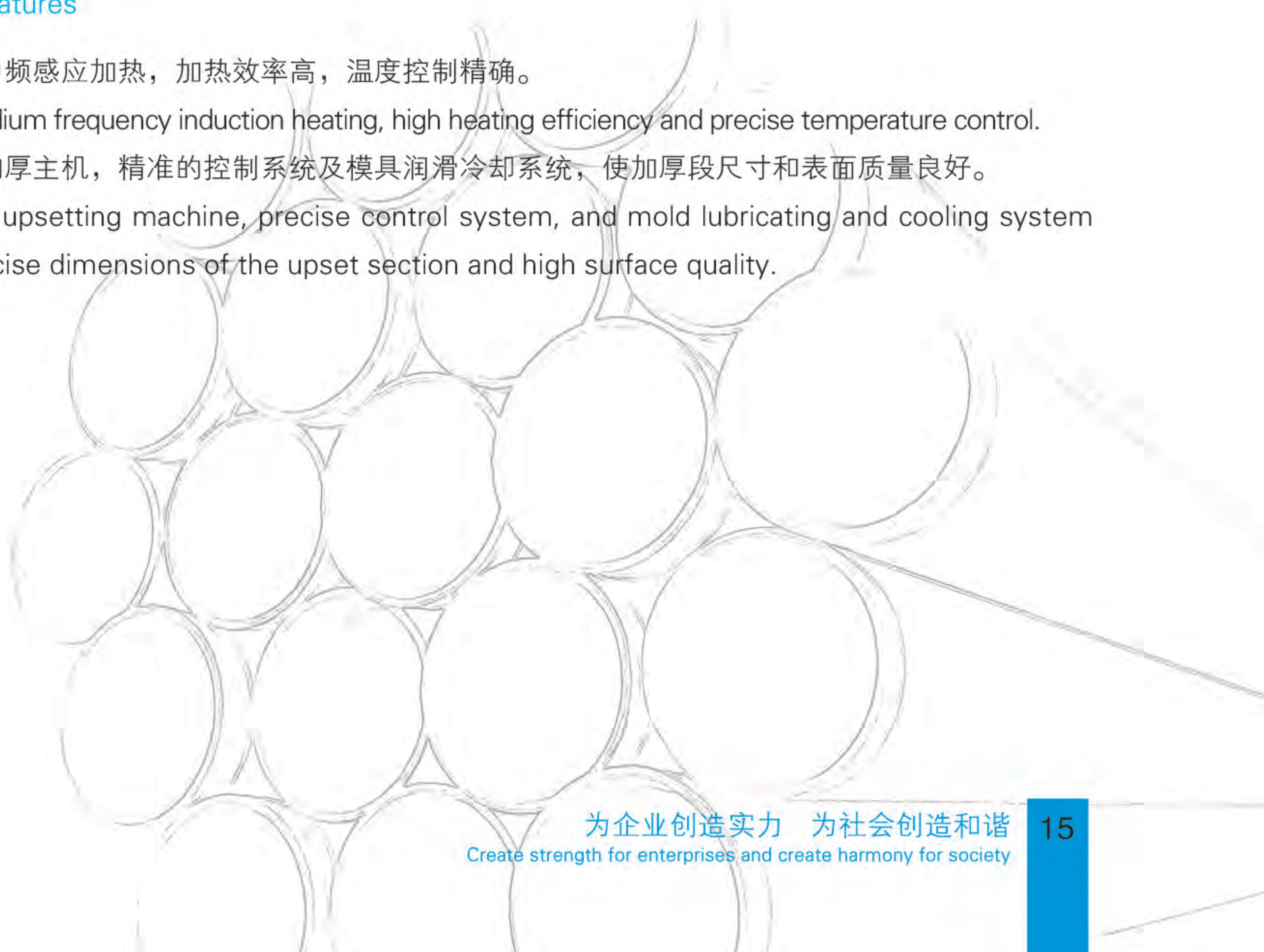
油管加厚线
Tube upsetting line



液压加厚设备
Hydraulic upsetting equipment

◎特点 Features

- 1、采用中频感应加热，加热效率高，温度控制精确。
Using medium frequency induction heating, high heating efficiency and precise temperature control.
- 2、液压加厚主机，精准的控制系统及模具润滑冷却系统，使加厚段尺寸和表面质量良好。
Hydraulic upsetting machine, precise control system, and mold lubricating and cooling system guarantee precise dimensions of the upset section and high surface quality.



两条热处理生产线 Two heat treatment production lines

两条热处理生产线 Two heat treatment production lines	
设备 Equipment	淬火加热炉 Quenching furnace 回火加热炉 Tempering furnace 淬火机床 Quenching machine 矫直机 Straightening mill 漏磁探伤机 Magnetic flux leakage flaw detector 水超探伤机 Ultrasonic flaw detector 测长称重喷标设备 Length measuring and weighing marking equipment
产品规格 Product size	外径 Diameter: Φ48-339mm 壁厚 Thickness: 3.5-35mm



淬火炉
Quenching furnace



回火炉
Tempering furnace



淬火机床
Quenching machine



矫直机
Straightening mill

特点 Features

1、每条生产线配备两座连续加热炉，炉温控制精度为 $\pm 5^{\circ}\text{C}$ 。热处理连续炉热转化效率高，工艺技术参数易于控制，生产效率高，产品质量稳定。

Equipped with two continuous heating furnaces with a temperature control precision of $\pm 5^{\circ}\text{C}$. Continuous heat treatment furnace has high heat conversion efficiency, easy control of technological parameters, high production efficiency and stable product quality.

2、配套一座精确控制水压、流量的淬火机床。具备内喷和外淋双冷却系统，保证钢管水淬均匀冷却，为得到组织均匀、性能均匀的产品提供有力保障。

Matched with one quenching machining with precise water pressure control and flow rate control. It is equipped with an internal and external spraying system, which will guarantee that the steel tubes cool down evenly through water quenching, and provides a solid foundation for products with a homogeneous structure and performance.

3、配套漏磁和超声探伤机可检测钢管内外表面横、纵向缺欠，还可以进行分层和全长测厚检测。
The magnetic flux leakage and ultrasonic flaw detector can detect horizontal and longitudinal defects inside and outside steel tubes and also lamination and full-length wall-thickness.

4、MES 系统向智能库的 WMS 系统发送要料申请，完成自动上料。一级、二级自动化系统和 MES 系统协同实现石油管逐支跟踪，热处理后进入智能库。

The MES system sends the material feeding application to the WMS system of the intelligent warehouse to complete automatic material feeding. The primary and secondary automatic systems and MES systems work together to successfully track each petroleum tube. After the heat treatment, tubes are delivered to the intelligent warehouse.

石油专用管生产线 OCTG production line

石油专用管生产线 OCTG production line	
设备 Equipment	PMC 管螺纹车丝机 PMC pipe treading machine 探伤机 Flaw detector 自动接箍、螺纹保护器拧接机器人 Automatic screwing robot for coupling and thread protector 水压试验机 Hydraulic testing machine 测长称重防腐喷标设备 Length measuring and weighing painting marking 自动打包机 Automatic baler
产品规格 Product size	直径 Diameter Φ48-508mm



PMC 五轴联动数控管螺纹车床
PMC Five-axis linkage CNC pipe threading lathe



螺纹保护器拧接机器人
Installing the thread protector robot



油套管喷条形码，实现逐支跟踪
Barcodes branch by branch tracking



螺纹参数自动检测
Automatic detection of thread parameters

特点 Features

1、高效、智能的石油专用管制造生产线主体设备采用世界上最先进的五轴联动数控管螺纹车丝机，其具有加工效率高、产品质量稳定的特点。

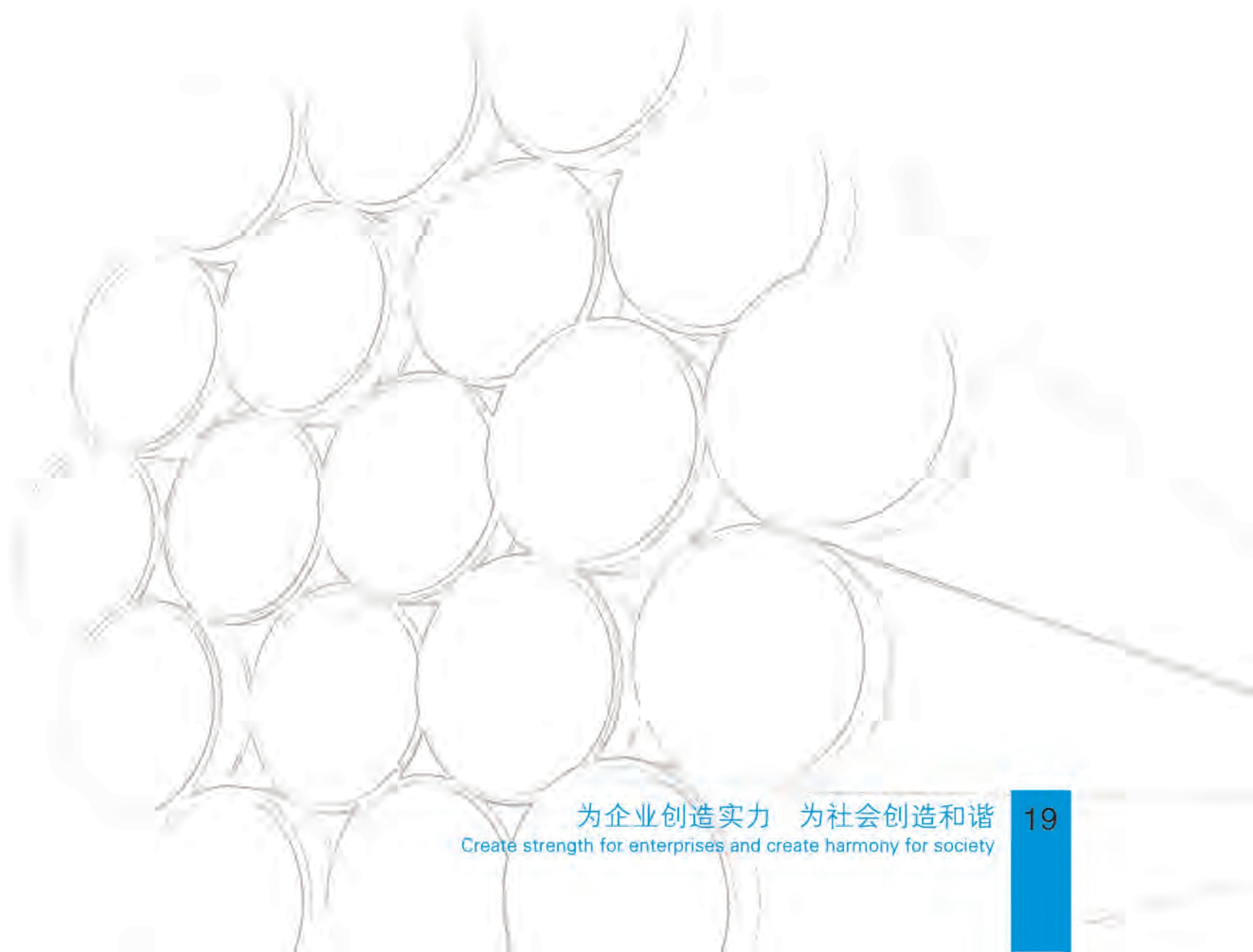
This line adopts the world's most advanced five-axle simultaneous CNC tube threading machine and tube thread processing equipment characteristic of high processing efficiency and steady performance.

2、配有可视功能的六轴智能机器人，自动完成上下料工作、接箍预拧接、螺纹保护器拧接工作，具有自动化程度高，拧接质量可靠的特点。

This line is also equipped with six-axle intelligent robots with visual functions. They can automatically complete material feeding and discharging, coupling pre-tightening and making up, tightening of the thread protector, etc. Thus, it has the characteristics of high automation and reliable screw connection quality.

3、本生产线将 MES 系统与管体编码系统、螺纹检测数据自动采集系统有机集成，形成了制造过程的信息化管理系统，实现逐支跟踪，测量数据自动记录等功能，使产品质量控制达到先进水平。

This production line is organically integrated with the MES system, the tube body coding system, and the thread test data automatic collection system, forming an information-based management system for the manufacturing process. This can realizes functions such as each tubing tracking and automatic recording of measurement data, so as to achieve advanced product quality control.



接箍生产线 Coupling production line

接箍生产线 Coupling production line	
设备 Equipment	接箍螺纹车丝机 Coupling threading machine 磁粉探伤机 Magnetic particle flaw detector 自动上下料机器人 Automatic feeding and unloading robot 自动打码设备 Automatic coding equipment
产品规格 Product size	直径 Diameter $\Phi 55.88 \sim 533\text{mm}$



接箍智能加工单元
Coupling intelligent machining unit



外圆加工上料机器人
External processing feeding robot



接箍锯切取料机器人
Coupling sawing reclaiming robot



接箍加工上料机器人
Coupling threading feeding robot

特点 Features

- 1、智能接箍加工线由接箍坯料切断、预加工、螺纹加工和螺纹表面处理四个智能化生产单元构成。
The intelligent coupling processing line comprises four intelligent production units – coupling raw material cutting, pr-processing, thread machining, and thread surface processing.
- 2、接箍切断单元：油套管接箍料全自动切断单元，配套上下料机器人，准确高效的实现接箍半成品切断和装框。
Coupling sawing unit. This unit can realize the fully-automatic cutting of tubing and casing coupling materials and is equipped with material feeding and discharging robots, to obtain the accurate and efficient cutting and putting semi-finished coupling products into box.
- 3、接箍螺纹智能加工单元，配备两套带有视觉识别系统的智能机器人，两台 PMC 自动装卸料石油专用管接箍车丝机，一套自动打标系统，螺纹检测数字化系统，实现螺纹检测数据的自动录入、统计分析和加工质量判定，一套具备自学习能力的磁粉探伤、识别、判定系统。本单元是当今世界智能化水平最高的石油专用管接箍螺纹加工装备。
Automatic coupling processing center. The center is equipped with two intelligent robots carrying a visual identification system, two PMC COLINET automatic material loading/unloading casing and tube coupling threading machines, one automatic marking system, one digitalized thread inspection system that can perform automatic entry, statistical analysis, and processing quality judgment of thread inspection data, and one magnetic particle test, identification, judgment system with a self-learning ability. This unit is the highest intelligence level for OCTG coupling thread machining equipment in the world.
- 4、接箍螺纹表面处理单元是一条上下料、过程运行、工艺参数检测全自动化的螺纹表面处理单元。该单元是目前国内生产能力最大、环保效果最好、自动化程度最高的螺纹表面处理生产线。本生产线 MES 系统实现石油专用管接箍从坯料切断至成品入库的全流程信息管理，实现全流程的产品信息追溯。
The coupling thread surface processing unit is a fully automatic thread surface processing unit that involves material feeding and discharging, process operation, and process parameter test. This unit is a threaded surface processing line with the largest production capacity, the best environmental protection and the highest automation in China. The MES system of this production line can perform information management of the entire process from petroleum tube coupling to raw material cutting, to tracing production information through out the entire process.

生产检测设备 Production test equipment

配备超声检测设备、漏磁检测设备、磁粉检测设备，静水压试验设备，最大试压压力达到100MPa。同时配有测长、称重、自动喷码设备。

Ultrasonic test equipment, magnetic flux leakage test equipment, magnetic powder test equipment, and hydrostatic pressure testing equipment is configured. The maximum test pressure can be up to 100MPa. Meanwhile, it is equipped with the length measurement, weighing, and automatic code spraying equipment.



漏磁探伤机
Magnetic flux leakage testing machine



超声探伤机
Ultrasonic equipment



水压试验机
Hydrostatic testing machine



测长、称重、喷标设备
Length measuring, weighing, and code spraying equipment

5 质量保证 QUALITY ASSURANCE

自公司成立以来，通过持续改善和优化，强化能力提升和规范管理，取得了多项体系认证，相继通过了中国船级社 ISO9001 质量体系认证、美国石油学会产品质量认证、特种设备制造认证、中国石油健康安全环境管理体系认证、CNAS 体系认证、ISO10012 测量管理体系认证、知识产权管理体系认证、能源管理体系认证……

Since the establishment of the company, through the development and improvement of technical ability, it has been recognized by various system certification, successively passed ISO9001 certification, API 5CT/5L certification, TS certification, CNPC health, safety and environmental management system certification, CNAS system certification, ISO10012 measurement management system certification, intellectual property management system certification, energy management system certification...



6

API 标准油套管

CASING AND TUBING IN API STANDARD

达力普生产的 API 标准油套管，在化学成分、力学性能、尺寸精度等质量控制方面在严格遵循 API 5CT 标准控制原则的基础上，对各项指标采取了更为严格的控制措施，使实物性能更加稳定，质量更加可靠。

The API standard casing and tubing produced by Dalipal strictly follows the API 5CT standard in terms of quality control such as chemical composition, mechanical properties, and dimensional accuracy. Within the scope of the standard, all control indicators are tightened to make the performance more stable and the quality more reliable.

在成分控制上，制订严格的内控标准，其实物冶炼 P、S 控制水平远远优于 API 5CT 的标准要求。对于有耐腐蚀的要求产品，严格控制强度范围，实际控制水平介于强度要求的中线附近。对于其他钢级，屈服强度控制水平处于强度要求范围的中上限；除此之外，材料的韧性性能远远高于 API 5CT 的标准要求，通过强度和韧性的控制，保证了油套管的实物性能。

In terms of composition control, strict internal control standards are implemented, and the P and S control levels of physical smelting are far stricter than the standard requirements of API 5CT. For products with corrosion resistance requirements, the strength range is strictly controlled, and the actual control level is near the midline of the strength requirements. For other steel grades, the yield strength control level is at the upper limit of the strength requirement range; in addition, the toughness performance of the material is much higher than the API 5CT standard requirement. Through the control of strength and toughness, the physical performance of the casing and tubing is guaranteed.

◎应用 Uses

- 油管：下入井中，用作生产流体或注入流体的管子。
- Tubing：Pipe placed in a well to produce or inject fluids.
- 套管：应用于地表下进入已钻油气井井眼做衬壁的管子。

Casing：Pipe run from the surface and intended to line the walls of a drilled well.

◎执行标准 Standard API Spec 5CT、API Spec 5B、技术协议、企业标准
API Spec 5CT、API Spec 5B、Technical agreement and corporation agreement

◎覆盖 API Spec 5CT PSL1-PSL3 等级 Covering API Spec 5CT PSL1, PSL2, PSL3

◎化学成分，质量分数（%） Chemical composition, mass fraction(%)

钢级 Grade	C	Mn	Mo	Cr	Ni	Cu	P	S	Si
					max	max	max	max	max
H40							0.020	0.010	
J55							0.020	0.010	
K55							0.020	0.010	
N80-1							0.020	0.010	
N80-Q							0.020	0.010	
R95	0-0.45	0-1.90					0.020	0.010	0.45
L80-1	0-0.43	0-1.90			0.25	0.35	0.020	0.010	0.45
L80-9Cr	0-0.15	0.30-0.60	0.90-1.10	8.00-10.0	0.50	0.25	0.015	0.010	1.00
L80-13Cr	0.15-0.22	0.25-1.00		12.0-14.0	0.50	0.25	0.015	0.010	1.00
C90	0-0.35	0-1.20	0.25-0.85	0-1.50	0.99		0.015	0.010	
T95	0-0.35	0-1.20	0.25-0.85	0.4-1.50	0.99		0.015	0.005	
C110	0-0.35	0-1.20	0.25-1.00	0.4-1.50	0.99		0.015	0.005	
P110							0.020	0.010	
Q125	0-0.35	0-1.35	0-0.85	0-1.50	0.99		0.015	0.005	

◎力学性能 Mechanical properties

钢级 Grade	加载下的总伸长率 Total elongation under load	屈服强度 Yield strength	抗拉强度 Tensile strength Min	硬度 Hardness Max		规定厚度 Specified wall thickness	允许硬度变化 Allowable hardness variation
	m	(MPa)	(MPa)	HRC	HBW	mm	HRC
H40	0.5	276-552	414				
J55	0.5	379-552	517				
K55	0.5	379-552	655				
N80-1	0.5	552-758	689				
N80-Q	0.5	552-758	689				
R95	0.5	655-758	724				
L80	0.5	552-655	655	23	241		
C90	0.5	621-724	689	25.4	255	≤ 12.70 12.71~19.04 19.05~25.39 ≥ 25.40	3.0 4.0 5.0 6.0
T95	0.5	655-758	724	25.4	255	≤ 12.70 12.71~19.04 19.05~25.39 ≥ 25.40	3.0 4.0 5.0 6.0
C110	0.7	758-828	793	30	286	≤ 12.70 12.71~19.04 19.05~25.39 ≥ 25.40	3.0 4.0 5.0 6.0
P110	0.6	758-965	862				
Q125	0.65	862-1034	931			≤ 12.70 12.71~19.04 ≥ 19.05	3.0 4.0 5.0

注：Q125 PSL3 等级屈服强度范围为 862-965MPa Note: Q125 PSL3 Yield strength：862-965MPa

◎油管产品规格 Tubing product size

油管规格及端部加工形式 Size of tubing, Type of end finish													
代号 Label			外径 Outside diameter mm	单位长度重量 Nominal linear masses		壁厚 Wall thickness mm	端部加工形式 Type of end finish						
1	2			不加厚 带螺纹 和接箍 Non-upset T&C Kg/m	外加厚 带螺纹 和接箍 Ext. upset T&C Kg/m		H40	J55	L80- 1/9Cr/ 13Cr R95	N801、 Q 类	C90	T95	P110
	不加厚 带螺纹 和接箍 NU T&C	外加厚 带螺纹 和接箍 EU T&C											
2-3/8	4.00		60.32	5.95		4.24	PU	PN	PN	PN	PN	PN	PN
2-3/8	4.60	4.70	60.32	6.85	6.99	4.83	PNU	PNU	PNU	PNU	PNU	PNU	PNU
2-3/8	5.80	5.95	60.32	8.63	8.85	6.45			PNU	PNU	PNU	PNU	PNU
2-3/8	7.35	7.45	60.32	10.94	11.09	8.53			PU		PU	PU	
2-7/8	6.40	6.50	73.02	9.52	9.67	5.51	PNU	PNU	PNU	PNU	PNU	PNU	PNU
2-7/8	7.80	7.90	73.02	11.61	11.76	7.01			PNU	PNU	PNU	PNU	PNU
2-7/8	8.60	8.70	73.02	12.80	12.95	7.82			PNU	PNU	PNU	PNU	PNU
2-7/8	9.35	9.45	73.02	13.91	14.06	8.64			PU		PU	PU	
3-1/2	7.70		88.90	11.46		5.49	PN	PN	PN	PN	PN	PN	
3-1/2	9.20	9.30	88.90	13.69	13.84	6.45	PNU	PNU	PNU	PNU	PNU	PNU	PNU
3-1/2	10.20		88.90	15.18		7.34	PN	PN	PN	PN	PN	PN	
3-1/2	12.70	12.95	88.90	18.90	19.27	9.52			PNU	PNU	PNU	PNU	PNU
4	9.50		101.60	14.14		5.74	PN	PN	PN	PN	PN	PN	
4	10.70	11.00	101.60		16.37	6.65	PU	PU	PU	PU	PU	PU	
4-1/2	12.60	12.75	114.30	18.75	18.97	6.88	PNU	PNU	PNU	PNU	PNU	PNU	
N- 不加厚带螺纹和接箍 U- 外加厚带螺纹和接箍 N=Non-upset threaded and coupled U=External threaded and coupled													

◎套管产品规格 Casing product size

套管规格及端部加工形式					Size of casing, Type of end finish							
代号	Label	外径 OD mm	单位长度名义 质量 (带螺纹和 接箍) Nominal linear mass T&C kg/m	壁厚 Wall thickness mm	端部加工形式 Type of end finish							
1	2				H40	J55 K55	L80- 1/9Cr/ 13Cr/ R95	N80 1、Q 类	C90 T95	C110	P110	Q125
4-1/2	9.50	114.30	14.38	5.21	PS	PS						
4-1/2	10.50	114.30	15.73	5.69		PSB						
4-1/2	11.60	114.30	17.38	6.35		PSLB	PLB	PLB	PLB	P	PLB	
4-1/2	13.50	114.30	19.87	7.37			PLB	PLB	PLB	P	PLB	
4-1/2	15.10	114.30	22.69	8.56							PLB	PLB
5	11.50	127.00	17.19	5.59		PS						
5	13.00	127.00	19.69	6.43		PSLB						
5	15.00	127.00	22.69	7.52		PSLB	PLB	PLB	PLB	P	PLB	
5	18.00	127.00	27.19	9.19			PLB	PLB	PLB	P	PLB	PLB
5	21.40	127.00	32.13	11.10			PLB	PLB	PLB	P	PLB	PLB
5	23.20	127.00	34.76	12.14			PLB	PLB	PLB	P	PLB	PLB
5	24.10	127.00	36.15	12.70			PLB	PLB	PLB	P	PLB	PLB
5-1/2	14.00	139.70	20.91	6.20	PS	PSLB						
5-1/2	15.50	139.70	23.48	6.98		PSLB						
5-1/2	17.00	139.70	25.72	7.72			PLB	PLB	PLB	P	PLB	
5-1/2	20.00	139.70	30.05	9.17			PLB	PLB	PLB	P	PLB	
5-1/2	23.00	139.70	34.05	10.54			PLB	PLB	PLB	P	PLB	PLB
6-5/8	20.00	168.28	29.76	7.32	PS	PSLB						
6-5/8	24.00	168.28	35.72	8.94		PSLB	PLB	PLB	PLB	P	PLB	
6-5/8	28.00	168.28	41.67	10.59			PLB	PLB	PLB	P	PLB	
6-5/8	32.00	168.28	47.62	12.06			PLB	PLB	PLB	P	PLB	PLB
7	17.00	177.80	25.60	5.87	PS							
7	20.00	177.80	29.91	6.91	PS	PS						
7	23.00	177.80	34.67	8.05		PSLB	PLB	PLB	PLB	P		
7	26.00	177.80	39.14	9.19		PSLB	PLB	PLB	PLB	P	PLB	
7	29.00	177.80	43.60	10.36			PLB	PLB	PLB	P	PLB	
7	32.00	177.80	47.92	11.51			PLB	PLB	PLB	P	PLB	
7	35.00	177.80	52.09	12.65			PLB	PLB	PLB	P	PLB	PLB
7	38.00	177.80	56.10	13.72			PLB	PLB	PLB	P	PLB	PLB
7-5/8	24.00	193.68	35.72	7.62	PS							
7-5/8	26.40	193.68	39.29	8.33		PSLB	PLB	PLB	PLB	P		
7-5/8	29.70	193.68	44.20	9.52			PLB	PLB	PLB	P	PLB	
7-5/8	33.70	193.68	50.15	10.92			PLB	PLB	PLB	P	PLB	
7-5/8	39.00	193.68	58.04	12.70			PLB	PLB	PLB	P	PLB	PLB
7-5/8	42.80	193.68	63.69	14.27			PLB	PLB	PLB	P	PLB	PLB
7-5/8	45.30	193.68	67.41	15.11			PLB	PLB	PLB	P	PLB	PLB
7-5/8	47.10	193.68	70.09	15.88			PLB	PLB	PLB	P	PLB	PLB
P——平端 S——短圆螺纹 L——长圆螺纹 B——偏梯形螺纹 P——PE S——SC L——LC B——BC												

◎套管产品规格 Casing product size

套管规格及端部加工形式					Size of casing, Type of end finish							
代号 Label		外径 OD mm	单位长度名义质量 (带 螺纹和接箍) Nominal linear mass T&C kg/m	壁厚 Wall thickness mm	端部加工形式 Type of end finish							
1	2				H40	J55 K55	L80— 1/9Cr/ 13Cr/ R95	N80 1、Q 类	C90 T95	C110	P110	Q125
8—5/8	24.00	219.08	35.72	6.71		PS						
8—5/8	28.00	219.08	41.67	7.72	PS							
8—5/8	32.00	219.08	47.62	8.94	PS	PSLB						
8—5/8	36.00	219.08	53.57	10.16		PSLB	PLB	PLB	PLB	P		
8—5/8	40.00	219.08	59.53	11.43			PLB	PLB	PLB	P	PLB	
8—5/8	44.00	219.08	65.48	12.70			PLB	PLB	PLB	P	PLB	
8—5/8	49.00	219.08	72.92	14.15			PLB	PLB	PLB	P	PLB	PLB
9—5/8	32.30	244.48	48.07	7.92	PS							
9—5/8	36.00	244.48	53.57	8.94	PS	PSLB						
9—5/8	40.00	244.48	59.53	10.03		PSLB	PLB	PLB	PLB	P		
9—5/8	43.50	244.48	64.74	11.05			PLB	PLB	PLB	P	PLB	
9—5/8	47.00	244.48	69.94	11.99			PLB	PLB	PLB	P	PLB	PLB
9—5/8	53.50	244.48	79.62	13.84			PLB	PLB	PLB	P	PLB	PLB
9—5/8	58.40	244.48	86.91	15.11			PLB	PLB	PLB	P	PLB	PLB
10—3/4	32.75	273.05	48.74	7.09	PS							
10—3/4	40.50	273.05	60.27	8.89	PS	PSB						
10—3/4	45.50	273.05	67.71	10.16		PSB						
10—3/4	51.00	273.05	75.90	11.43		PSB	PSB	PSB	PSB		PSB	
10—3/4	55.50	273.05	82.59	12.57			PSB	PSB	PSB	P	PSB	
10—3/4	60.70	273.05	90.33	13.84					PSB	P	PSB	PSB
10—3/4	65.70	273.05	97.77	15.11					PSB	P	PSB	PSB
11—3/4	42.00	298.45	62.50	8.46	PS							
11—3/4	47.00	298.45	69.94	9.53		PSB						
11—3/4	54.00	298.45	80.36	11.05		PSB						
11—3/4	60.00	298.45	89.29	12.42		PSB	PSB	PSB	PSB	P	PSB	PSB
13—3/8	48.00	339.72	71.43	8.38	PS							
13—3/8	54.50	339.72	81.1	9.65		PSB						
13—3/8	61.00	339.72	90.78	10.92		PSB						
13—3/8	68.00	339.72	101.19	12.19		PSB	PSB	PSB	PSB	P	PSB	
13—3/8	72.00	339.72	107.15	13.06			PSB	PSB	PSB	P	PSB	PSB
16	65.00	406.40	96.73	9.53	PS							
16	75.00	406.40	111.61	11.13		PSB						
16	84.00	406.40	125.01	12.57		PSB						
18—5/8	87.50	473.08	130.21	11.05	PS	PSB						
20	94.00	508.00	139.89	11.13	PSL	PSLB						
20	106.50	508.00	158.49	12.70		PSLB						
20	133.00	508.00	197.93	16.13		PSLB						
P——平端		S——短圆螺纹	L——长圆螺纹	B——偏梯形螺纹	P——PE		S——SC		L——LC		B——BC	

DLP 系列油套管 (非 API 系列) DLP CASING AND TUBING (NON-API)

随着油套管服役条件日益复杂和严酷，适应各种油气井条件的非 API 油套管应运而生，达力普非 API 油套管产品 DLP 系列主要包括：抗 H₂S 应力腐蚀油套管、耐 CO₂ 腐蚀油套管、耐 CO₂/H₂S 腐蚀系列油套管、高抗挤毁系列套管、高强高韧套管、含硫环境使用的高抗挤毁套管、耐热系列油套管及特殊扣型油套管等。除上述产品外，达力普也可根据用户的需求，提供定制化解决方案。系列产品介绍如下：

Non-API casing and tubing being service for complex and harsh conditions becomes popular as so far. Non-API casing and tubing of DALIPAL series include: anti-H₂S corrosion casing and tubing, economical anti-CO₂ and anti-CO₂/H₂S corrosion casing and tubing, high collapse strength casing, high strength and high toughness casing, high collapse strength and anti-H₂S corrosion casing, heat resistance casing and tubing, premium connection casing and tubing, and so on. Customized products could be supplied according to the requirements of customers, except above products. The detail introductions are as follows:

◎ DLP 系列油套管产品 DLP Casing and Tubing

规格 Size		抗 H ₂ S 系列 Anti-H ₂ S	耐 CO ₂ 系列 Economical Anti-CO ₂	耐 CO ₂ / H ₂ S 系列 Anti-CO ₂ / H ₂ S	含硫环境抗挤系列 High Collapse Strength and Anti-H ₂ S Corrosion	耐热系列 Heat Resistance	高抗挤系列 High Collapse	高强韧系列 High Strength and High Toughness	特殊螺纹系 列 Premium Connections
油管 Tubing	2 3/8"	✓	✓	✓		✓			✓
	2 7/8"	✓	✓	✓		✓			✓
	3 1/2"	✓	✓	✓		✓			✓
	4"	✓	✓	✓		✓			✓
	4 1/2"	✓	✓	✓		✓			✓
套管 Casing	4 1/2"	✓	✓	✓	✓	✓	✓	✓	✓
	5"	✓	✓	✓	✓	✓	✓	✓	✓
	5 1/2"	✓	✓	✓	✓	✓	✓	✓	✓
	6 5/8"	✓	✓	✓	✓	✓	✓	✓	✓
	7"	✓	✓	✓	✓	✓	✓	✓	✓
	7 5/8"	✓	✓	✓	✓	✓	✓	✓	✓
	8 5/8"	✓	✓	✓	✓	✓	✓	✓	✓
	9 5/8"	✓	✓	✓	✓	✓	✓	✓	✓
	10 3/4"	✓	✓	✓	✓	✓	✓	✓	✓
	13-3/8"	✓	✓	✓	✓	✓	✓	✓	✓
注：✓表示可生产 Note: ✓ represents producibility									

❖ 抗 H₂S 应力腐蚀系列油套管
Anti-H₂S Corrosion Casing and Tubing

在含有 H₂S 的油气井中，油套管失效的最大风险是硫化物应力腐蚀（SSC），因此应用于 H₂S 环境下的油套管必须具备足够的抗 SSC 性能。针对含 H₂S 的油气井环境，达力普公司开发的铬－钼钢系抗硫系列油套管，其具备优异的抗 SSC 性能。此钢种具有高淬透性和回火稳定性，通过 Cr-Mo 和针对不同钢级的热处理，获得细小而均匀的回火索氏体，其硬度和强度完全满足相应钢级要求，同时表现出优异的抗 SSC 性能。

The biggest failure risk of casing and tubing served in H₂S contained wells is sulfide stress corrosion cracking. Dalipal develops a series of casing and tubing with favorable sulfide resistance performance, which is produced by Cr-Mo steel. The steel has high hardenability and tempering stability, and obtains ultra-fine and homogeneous tempered sorbite under certain tempering conditions. Its hardness and strength fully meet the different grades through the fine-tuning of chemical compositions and heat treatment parameters.

◎应用 Uses

用于含有 H₂S 酸性腐蚀介质的油、气井的开采。
Used for oil and gas wells containing H₂S corrosive medium.

◎产品命名 Names

命名规则：DLP + 强度 + 抗硫
Naming rule: DLP + Strength + Anti-H₂S

◎含义 Meanings

DLP——达力普非 API 系列
DLP——DALIPAL Non-API series
强度——取英制最小名义屈服强度（单位为 KSI，并修整至 5 的倍数）
Strength——Specified minimum yield strength (the unit is KSI and trimmed to multiples of 5)
S—抗硫 SS—高抗硫
S—Anti-H₂S SS—High anti-H₂S

H ₂ S 分压 H ₂ S partial pressure		选用抗硫级别 Anti-H ₂ S level
H ₂ S 分压 > 700 kPa H ₂ S Partial Pressure > 700 kPa		SS
10 kPa ≤ H ₂ S 分压 ≤ 700 kPa 10 kPa ≤ H ₂ S Partial Pressure ≤ 700 kPa	爆破安全系数 ≤ 1.35 Blasting safety factor ≤ 1.35	SS
	爆破安全系数 > 1.35 Blasting safety factor > 1.35	S
0.34 kPa ≤ H ₂ S 分压 < 10 kPa 0.34 kPa ≤ H ₂ S Partial Pressure < 10 kPa		S
H ₂ S 分压 < 0.34 kPa H ₂ S Partial Pressure < 0.34 kPa		非抗硫 Non anti-H ₂ S

◆ 耐 CO₂ 和耐 CO₂/H₂S 腐蚀系列油套管
Anti-CO₂ and Anti-CO₂/H₂S Corrosion Casing and Tubing

钢级牌号 Grade	检验方法 Test method	加载应力 Load stress(MPa)	承载时间 Loading time(H)
DLP80S DLP90S DLP95S DLP110S	NACE TM 0177 A 溶液 A 法 NACE TM 0177 A Solution, Method A	SYMS*80%	720
DLP80SS DLP90SS DLP95SS DLP110SS		SYMS*90%	720
DLP125S	NACE TM 0177 B 溶液 A 法 H ₂ S 分压为 10kPa NACE TM 0177 B solution, Method A H ₂ S pressure is less 10kPa	SYMS*80%	720

◎应用 Uses:

用于含有 CO₂、H₂S 腐蚀性环境工况的油、气井的钻探开发。
Used for oil and gas wells containing CO₂, H₂S corrosive media.

◎产品命名 Names:

Naming rule: DLP+ Strength + "-*Cr"; DLP+ Strength + Anti-H₂S + "-*Cr"

◎含义 Meanings:

DLP—达力普非 API 系列

DLP —DALIPAL Non-API series

强度——取英制最小名义屈服强度（单位为 KSI，并修整至 5 的倍数）

Strength——Specified minimum yield strength (the unit is KSI and trimmed to multiples of 5)

S—抗硫 SS—高抗硫

S—Anti-H₂S SS—High anti-H₂S

Cr——抗 CO₂ 腐蚀； 为 Cr 含量

Cr——Anti-CO₂ corrosion； is Cr content

耐 CO₂ 腐蚀性能试验 CO₂ corrosion resistance test

根据其使用环境进行相应的耐蚀性能试验。

Corrosion resistance test is carried out according to the service environment.

◎标准试验条件 Standard test conditions:

试验溶液 Test solution: 3.5% NaCl;
二氧化碳分压 Carbon dioxide partial pressure: 2.5MPa;
温度 Temperature: 60°C;
时间 Time: 10 days;

西安摩石油工程实验室股份有限公司 Xi'an Muir Petroleum Engineering Laboratory Co., Ltd. 西安摩石油工程实验室股份有限公司 检验检测中心 Xi'an Muir Petroleum Engineering Laboratory Co., Ltd.							
硫化物应力腐蚀开裂 (SSC-A 法) 试验检测报告							
SSC-Method A Resistance Test Report							
(2020) 摩尔检字第 01-1779-01 号 (2020) MAURER 01-1779-01							
样品名称 Product Name	平滑管 Flat End Pipe		规格 Specification	Φ139.7×10.54mm			
钢级牌号 Grade/Material	J25S/18CrMoVnB		样品编号 Sample No.	样品编号 Sample No.: 20508316-2-1-Heat No.: 2013092; 批号 Lot No.: 20508316; 管号 Pipe No.: 02			
样品状态 Specimen State	符合检测要求 Meet the test requirements		来样日期 Submission Date	2020-09-11			
检测项目 Test Item	抗 H ₂ S 应力腐蚀开裂 SSC Resistance		检测日期 Test Date	2020-09-22~2020-10-23			
检测方法 Test method	NACE TM0177-2016		环境温度 Ambient Environment (°C)	/			
验收标准 Acceptance Criteria	NACE TM0177-2016		主要仪器及编号 Main Equipment and No.	应力环 Proof-Ring			
试验条件 Test Condition							
试样类型 Type of Specimen	标称直径 Nominal Diameter (mm)	标距长度 Gauge Long (mm)	温度 Temperature (°C)	周期 Test Duration (h)	气体 Test Gas	溶液类型 Type of Solution	加载应力 Stress (MPa)
标准 Standard	6.35	25.4	24±3	720h	10kPa H ₂ S	B 溶液 Solution B	732.7
试验结果 Test Result							
本室编号 Specimen No.	应力环 Proof-Ring No.	最小直径 Minimum Gauge Diameter (mm)	加载位移 Displacement (mm)	初始 pH 值 pH Value Solution pH Before	试验后 pH 值 pH Value Solution pH After	试验结果 Test Result	
2020-01-1779-1-A1	2714	6.31	1.580	3.40	3.60	720h 后未断裂, 无裂纹 No break and no cracks after 720h	
2020-01-1779-1-A2	2715	6.29	1.561	3.40	3.60	720h 后未断裂, 无裂纹 No break and no cracks after 720h	
2020-01-1779-1-A3	2716	6.31	1.528	3.40	3.65	720h 后未断裂, 无裂纹 No break and no cracks after 720h	
验收要求 Acceptance requirements				720h 后未断裂, 无裂纹 No break and no cracks after 720h			
结论 Conclusion				合格 Qualified			

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西安摩尔石油工程实验股份有限公司检验试验中心 Inspection&Test center Xi'an Maurer Petroleum Engineering Laboratory Co., Ltd

硫化物应力腐蚀开裂 (SSC-A 法) 试验检测报告

SSC-Method A Resistance Test Report

(2020) 摩尔检字第 01-1779-01 号

(2020) MAURER 01-1779-01

试验后试样宏观照 Macro-Morphology of Specimens after Test

备注
Remark

来样照
Sample Pictures

3/5

◎应用于华北油田永 22 储气库、延长油田

It is used in Yong22 gas storage of Huabei oil field and Yanchang oil field.

根据上述条件分别进行动态或静态高压釜耐腐蚀性能试验。
The dynamic or static autoclave corrosion resistance test is carried out according to the above conditions.

产品类型 Types	钢级牌号 Grade	抗 CO ₂ 腐蚀性能 Anti-CO ₂	抗 H ₂ S 腐蚀性能 Anti-H ₂ S
1Cr	DLP55-1Cr DLP80-1Cr	中等腐蚀介质条件下，与常规材料相比，耐腐蚀性能提高 1 倍 Corrosion resistance is doubled compared to conventional materials in moderately corrosive media	—
3Cr 抗 CO ₂ /H ₂ S 腐蚀 3Cr anti-CO ₂ /H ₂ S	DLP80SS-3Cr DLP90SS-3Cr DLP95SS-3Cr	中等腐蚀介质条件下，与常规材料相比，耐腐蚀性能提高 2 倍 Corrosion resistance increases by 2 times compared to conventional materials in moderate corrosive media	NACE TM 0177 A SYMS*90% 720 Hours
	DLP80S-3Cr DLP90S-3Cr DLP95S-3Cr DLP110S-3Cr		NACE TM 0177 A SYMS*80% 720 Hours
3Cr 抗 CO ₂ 腐蚀 3Cr anti-CO ₂	DLP80-3Cr DLP90-3Cr DLP95-3Cr DLP110-3Cr	—	—
9Cr 抗 CO ₂ 腐蚀 9Cr anti-CO ₂	DLP80-9Cr DLP90-9Cr	根据其使用环境进行相应的耐蚀性能试验。 Corrosion resistance test is carried out according to the service environment.	—
13Cr 抗 CO ₂ 腐蚀 13Cr anti-CO ₂	DLP80-13Cr DLP110-13Cr		—

检测报告 Testing report

MA 达力普 DALIPAL CNAS 中国合格评定国家认可委员会 TESTING CHINA LABOR

检验检测报告

(2019) 摩尔检字第 01-1873-02 号

报告名称: Φ177.8×12.65mm P110-3Cr 钢管 (批号: 1971001A001-1)

均匀腐蚀-高温高压

委托单位: 达力普石油专用管有限公司

检验类别: 委托检测

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Xi'an Moer Petroleum Engineering Laboratory
Inspection and Testing Center of Xi'an Moer Petroleum Engineering Laboratory Co., Ltd.

均匀腐蚀试验检测报告

(2019) 摩尔检字第 01-1873-02 号

样品名称	规格	规格号	Φ177.8×12.65mm
钢级牌号	材质: P110-3Cr, 厚度: 20.3mm	样品编号	批号: 1971001A001-1, 序号: 01A077
样品状态	热轧态	检测日期	2019.01.02
检测项目	均匀腐蚀-高温高压	检测日期	2019.11.05-2019.12.06
检测方法	GB/T 1991-2001	实验室温度 (°C)	—
检测标准	—	主要仪器及编号	M900-F2009 电子天平 M900-27004 烘箱及压力设备

试验条件

温度 (°C)	压力 (MPa)	CO ₂ (MPa)	H ₂ S (MPa)	流量 (MPa)	流量 (MPa)
100	148	0.5	0.001	0	31

试验结果

本试	试样尺寸 (mm)	重量 (g)	重量 (g)	重量 (g)	重量 (g)	重量 (g)	重量 (g)	重量 (g)	重量 (g)
2019-01-18	TS-1A1	36.32	11.04	4.199	13.991	13.987	6.000	6.124	6.1270
2019-01-18	TS-1A2	36.24	11.11	4.216	13.884	13.881	6.007	6.1309	6.1270
2019-01-18	TS-1A3	36.42	11.07	4.220	14.218	14.213	6.075	6.1178	6.1270

腐蚀速率 (mm/a) = (W₀-W₁)/[(W₀-W₁)/ρ] × 10⁴ / (F-T-D)
其中: W₀ 试验前的试样重量, g; W₁ 试验后的试样重量, g; F 试验的总质量, mm²;
T 试验时间, h; D 试样的厚度, mm; ρ 试样的密度, g/cm³.

腐蚀速率: / 腐蚀: /

图1 试样腐蚀后 (a) 腐蚀前 (b) 腐蚀后

图2 腐蚀后

高抗挤系列套管 High Collapse Strength Casing

随着钻井深度的不断增加，地质条件越来越复杂，套管所受的外挤载荷越来越高。尤其是岩盐层、泥岩层、高压注水井等高地层压力或存在地层压力异常段的油气井中，API 套管的抗挤强度已经难以满足要求。因此，达力普公司开发的高抗挤系列套管来满足国内外市场的不同需求。

With the depth increasing of drilling, the geological conditions become much more complex. The casing is subjected to much higher external pressure. The collapse strength of common API standard casing has been difficult to meet the requirements of the oil and gas wells with high or abnormal formation pressure, such as rock salt layer, mudstone layer or high pressure water injection wells. Thus, Dalipal develops a series of high collapse strength casing to meet the different market need.

应用 Uses:

用于岩盐层、泥岩层、高压注水井等高地层压力或存在地层压力异常段油气井的钻探开发。
Used for oil and gas wells with high or abnormal formation pressure, such as rock salt layer, mudstone layer and high pressure water injection wells.

产品命名 Names:

命名规则: DLP+ 强度 +TT
Naming rule: DLP+Strength+TT
DLP——达力普非 API 系列
DLP——DALIPAL Non-API series
强度——取英制最小名义屈服强度 (单位为 KSI, 并修整至 5 的倍数)
Strength——Specified minimum yield strength (the unit is KSI and trimmed to multiples of 5)

产品规格 Product size

达力普高抗挤系列套管产品规格: 4 1/2"~13 3/8"。
The range of OD for the Dalipal's high collapse strength casing: 4 1/2"~13 3/8"

典型产品抗挤强度 Collapse strength of typical products

- DLP110-3Cr 应用于苏桥储气库。DLP110-3Cr is applied in Suqiao gas storage.
- DLP90-9Cr、DLP80-9Cr 用于蒙古林砾岩油藏火驱井。DLP90-9cr and DLP80-9cr are used for fire drive wells in Menggulin conglomerate reservoir.

规格 Size (mm)		TT 系列抗挤强度 Collapse strength for TT series (MPa)				
外径 Outside diameter	壁厚 Wall thickness	DLP80TT	DLP95TT	DLP110TT	DLP125TT	DLP140TT
139.70	7.72	56.3	63.4	69.9	73.9	78.2
	9.17	72.6	85.4	92.0	98.0	106.6
	10.54	88.1	100.8	112.9	120.8	132.1
177.80	9.19	50.7	56.8	61.7	66.0	67.0
	10.36	61.0	70.7	80.7	86.0	87.0
	11.51	71.2	83.8	95.5	102.1	104.2
	12.65	81.3	95.2	110.0	113.4	120.9
	13.72	90.7	103.9	123.8	132.8	136.6
244.48	10.03	30.9	33.1	34.1	34.8	34.8
	11.05	40.4	41.9	43.8	44.1	44.1
	11.99	46.5	51.2	53.0	54.0	56.2
	13.84	58.4	69.0	77.2	81.4	83.1
	15.11	66.6	78.6	89.0	93.1	96.6

检测报告 Testing report

MA 160008113411

检验报告

Test Report

No. 2019/JX05Y2500897

产品名称: P110-HC 177.8×10.36 平端管
Product description
型号规格: 177.8×10.36
Model Type
委托单位: 达力普石油专用管有限公司
Entrusted Enterprise
受托单位: /
Supervised Enterprise
生产单位: 达力普石油专用管有限公司
Supervised Enterprise
检验类别: 委托测试
Test Kind

国家石油装备产品质量监督检验中心(山东)
National Quality Supervision and Inspection Center of Petroleum Equipment and Products (Shandong)

2019/JX05Y2500897

国家石油装备产品质量监督检验中心(山东)
National Quality Supervision and Inspection Center of Petroleum Equipment and Products (Shandong)

检验报告
Test Report

样品名称 Sample P110-HC 177.8×10.36 平端管 检验类别 Test Kind 委托测试
型号规格 Model Type 177.8×10.36 样品来源 Grade 合格品
委托单位 Entrusted Enterprise 达力普石油专用管有限公司 商标 Brand 达力普
受托单位 Address of Enterprise 河北省沧州市海兴县南德路海兴县 1 号 送样地点 Sampling Location 海兴县
样品制造商 Sample Manufacturer 达力普石油专用管有限公司 送样人员 Client Representative 吕景岩
样本数量 Batch Quantity / 送样日期 Reported Date 2019-12-03
样品数量 Sample Quantity 1 根 生产日期 Producing Date 2019-11-15
样品特征和描述 Sample Description 样品外观无异常 样品编号 Batch No. W1904506-2019
检验环境 Environmental for Test 温度 5℃ 检验日期 Test Date 2019-12-03
检验标准 Test Standard API Spec 5CT (第 10 版)
检验方法 Test Method 拉伸试验
检验设备 Test Equipment 拉伸试验机
检验结论 Test Conclusion 不作结论, 该样品本次检验结果详见报告。
备注 Note 1. 本报告含封面及封二; 2. “Z” 符号表示在室温下; 3. “S” 符号: 1915104, 牌号: 19711976, 管号: 011; 4. 外压失稳试验前经测试样品照片见附录 1。

批准: 高志刚 审核: 李耀坤 编制: 任业伟
Approved By: 2019-12-05 Verified By: 2019-12-05 Prepared By: 2019-12-03

2019/JX05Y2500897

国家石油装备产品质量监督检验中心(山东)
National Quality Supervision and Inspection Center of Petroleum Equipment and Products (Shandong)

检验报告(续页)
Test Report

序号 检测项目 技术要求 检验结果 判定
1 拉伸试验 / 未发生屈服, 屈服强度为 86.7MPa /

图 1 拉伸试验结果图

图 2 拉伸试验结果图

图 3 拉伸试验结果图

图 4 拉伸试验结果图

◆ 高强高韧系列套管
High Strength and High Toughness Casing

随着钻井深度的不断增加, 套管所受的载荷越来越高。同时, 地质条件越来越复杂, 尤其是岩盐层、泥岩层、高压注水井等高地层压力或存在地层压力异常段的油气井中, 普通 API 标准的套管已经难以满足要求。因此, 高强高韧系列套管可满足国内外市场的不断需求。

以“高强高韧”为方向, 通过“洁净钢冶炼+控制轧制+热处理”等工艺技术路线, 结合“细晶强化+固溶强化+析出强化+相变控制”等材料组织与性能控制措施, 突破强度、韧性等多目标约束的挑战, 达力普公司开发的性能优异的 110V、125V、140V、150V、155V、165V 等系列高强高韧套管产品。

As the depth of drilling increases, the load on casing is getting much higher. Meanwhile, the geological conditions are becoming much more complex, especially in oil and gas wells with high formation pressure or abnormal formation pressure, such as sock salt layer, mudstone layer and high pressure water injection wells, casings of common API standard are difficult to meet the requirements. Therefore, developing high strength and high toughness casing to meet the market demand is really necessary.

In the direction of "high strength and high toughness", through the process control technology such as "clean steel + controlled rolling + heat treatment", combined with microstructure and property control method of "fine grain strengthening + solid solution strengthening + precipitation strengthening + phase change control", Dalipal develops a series of high strength and high toughness casings with excellent performance such as 110V、125V、140V、150V、155V、165V etc.

● 应用 Uses:

用于深井、超深井及地质复杂的油气井钻探开发。
Used for deep wells, ultra-deep wells, oil and gas wells with complex geology.

● 产品命名 Names

高强韧系列套管包括 DLP110V、DLP125V、DLP140V、DLP150V、DLP155V、DLP165V。
High strength and high toughness casings include DLP110V, DLP125V, DLP140V, DLP150V, DLP155V, DLP165V .

命名规则 Naming rule:

DLP+ 强度 +V; DLP + Strength + V

● 含义 Meanings:

DLP——DALIPAL Non-API series

强度——取英制最小名义屈服强度 (单位为 KSI, 并修整至 5 的倍数)

Strength——Specified minimum yield strength (the unit is KSI and trimmed to multiples of 5)

V—— 高强高韧
V—— High strength and high toughness

● 产品规格 Product size

达力普高强韧系列套管规格范围为：4 1/2"~13 3/8"。
The range of OD for the Dalipal's the high strength and high toughness casing: 4 1/2"~13 3/8".

● 力学性能 Mechanical properties

钢级牌号 Grade	Rt (MPa)	Rm (MPa) ≥	延伸率 Elongation (%) ≥	横向冲击功 Transverse absorbed energy (0℃) J ≥	纵向冲击功 Longitudinal absorbed energy (0℃) J ≥
DLP110V	758-965	862	16	100	110
DLP125V	862-1034	931	15	100	110
DLP140V	965-1172	1034	13	100	110
DLP150V	1034-1241	1103	11	100	103
DLP155V	1069-1276	1138	11	100	107
DLP165V	1138-1344	1206	11	90	100

MA 16000113411

检验报告
Test Report

No. 2020/JQGSYZB00746

产品名称: 139.7*10.54 155V 套管
Product description
型号规格: 139.7*10.54
Model Type
委托单位: 达力普石油专用管有限公司
Entrusted Enterprise
受检单位: /
Supervised Enterprise
生产单位: 达力普石油专用管有限公司
Supervised Enterprise
检验类别: 委托测试
Test Kind

国家石油装备产品质量监督检验中心(山东)
National Quality Supervision and Inspection Center of Petroleum Equipment and Products(Shandong)

2020/JQGSYZB00746

国家石油装备产品质量监督检验中心(山东)
National Quality Supervision and Inspection Center of Petroleum Equipment and Products(Shandong)

检验报告
Test Report

样品名称 Sample	139.7*10.54 155V 套管	检验类别 Test Kind	委托测试
型号规格 Model Type	139.7*10.54	样品等级 Grade	合格品
委托单位 Entrusted Enterprise	达力普石油专用管有限公司	商标 Brand	/
受检单位地址 Address of Enterprise	河北省沧州市海兴县经济开发区1号	送样地点 Sampling Location	质检部
样品制造商 Sample Manufacturer	达力普石油专用管有限公司	送样人员 Client Representative	吕景岩
样本数量 Batch Quantity	1 根	送样日期 Received Date	2020-09-25
样品数量 Sample Quantity	1 根	生产日期 Producing Date	2020-08
样品特性描述 Sample Description	样品外观无异常	样品编号 Batch No.	W2005034-2020
检验环境 Environmental for Test	温度 28℃	检验日期 Test Date	2020-09-28
检验依据 Test Standard	SY/T 6128-2012	检验要求 Test Item	静压失效试验
检验结论 Test Conclusion	不作结论, 该样品本次检验结果详见报告。		
备注 Note	1、本报告含封面及封二; 2、“/”符号表示此页无内容; 3、试验曲线及试验后样品照片见附录。		

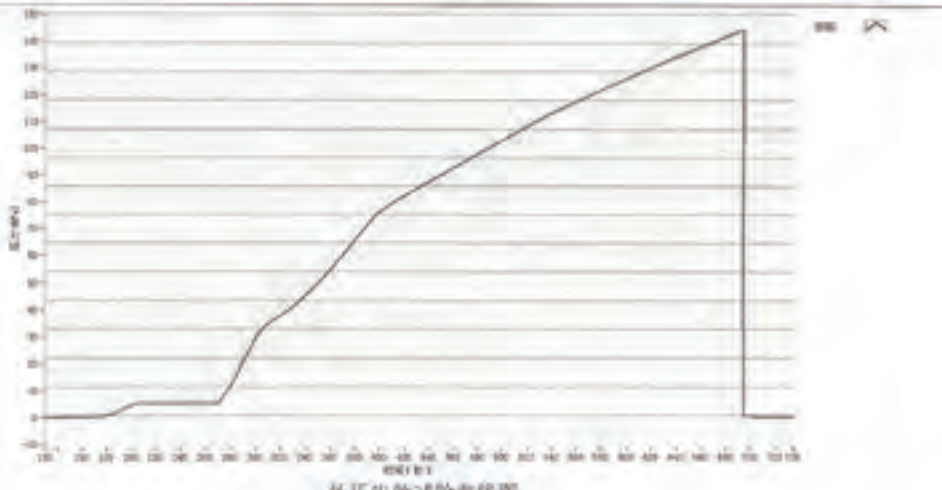
批准: 刘锦奇 审核: 初敬 编制: 李俊
Approved By 2020-10-15 Verified By 2020-10-15 Prepared By 2020-09-28

2020/JQGSYZB00746

国家石油装备产品质量监督检验中心(山东)
National Quality Supervision and Inspection Center of Petroleum Equipment and Products(Shandong)

检验报告 (续页)
Test Report

序号	检测项目	技术要求	检测结果	单项判定
1	静压失效试验	管体静压最大失效压力值为 144.3MPa, 失效位置位于样管的中间。		



DLP140V 小套管 (95.25mm × 9.52mm) 应用于膏泥岩层
DLP140V small casing (95.25mm × 9.52mm) applied to gypsum mudstone formation

检测报告 Testing report

MA 16000113411

检验报告
Test Report

No. 2020/JQGSYZB00039

产品名称: DLP110V 平端管
Product description
型号规格: 127*11.1
Model Type
委托单位: 达力普石油专用管有限公司
Entrusted Enterprise
受检单位: /
Supervised Enterprise
生产单位: 达力普石油专用管有限公司
Supervised Enterprise
检验类别: 委托检验
Test Kind

国家石油装备产品质量监督检验中心(山东)
National Quality Supervision and Inspection Center of Petroleum Equipment and Products(Shandong)

2020/JQGSYZB00039

国家石油装备产品质量监督检验中心(山东)
National Quality Supervision and Inspection Center of Petroleum Equipment and Products(Shandong)

检验报告
Test Report

样品名称 Sample	DLP110V 平端管	检验类别 Test Kind	委托检验
型号规格 Model Type	127*11.1	样品等级 Grade	合格品
委托单位 Entrusted Enterprise	达力普石油专用管有限公司	商标 Brand	/
受检单位地址 Address of Enterprise	河北省沧州市海兴县经济开发区1号	送样地点 Sampling Location	质检部
样品制造商 Sample Manufacturer	达力普石油专用管有限公司	送样人员 Client Representative	吕景岩
样本数量 Batch Quantity	1 根	送样日期 Received Date	2020-03-14
样品数量 Sample Quantity	1 根	生产日期 Producing Date	/
样品特性描述 Sample Description	样品外观无异常	样品编号 Batch No.	W2001973-2020
检验环境 Environmental for Test	温度 14±1℃	检验日期 Test Date	2020-03-14
检验依据 Test Standard	SY/T 6128-2012; 《DLP110V 平端管产品技术要求》	检验要求 Test Item	抗挤抗压试验
检验结论 Test Conclusion	该样品本次检验, 所检项目合格。		
备注 Note	1、本报告含封面及封二; 2、“/”符号表示此页无内容; 3、炉号: 1915526; 批号: 19512216; 4、抗挤抗压试验和试验后样品照片见附录 1。		

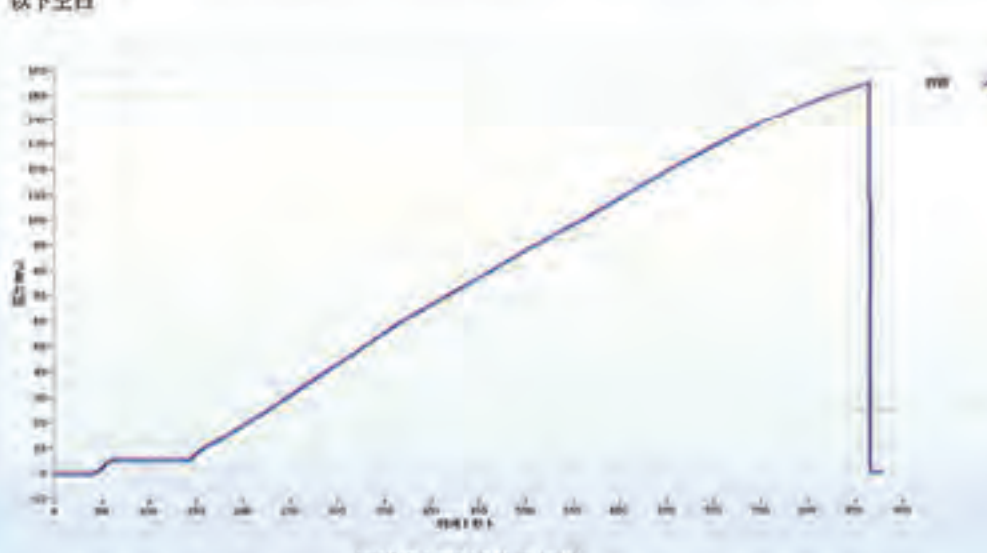
批准: 刘锦奇 审核: 任业明 编制: 李俊
Approved By 2020-03-16 Verified By 2020-03-16 Prepared By 2020-03-14

2020/JQGSYZB00039

国家石油装备产品质量监督检验中心(山东)
National Quality Supervision and Inspection Center of Petroleum Equipment and Products(Shandong)

检验报告 (续页)
Test Report

序号	检测项目	技术要求	检测结果	单项判定
1	抗挤抗压试验	抗挤抗压压力值不小于 134MPa。	管体静压最大失效压力值为 155.3MPa, 失效位置位于样管的中间。	符合



D323.85mm × 124.22m
D444.5mm × 126.00m

水泥返深2190m
侧钻点: 2496m

厚壁套管:
2751-3012m

膏泥岩
2793.5m~2952.5m

D139.7mm × 3296.44m
D215.9mm × 3300m

D95.3mm × 井底
D120mm × 井底

达力普产品下井使用报告

产品名称	140V 套管	规格	95.25mm×9.52mm
生产单位	达力普	钢级	140V
套管扣型	LC	井号	晋 45-S2X1
使用地点	河北省宁晋县 晋 45 断块	井深	3317 米
井队名称	渤海钻探四公司 30602 井队	下井数量	88 根
套管下深	2383.7~3307.8 米	下井日期	2019.11.3

达力普生产的 140V 95.25×9.52mm LC 特殊规格、特殊钢级的套管于 2019 年 11 月 3 日 15 时至 21 时在位于河北省宁晋县——晋 45 断块“晋 45-S2X1 井”下井使用。

“晋 45-S2X1 井”属于老井再利用, 在老井的盐膏层上方, 井深 2383 米处进行侧钻开凿, 下钻深度至 3317 米。为保证井筒的稳定性和服役周期, 选用达力普生产的 140V 95.25×9.52mm LC 套管。

现场对每个套管接头进行检查, 经检测全部合格。上扣扭矩推荐范围为 5290~8810 N·m, 最佳扭矩 7010 N·m, 上扣顺利, 无粘扣。该批 140V 95.25×9.52 LC 套管在井队、套管厂家、套管作业队的相互配合下, 顺利完成套管下井作业任务, 并顺利固井。

本次套管下井作业过程顺利, 使用后未出现异常情况, 完全符合作业设计和工程技术要求, 现场进行的管体及螺纹检验, 质量合格, 全部满足设计要求。

◆ 抗挤抗硫系列套管

High Collapse Strength and Anti-H₂S Corrosion Casing

©应用 Uses:

用于岩盐层、泥岩层、高压注水井等高地层压力或存在地层压力异常段且含 H_2S 油气井的钻探开发。

Used for wells with H₂S contained and special strata such as rock salt layer, mudstone layer, abnormal formation pressure layer, or high pressure water injection wells with H₂S contained.

◎产品命名 Names

含硫环境使用的高抗挤套管包括 DLP80TS、DLP80TSS、DLP95TS、DLP95TSS、DLP110TS 和 DLP110TSS。

High collapse strength and anti-H₂S corrosion casings include DLP80TS, DLP80TSS, DLP95TS, DLP95TSS, DLP110TS and DLP110TSS.

◎命名规则：DLP+ 强度 +T+S (S)

Naming rule: DLP + Strength +T+ S (S)

◎含义 Meanings:

DLP——达力普非 API 系列

DLP—DALIPAL Non-API series

强度——取英制最小名义屈服强度（单位为 KSI，并修整至 5 的倍数）

Strength—Specified minimum yield strength (the unit is KSI and trimmed to multiples of 5)

T——抗挤 High collapse

S—抗硫 SS—高抗硫

S—Anti-H₂S SS—High anti-H₂S

达力普抗挤耐硫化氢腐蚀系列套管规格范围为：4 1/2"~13 3/8"。

The range of OD for the Dalipal's high collapse strength and anti-H₂S casing : 4 1/2"~13 3/8".

◎产品性能 Product performance

钢级牌号 Grade	抗 H ₂ S 腐蚀性能 (NACE TM 0177) Anti-H ₂ S corrosion performance	加载应力 Load stress(MPa)	承载时间 Loading time(H)	抗挤性能 Collapse strength
DLP80TS	NACE TM 0177 A 溶液 A 法 NACE TM 0177 A Solution, Method A	SMYS*80%	720	抗挤毁性能按照 DLP 高抗挤 毁套管性能控制 Collapse strength according to DLP high collapse strength casing
DLP95TS				
DLP110TS		SMYS*90%		
DLP80TSS				
DLP95TSS				
DLP110TSS				

检测报告 Testing report



中国合格评定国家认可委员会
CNAS

西安摩尔石油工程实验室股份有限公司 Xian Maoru Petroleum Engineering Laboratory Co., Ltd.
西安摩尔石油工程实验室股份有限公司综合检测中心 Inspection Test center Xian Maoru Petroleum Engineering Laboratory Co., Ltd.

西安摩尔石油工程实验室股份有限公司
西安摩尔石油工程实验室股份有限公司综合检测中心

检验检测报告

INSPCTION & TEST REPORT

检验检测报告

INSPCTION & TEST REPORT

(2019) 摩尔检字第 01-1928-01 号

(2019) MAURER 01-1928-01

报告名称: q177.8-9.19mm C10 套管 Casing

Report Name: Pipe

外压至失效试验检测

委托单位: 达力普石油专用管有限公司

Commissioned by: Dalipai Pipe Company

检验检测: 委托检测

Test Type: Commission Test

样品名称 Specimen Name	套管 Casing Pipe	规格型号 Specification
标识编号 Grade/Material	C10	样品编号 Sample number
样品状态 Specimen State	/	生产单位 Manufacturer
委托单位 Commissioned By 达力普石油专用管有限公司 Dalipai Pipe Company 受托检测 Inspector 地址 Address 西安市雁塔区曲江新区雁鸣路 No.1 Zhongxin District, Nanbaogang Road, Beibai New District, Chang'an City, Xi'an Province		
取样日期 Receive Date	2019-11-19	检测日期 Test Date
检测样品名称 Test Item/Parameter	外压至失效试验 Collapse Test	检测日期 Test Date
检测标准 Test Standard	SY/T 6128-2012	
接收标准 Acceptance Criteria	/	

根据 SY/T 6128-2012 标准对规格为 q177.8-9.19mm C10 套管进行外压至失效试验。试验结果见表 3。

The collapse test of the commissioned q177.8-9.19mm C10 casing pipe is carried out according to the standard SY/T 6128-2012, the test result is shown in Table 3.

报告发布日期
Issued Date: 2019 年 12 月 3 日

批准人: 张永成
审核人: 胡学军
编制人: 胡学军

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8 DLP 特殊扣 DLP PREMIUM CONNECTION

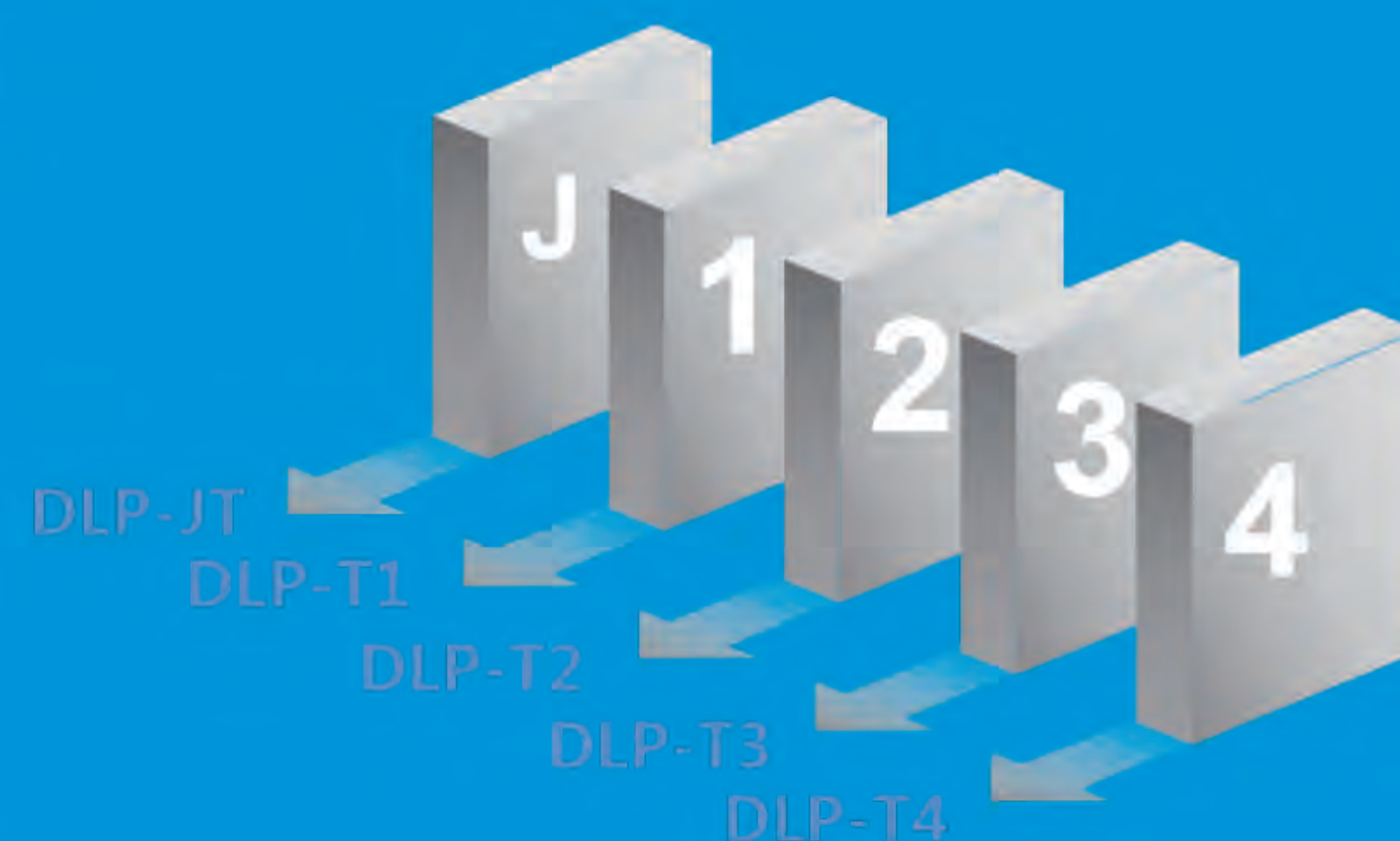
DLP 系列特殊扣产品 DLP Series Premium Connections

达力普公司针对油气田开采对螺纹连接强度、密封性能等方面的不同需要，相继开发了 DLP-JT、DLP-T1、DLP-T2、DLP-T3、DLP-T4 等系列特殊扣。达力普特殊扣产品广泛应用于大庆油田、青海油田、华北油田等国内油田以及欧洲、澳洲、中东等国外油田。

达力普特殊扣油套管产品具有独特的技术、质量和服务特点：

◆ 全流程研发和制造技术的支持。通过计算机模拟仿真和全尺寸实物试验，对产品的设计持续的改进和研究，为用户提供更安全更高效的特殊螺纹接头油套管产品；从炼钢、轧制、热处理，到螺纹精密加工，全部按照 ISO9001 的质量管理体系和 API Spec 5CT、API Spec 5B 质量要求进行质量控制；螺纹加工采用先进的数控机床。

◆ 值得用户信赖的产品可靠性。产品完全满足 API 要求的抗内压强度、抗拉强度和承受弯曲 + 拉伸 + 内压复合载荷的性能要求；按照 ISO13679 标准进行全尺寸评估，保证产品性能。典型特殊扣产品分别通过了美国应力公司（STRESS）、中国石油集团石油管工程技术研究院（TGRI）的评价实验。



◆ 以用户满意为宗旨的服务目标和健全的售前、售后服务体系。达力普公司强大的技术力量和对油田各种使用条件长久的经验积累，能协助用户完成优化的油套管井身设计，提供相应的技术咨询，并具备油套管管柱的配套供货能力；派专业人员到现场协助指导井队对 DLP 系列油套管产品进行下井作业。

To meet the different demands for thread connection strength, seal performance, and other performance in the exploitation of oil & gas fields, Dalipal has successively developed a series of DLP-JT, DLP-T1, DLP-T2, DLP-T3, and DLP-T4 premium connections. Dalipal premium connections have been widely used in domestic oilfields like Daqing Oilfield, Qinghai Oilfield, and Huabei Oilfield, as well as foreign oilfields in Europe, Australia, the Middle East, etc.

Dalipal premium connection tubing and casing products possess a unique technology, quality, and service characteristics:

The support of the entire R&D and manufacturing technology process. Product design is continually improved and studied using computer simulations and full-size real object tests to provide users with safer and more efficient special threaded joint tubing and casing products. From steelmaking, rolling, and heat treatment to the precision processing of threads, quality is controlling in line with the quality requirement of the ISO9001 quality management system as well as API Spec 5CT and API Spec 5B. Thread machining adopts advanced CNC machines.

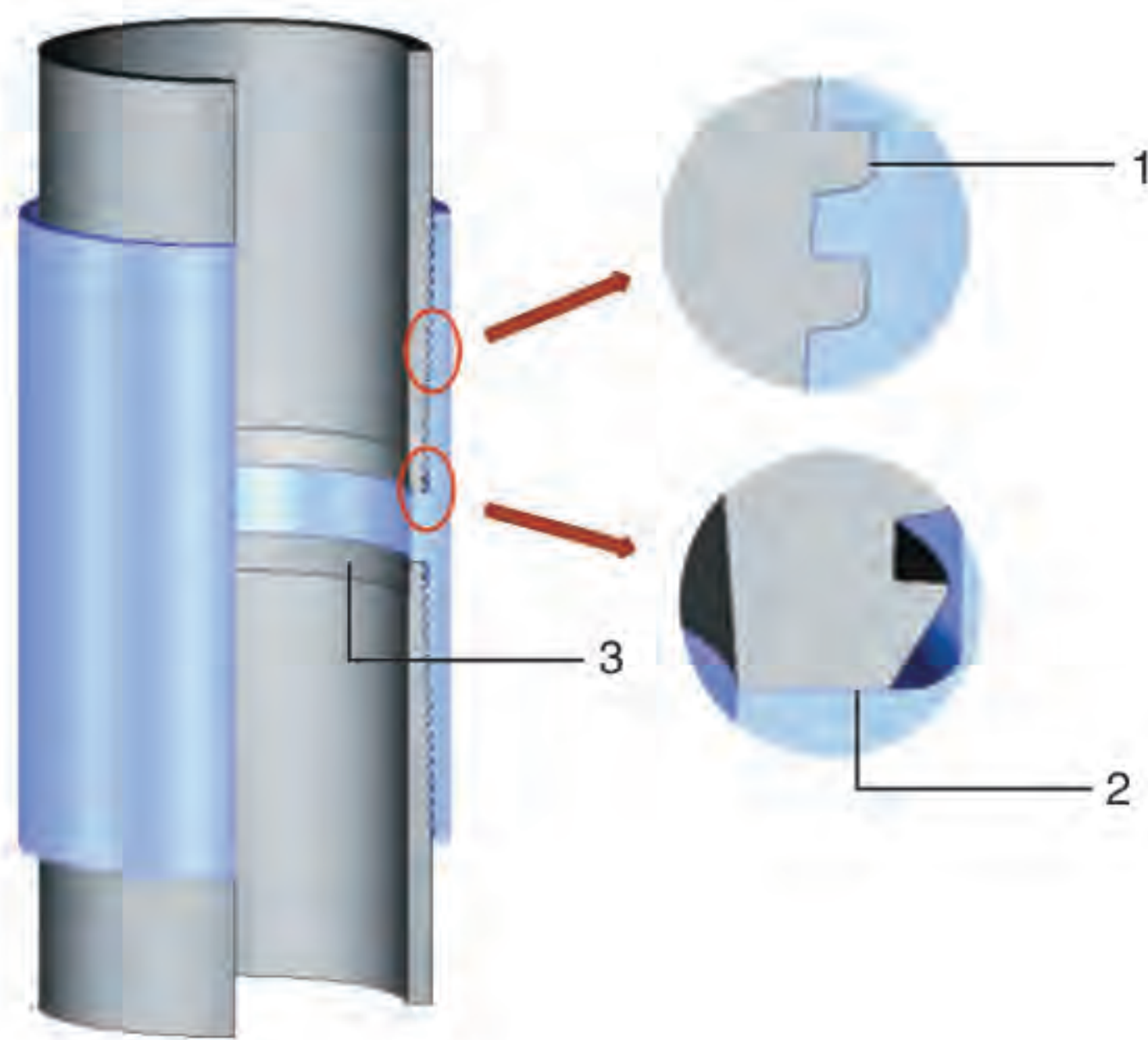
Trustworthy product reliability. The products can satisfy the performance requirements of API for internal pressure strength, tensile strength, and the capacity of bearing combined bending + tension + internal pressure. A full evaluation is conducted in accordance with the ISO13679 standard to guarantee product performance. Typical premium connection products have passed the evaluation experiment of Stress Engineering Services, Inc. and CNPC Tubular Goods Research Institute.

Service objective of taking user satisfaction as the tenet and mechanism for pre-sales and after-sales service system. With a strong technological base and the long-term accumulation of experience regarding different kinds of service conditions, Dalipal assists its users in finishing the design of optimized tubing and casing wells, provides users with corresponding technical consultation, and has the supporting goods supply capacity for tubing and casing columns. The company dispatches professionals on-site to assist the drilling crew with the operation of the DLP series tubing and casing products in the well.

特殊扣 DLP-JT 经济型气密封特殊螺纹套管
DLP-JT Semi Premium Connection Casing

DLP-JT 螺纹是一种在 API 螺纹基础上进行优化的螺纹，可以与 API 螺纹互换的简易、低成本特殊螺纹套管产品，该螺纹增加了抗扭台肩，接箍台肩与管子内壁内平设计。

DLP-JT connection is a close-tolerance thread form with shouldering pin noses that eliminate the open “J” area. It is optimized from API threads and can be interchanged with API threads. DLP-JT connection adds a torsion shoulder which creating a flush ID for turbulent free flow and reduced tool hang ups.



结构特点及功能 Design features of DLP-JT

序号 Item No.	结构 Design	功能 Features
1	API 标准螺纹扣型 The thread is identical with API	可与 API 螺纹互换，加工简便，减少专用工具 All weights within an OD are fully interchangeable, compatible with BTC accessories, economical solution for semi-premium performance
2	接箍 90° 直角台肩 Integral coupling torque shoulder	在复合载荷作用下，保持连接的密封性能，同时提高接头的抗扭能力 Integral shoulder eliminates mill-end coupling rotation, multiple make and break capabilities
3	流线型内部轮廓 Inner flush design	大限度地防止紊流的发生 Internal flush bore eliminates turbulence and tool hang ups

◎优点 Advantages:

1、产品连接强度达到特殊扣接头的连接强度。

DLP-JT Connecting strength is identical with premium connections

2、产品的气密封性能达到特殊扣气密封能力的 70% 以上，接头抗内压强度不低于管体。

The gas sealing performance of this connection reaches 70% of the premium connection, and the joint internal pressure resistance is not lower than the pipe body.

3、接头的抗弯曲能力较好，在一定压力下，弯曲狗腿度达到 15° /30m，复合应力水平达到 70% VME，接头不发生气体泄漏。

The joint has good bending resistance. Under certain pressure, the bending dog's leg reaches 15° /30m, the composite stress level reaches 70% VME, and the joint does not leak gas.

评价试验 Testing Report



特殊扣 DLP-T1 气密封特殊螺纹套管
DLP-T1 Premium Connection Casing

DLP-T1 由达力普公司和中国石油集团石油管工程技术研究院合作开发，适用于碳钢及耐蚀合金，尺寸范围 2 3/8" 至 13 3/8"。

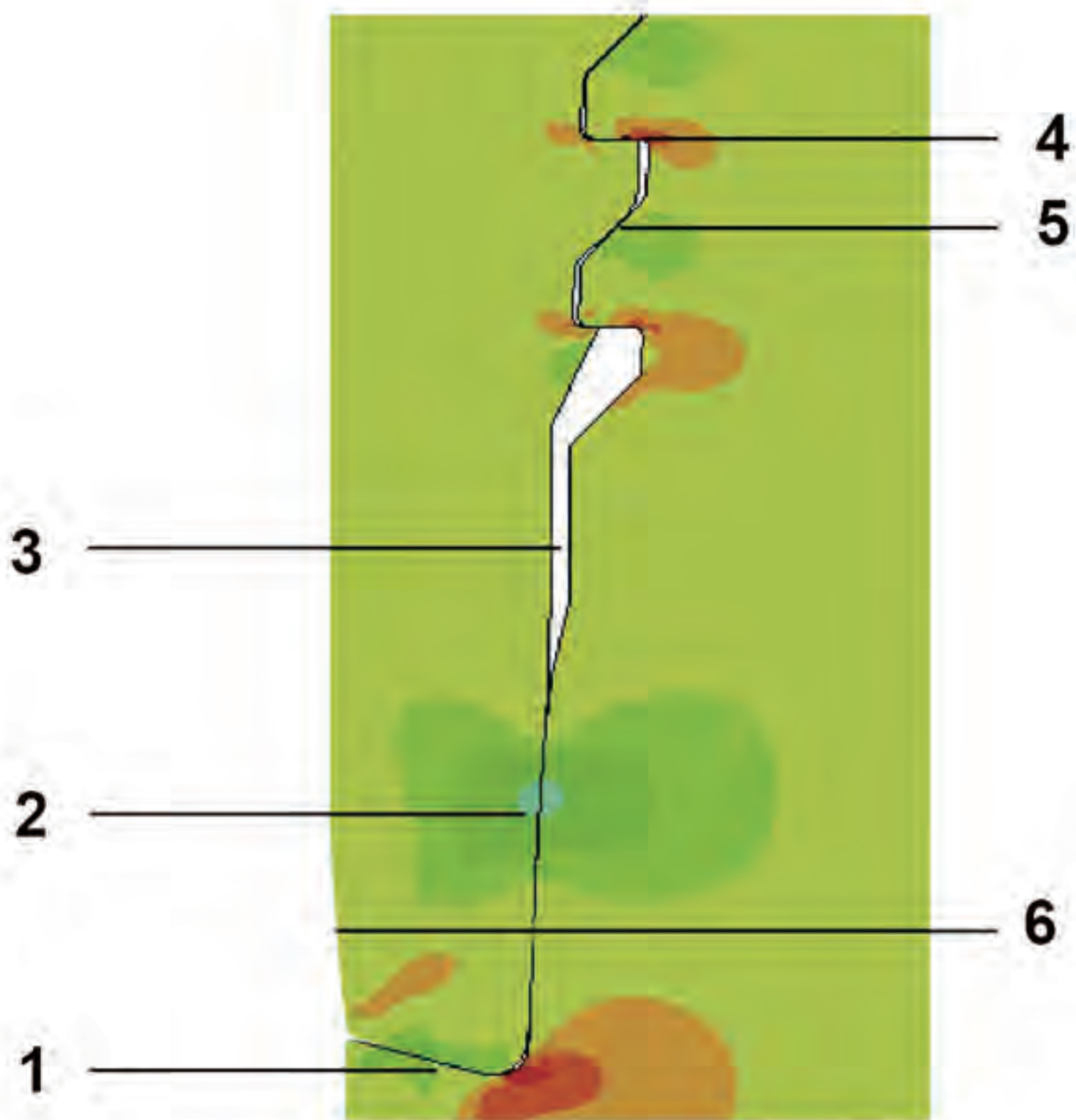
The premium connection is developed in cooperation with Dalipal and CNPC Tubular Goods Research Institute. It is suitable for carbon steel and corrosion-resistant alloys. The available size ranges from 2 3/8" to 13 3/8".

◎ DLP-T1 螺纹特点：

该气密封螺纹套管接头，具有气密封性能高、连接强度高、易于加工，测量简便、易于对扣等特点。

DLP-T1 螺纹接头已在中国石油集团石油管工程技术研究院通过了 ISO13679CAL II 试验评价。

DLP-T1 has excellent performance in gas tight sealing and connection strength, It is easy to process, measure, and make up. It passes a full evaluation test of ISO 13679 CAL II conducted by CNPC Tubular Goods Research Institute.

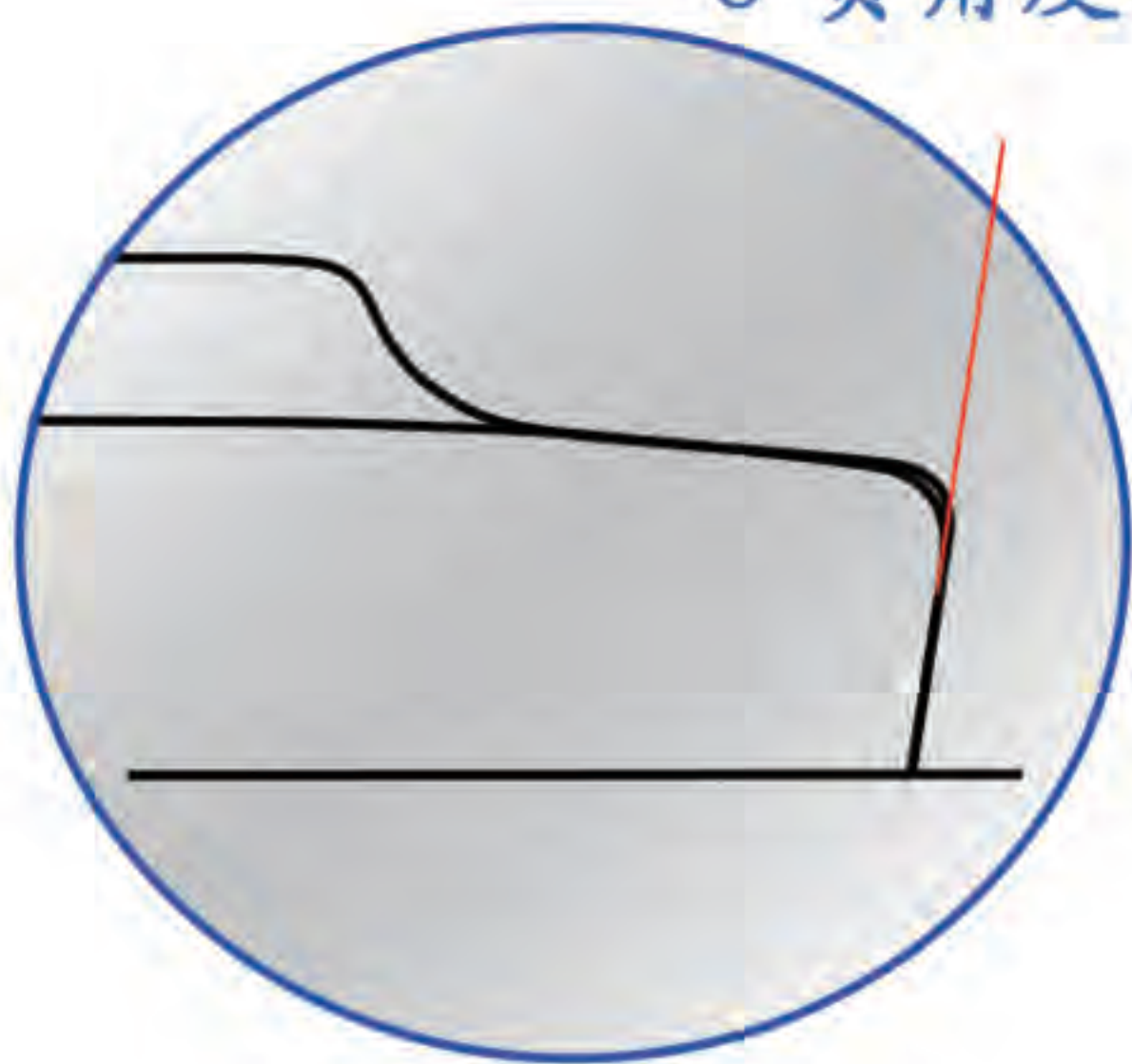
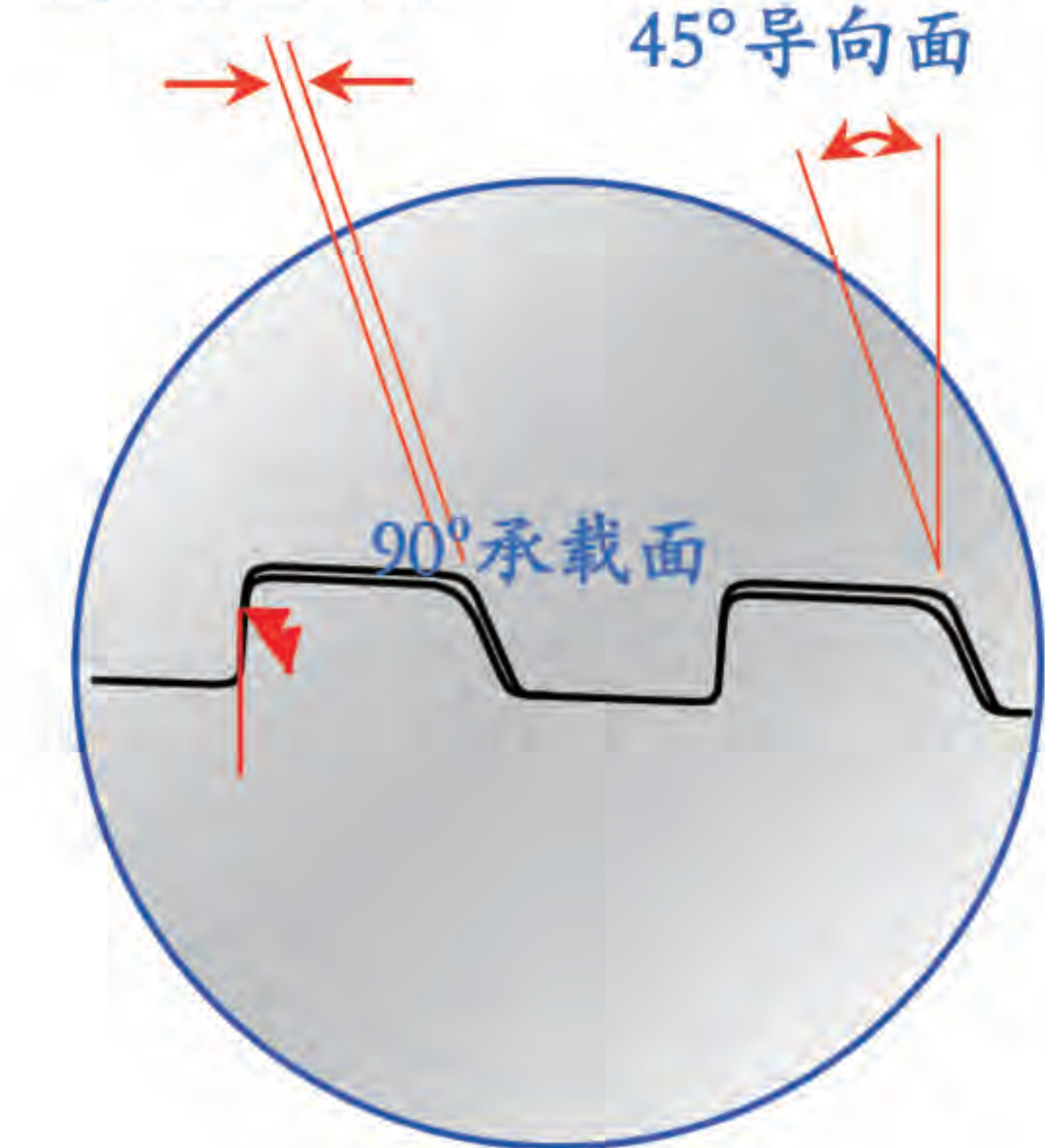


减小螺纹间隙

45°导向面

90°承载面

8°负角度台肩



◎结构特点及功能 Design features of DLP-T1

序号 Item No.	结构 Design	功能 Features
1	扭矩台肩 (-8°) Torque shoulder (-8°)	上扣定位，抗过扭矩，提高主密封能力 Optimized making up property, over torsion resistance, and improved main seal
2	主密封 (锥面 / 球面) Main seal- Conical and Spherical metal structure	在复合载荷作用下，保持密封接触压力 Keeping the thread's contact pressure under combined load condition
3	储油及退刀槽 Dope reservoir and thread undercut	储存多余螺纹脂及内螺纹加工退刀 Dope reservoir specially designed to allocate excess thread compound, internal thread process run out
4	承载面 (90°) Bearing plane (90°)	提高抗拉伸和弯曲的能力 Increasing the capacity of resistance to tension and bend
5	导向面 (45°) Guide plane (45°)	易对扣和抗粘扣 Easy making up, anti gluing
6	内平 (10°) Streamlined internal structure (10°)	止冲刷腐蚀及避免密封变形 Protecting against flowing corrosion and avoiding seal deformation

应用范围 Applying scope

可适用于气压 ≤ 60MPa，温度 ≤ 180° C，弯曲狗腿度 ≤ 20° /30m 的油气井的使用要求。

Suitable for use in oil and gas Wells with air pressure ≤ 60MPa, temperature ≤ 180 ° C, bending dogleg degree ≤ 20° /30m.

实际应用 Practical Application

目前在大庆油田和青海油田已下井使用。DLP-T1 110ksi 钢级套管 (包括 P110、DLP110-3Cr、DLP110-13Cr、DLP110S-13Cr) 在大庆油田广泛应用于徐深、芳深、宋升、升平等地质条件复杂的区块。

This series of products have been used in wells in the Daqing Oilfield and Qinghai Oilfield. DLP-T1 110ksi steel casings (including P110, DLP110-3Cr, DLP110-13Cr, and DLP110S-13Cr) have been widely used in complex geological conditions sections such as Xushen, Fangshen, Songsheng, and Shengping in the Daqing Oilfield.

特殊螺纹套管使用情况说明

根据甲方需求和钻井工程设计的要求，在大庆油田地区的深层天然气井上选择应用达力普石油专用管有限公司生产的扣型为 DLP-T1 型号气密封套管。

2018 年度，该套管在大庆油田已使用 22 口井（徐深区块、芳深区块、陆平区块等），并在井上进行了套管螺纹的试压、气密封检测的检验。

根据现场的使用反馈，该套管能够满足现场的实际需求：

- 1、套管螺纹上扣扭矩值都位于套管推荐上扣扭矩值范围之内，上扣扣顺畅，无余扣，螺纹公差配合很好。
- 2、该形式螺纹采用锥面及台肩双重密封，套管螺纹气密封良好，检测压力符合技术要求（49MPa），所用套管全部检验合格入井。特别遇到重复上扣扣工况后，其密封性仍然能符合要求，能达到良好的气密封效果。
- 3、套管外观清洁，钢级、壁厚标识清晰。
- 4、套管直线度符合规定、长度均匀。
- 5、套管扣性好，缩短套管联挽时间。
- 6、套管供货及时，大大方便了生产组织，缩短了准备时间。

采油工程研究院钻井设计室
大庆钻探工程公司工程管理处
2018 年 12 月 17 日

特殊螺纹套管使用情况说明

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2019 上半年度，该套管在大庆油田已使用 11 口井（宋深区块、芳深区块、陆平区块等），并在井上进行了套管螺纹的试压、气密封检测的检验。

根据现场的使用反馈，该套管能够满足现场的实际需求：

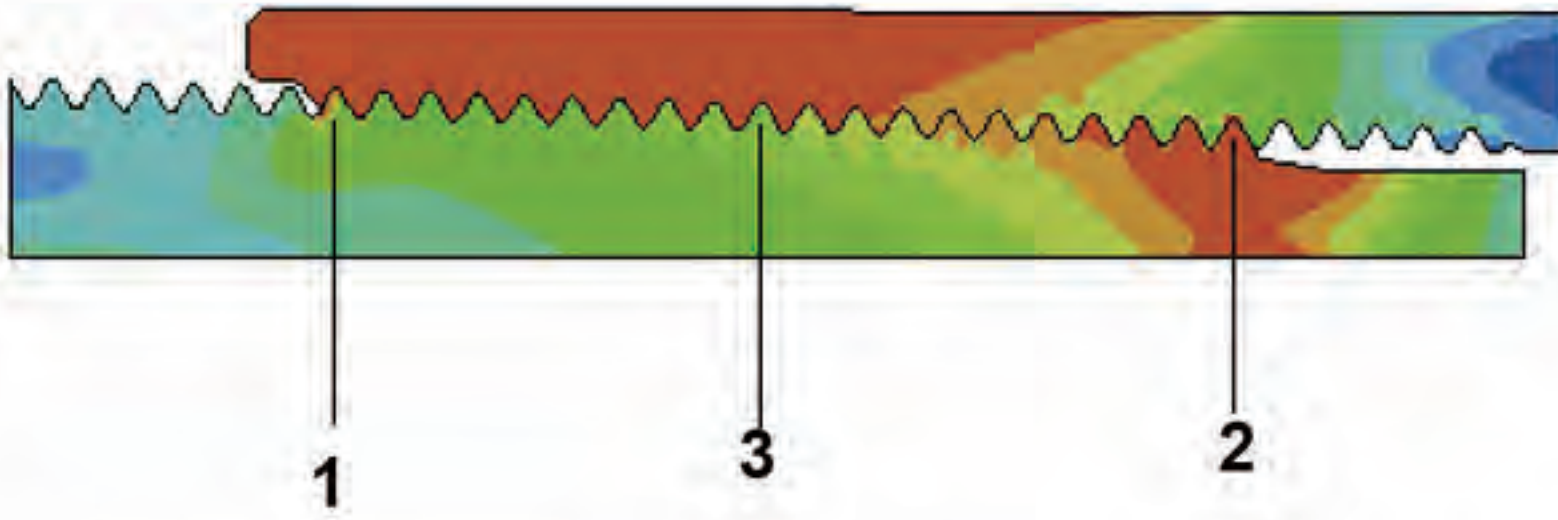
- 1、套管螺纹上扣扭矩值都位于套管推荐上扣扭矩值范围之内，上扣扣顺畅，无余扣，螺纹公差配合很好。
- 2、该形式螺纹采用锥面及台肩双重密封，套管螺纹气密封良好，检测压力符合技术要求（49MPa），所用套管全部检验合格入井。特别遇到重复上扣扣工况后，其密封性仍然能符合要求，能达到良好的气密封效果。
- 3、套管外观清洁，钢级、壁厚标识清晰。
- 4、套管直线度符合规定、长度均匀。
- 5、套管扣性好，缩短套管联挽时间。
- 6、套管供货及时，大大方便了生产组织，缩短了准备时间。

采油工程研究院钻井设计室
大庆钻探工程公司工程管理处
2019 年 6 月 10 日

特殊扣 DLP-T2 经济型气密封螺纹套管
DLP-T2 Premium Connection Casing

DLP-T2 螺纹特点：

该经济型气密封螺纹具有与 API 圆螺纹相似的结构，具有加工简单，方便测量的特点。密封采用内外螺纹在一个位置相互啮合紧密接触，具有密封性能稳定的特点。



DLP-T2 has similar thread structure with API SPEC round thread. It is easy to process and measure. The external and internal threads meshed tight in the same position to keep seal property stable.

结构特点及功能 Design features of DLP-T2

序号 Item No.	结构 Design	功能 Features
1	螺纹主密封 Main seal	在复合载荷条件下具有稳定密封 Seal performance still works under composite load
2	螺纹副密封 Auxiliary seal	在静态纯内压条件下具有较高密封性能 Keeping seal performance under static internal pressure
3	螺纹过渡 Thread transition	抗拉伸弯曲复合载荷作用 Resistance to tension and bend under composite load

优点：采用螺纹两级密封及螺纹过渡的结构形式。保证上扣后，螺纹密封位置具有一定的接触压力，螺纹过渡外承担载荷的作用。与传统密封螺纹接头比较，无台肩，节约材料、加工成本低，检测方便。DLP-T2 螺纹接头已在中国石油集团石油管工程技术研究院通过了 TGRC1 试验评价。

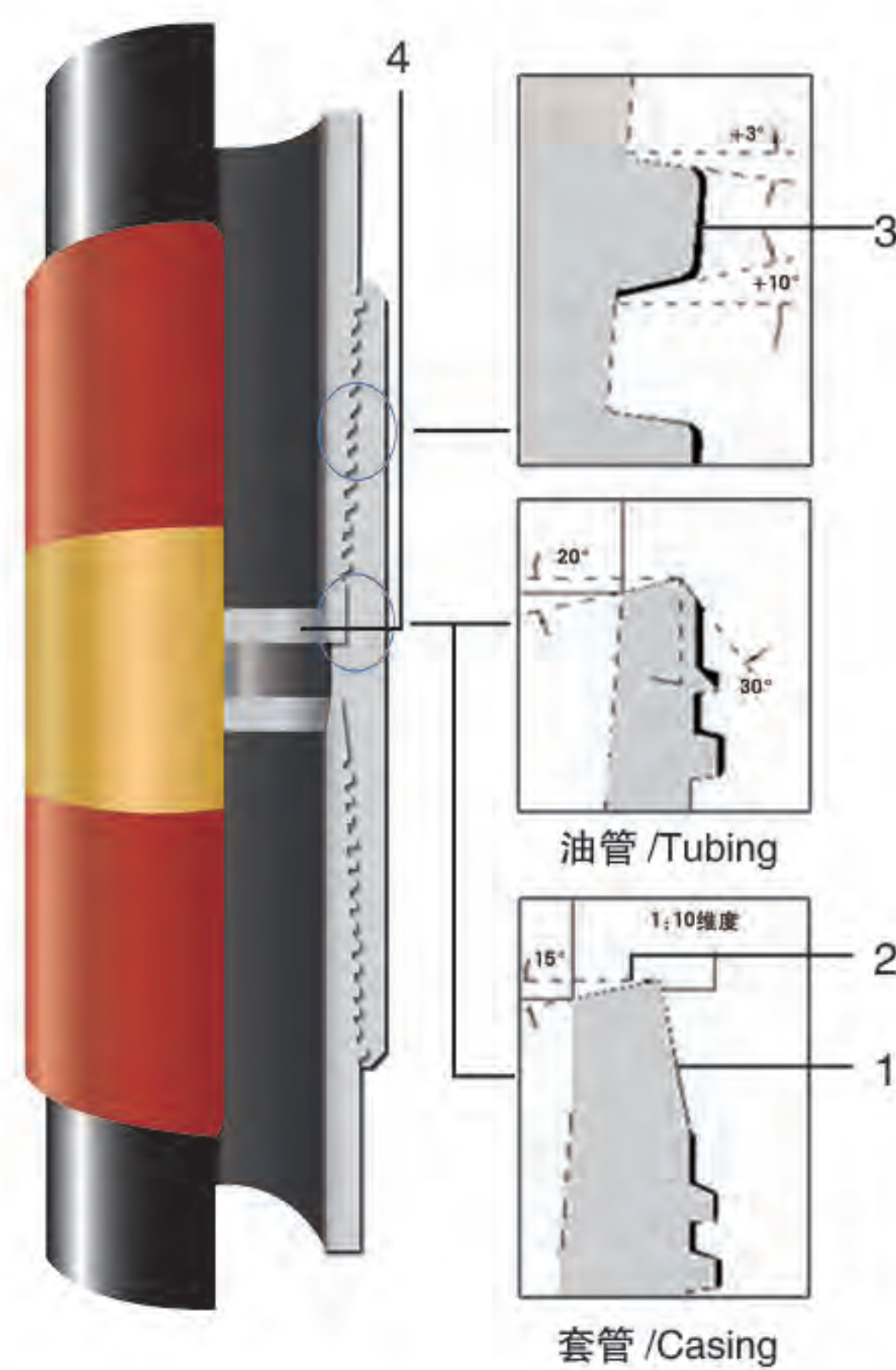
Advantage: DLP-T2 adopts structure of double seal and thread transition. The tooth width and depth is designed reasonably to increase thread's contact pressure and bearing load. Comparing with the traditional premium thread connection, DLP-T2 is easy to process and measure, without shoulder and saving material. DLP-T2 has passed the TGRC1 evaluation process conducted by CNPC Tubular Goods Research Institute.

特殊扣 DLP-T3 气密封特殊螺纹油、套管
DLP-T3 Premium Connection Casing and Tubing

◎ DLP-T3 螺纹特点：

该气密封螺纹油、套管接头，适用于中、深井和气井中，具有良好的气密性。采用改进的标准 API 偏梯螺纹形式，优化的逆向角度配合公差，以锥面对锥面、-15° 台肩双重金属接触形式提高了连接的密封性能。

Casing and tubing connection of DLP-T3 has excellent gas-tight seal performance in medium deep, deep well and gas well. It adopts the improved buttress thread and optimized fit tolerance of reverse angle with conical/conical and -15° shoulder double metal seal structure to improve the sealing performance of connection.



◎ 结构特点及功能 Design features of DLP-T3

序号 Item No.	结构 Design	功能 Features
1	反角台肩（油管 -20° 套管 -15°） Reverse angle torque shoulder (Tubing -20°, Casing -15°)	上扣定位，辅助密封 Optimized making up property and auxiliary seal
2	锥面 / 锥面的主密封（油管 30° 套管 1:10） Main seal- Conical metal sealing structure (Tubing 30°, Casing 1:10)	加工简便，在复合载荷作用下，保持连接的密封性能 Seal performance still works under composite load
3	承载面 3°、导向面 10° 的齿形 Thread of bearing plane 3°, Guide plane 10°	结构简单，易对中，上扣快捷 Simple structure, fast making up
4	流线型内部轮廓（油管 6°，套管 15°） Streamlined internal structure (Tubing 6°, Casing 15°)	把丝扣连接处的高速气体产生的涡流与能量损失降至最低 Minimizing turbulence and emerge loss inside the connection for the high velocity gas flows encountered

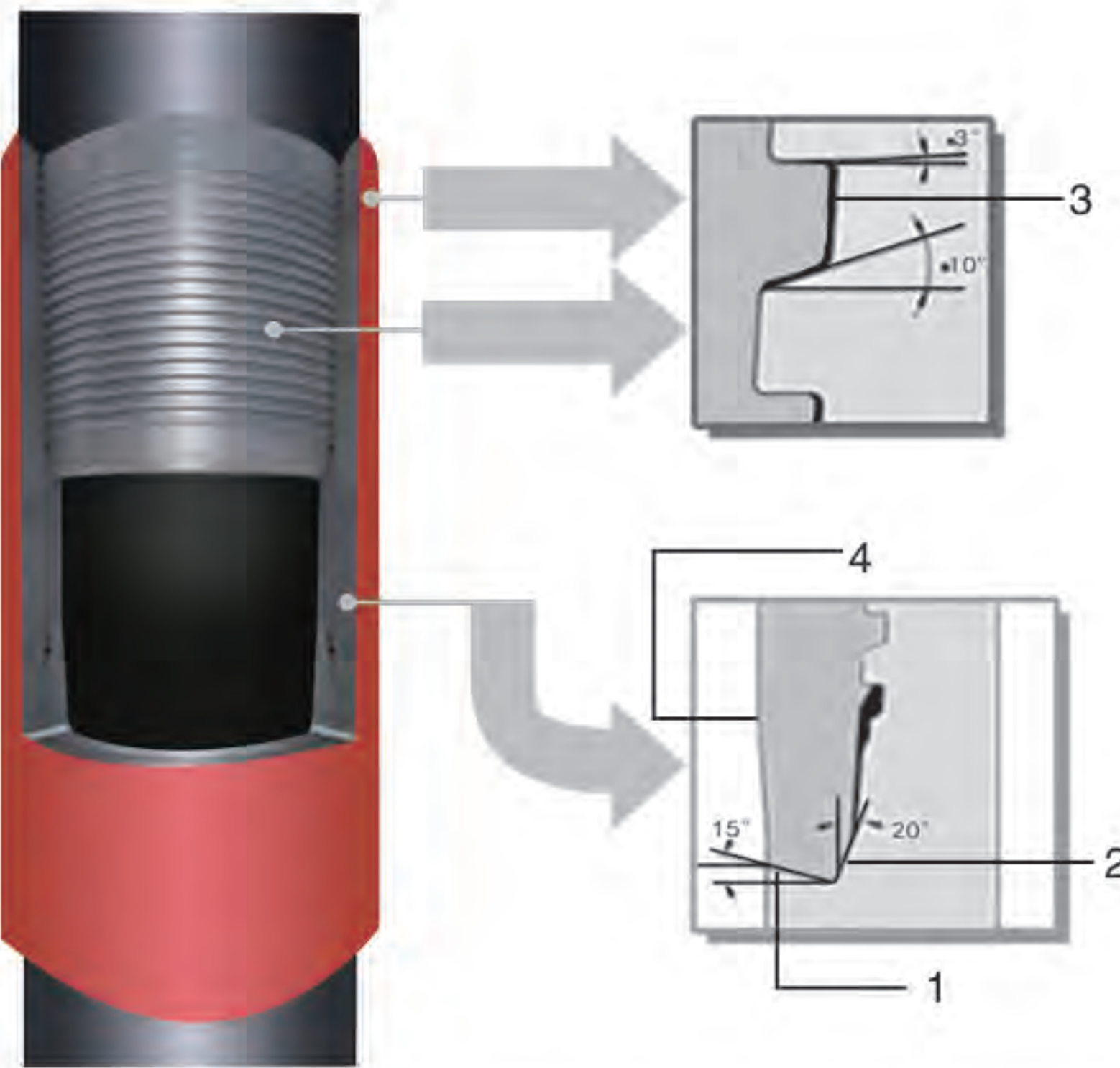
◎ 国际客户：出口至新西兰、乌兹别克斯坦、俄罗斯、智利等国家和地区。

International customers: exported to New Zealand, Uzbekistan, Russia, Chile and other countries or regions.

特殊扣 DLP-T4 气密封特殊螺纹油、套管
DLP-T4 Premium Connection Casing and Tubing

DLP-T4 特殊螺纹油、套管提供了一种连接强度高，密封效果好，性能优异的气密封螺纹结构。钩状丝扣外形，承载面带有 -3° 反向角，抗拉伸、耐粘扣，机械性能优越。独特的密封结构设计，在高拉伸和高压缩负荷下密封性能优越，即使重复上扣，密封性能依然良好，适用于在大位移井和长水平井段井使用。该扣型通过美国应力（STRESS）公司 API 5C5 CAL IV 级评价试验。

DLP-T4 is providing high connection strength and good seal performance. Hooked thread and a modified -3° reverse angle on bearing plane not only provide the connection with super tension stress, but also against gluing. The specialized metal seal geometry can offer excellent gas tight sealing performance even under load of high tension and compression, sealing integrity remains constant despite repeated make-ups and break-outs. It is suitable for the work conditions in extended reach well and long horizontal well. The DLP-T4 Premium Connection has been passed API 5C5 CAL IV TEST by AMERICAN STRESS TECHNOLOGIES INC..



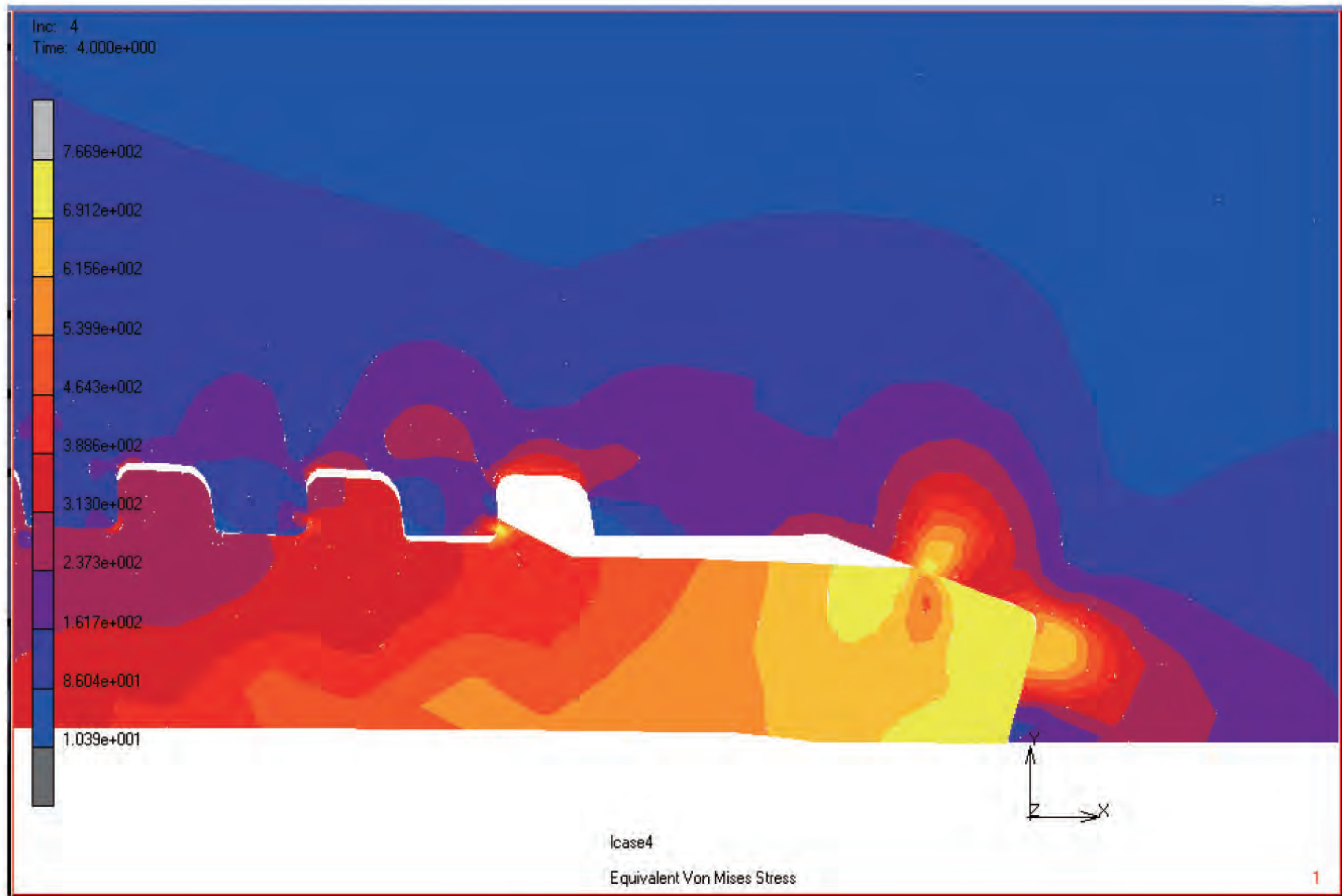
◎ 结构特点及功能 Design features of DLP-T4

序号 Item No.	结构 Design	功能 Features
1	-15° 扭矩台肩 -15° torque shoulder	止扣功能，抗过扭矩，辅助密封 Positive torque stop, over torsion resistance, auxiliary seal
2	带一定倾斜角的金属对金属主密封（套管 20°，油管 50% 倾斜） Metal to metal main seal with angle of inclination (Tubing 50% inclination, Casing 20°)	高拉伸和高压缩负荷下密封性能优越 Excellent gas tight sealing performance even under load of high tension and compression
3	-3° 承载面钩状丝扣外形 -3° hooked thread design on bearing plane	抗拉伸、耐粘扣，机械性能优越 Resistance to tension strength, anti gluing, superior mechanical property
4	流线型内孔设计（油管 3°，套管 6°） Streamlined internal structure (Tubing 3°, Casing 6°)	把丝扣连接处的高速气体产生的涡流与能量损失降至最低 Minimizing turbulence and energy loss at the connection when the high velocity gas flows encountered

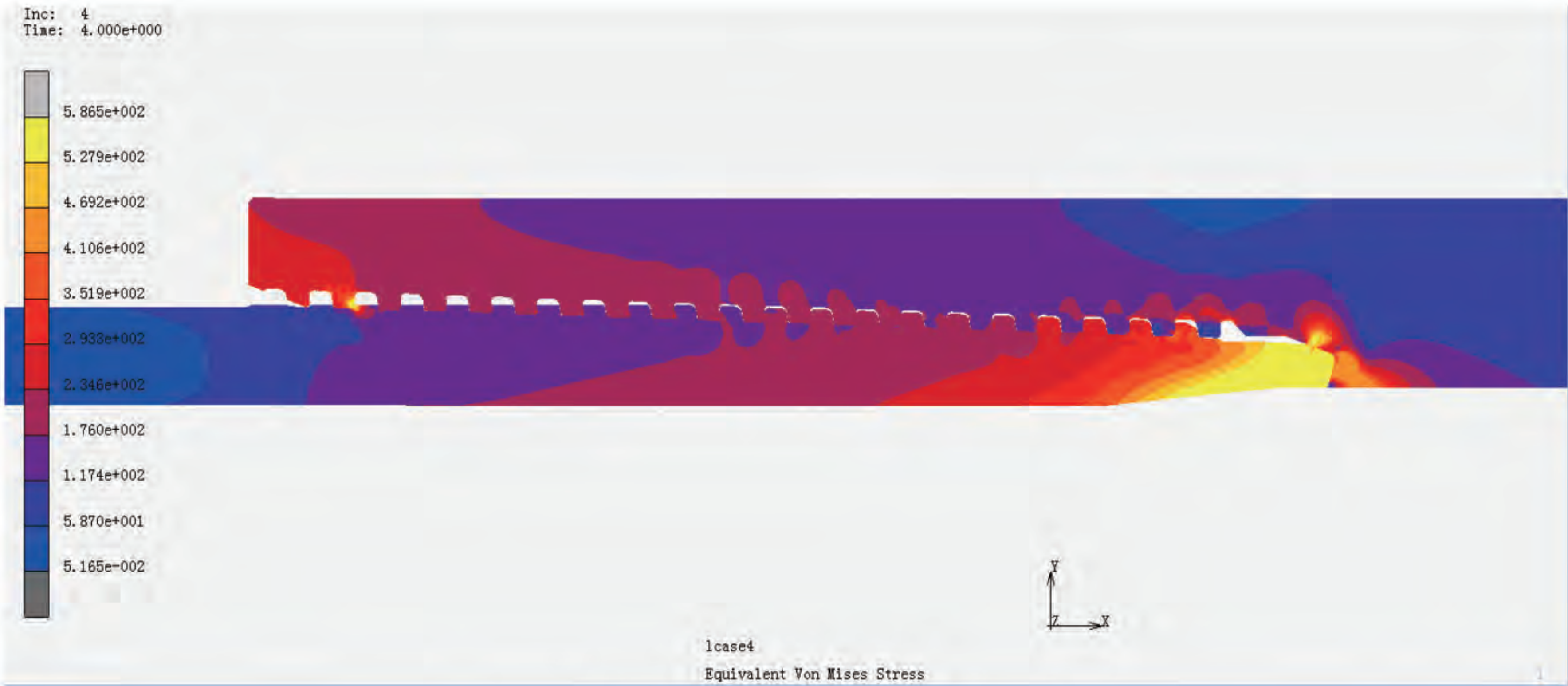
◎应用范围 Applying scope

- 深井、超深井，下井深度可达 8000 米；
- 高压油井、高压天然气井，可承受 100Mpa 以上气密封压力。
- 水平井、定向井、大位移井。
- Deep well, super deep well, down the depth of the well up to 8000 meters;
- High pressure oil well, high pressure natural gas well, can withstand more than 100MPa gas seal pressure.
- Horizontal well, extended reach well and long horizontal well.

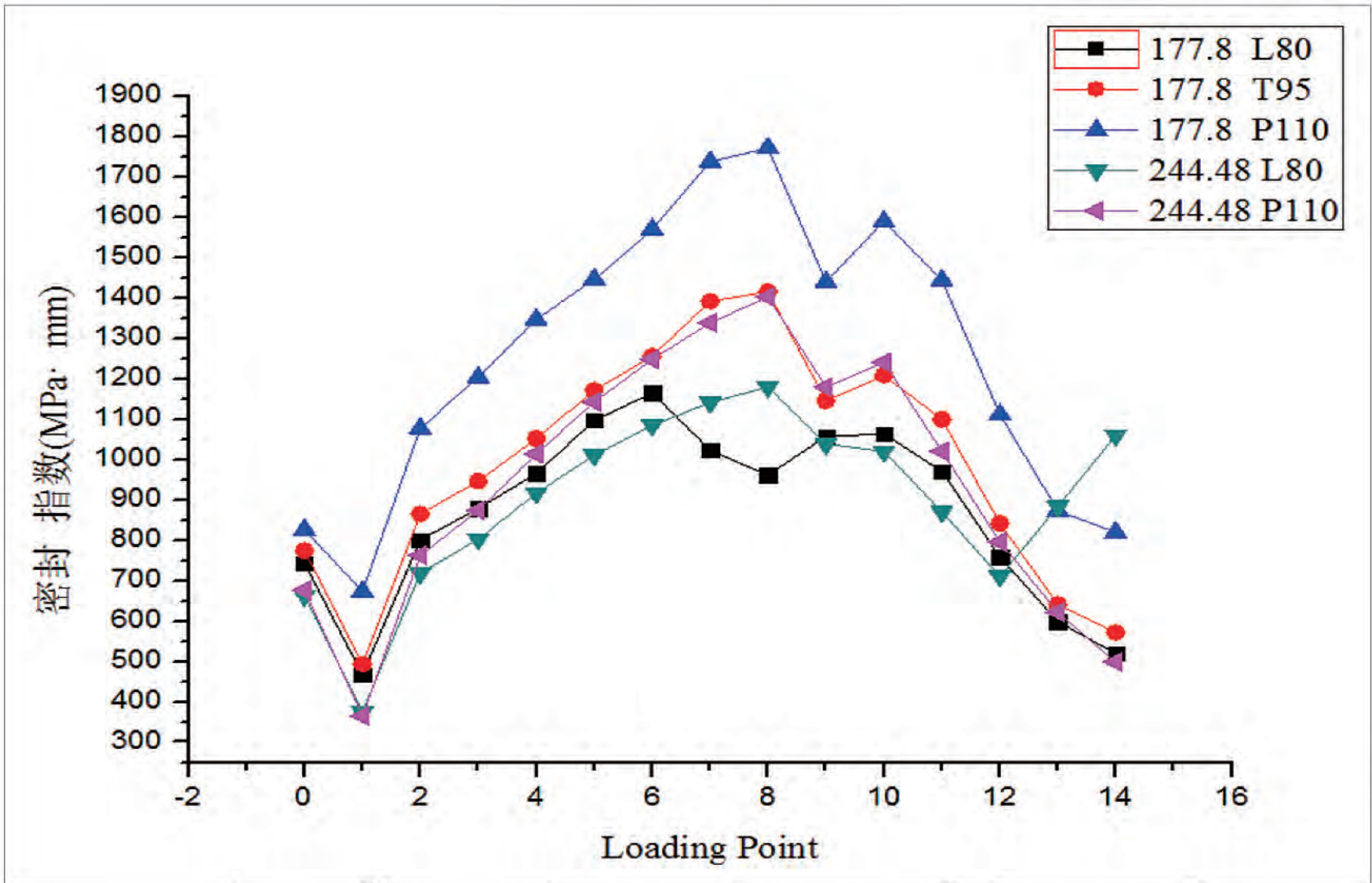
◎研究分析 Research and analysis



上扣后接触压力分布（局部）
Equivalent Von Mises Stress (local)



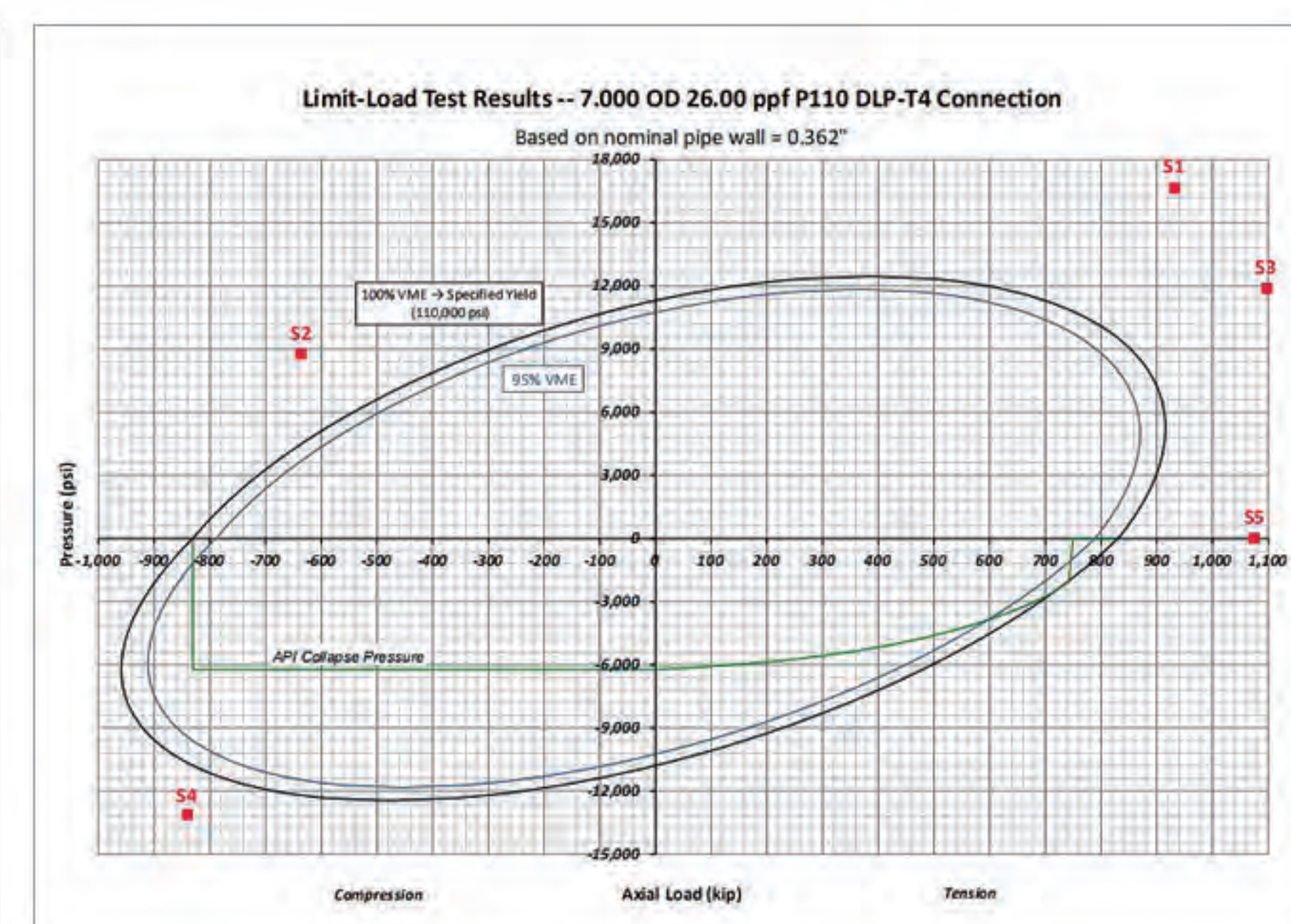
上扣后，DLP-T4 接头的 VME 等效应力分布
Equivalent Von Mises Stress



密封指数变化图
Sealing index change chart

◎实物应用 Application

It is applied to Jing51 gas storage and Suqiao gas storage. Suqiao gas storage is the deepest and the highest pressure level in China.



VME 试验载荷包络图
VME test load envelope diagram

9 管线管 LINE PIPE

管线管 Line Pipe

◎应用 Uses:

应用于石油、天然气行业中油、气、水的输送。

It can be used in the transportation of oil, gas and water in the field of petroleum and gas industry.

◎执行标准 Standard:

API Spec 5L、各国家标准、行业标准等。

API Spec 5L、IPS、ASME、ASTM、NACE、DIN、JIS、GB standard.

◎化学成分，质量分数（%） Chemical composition, mass fraction(%)

品种 Type	钢级 Grade	C	Si	Mn	P	S	V	Nb	Ti
		max	max	max	max	max	max	max	max
PSL1	L245 B	0.28		1.20	0.030	0.030			
	L290 X42	0.28		1.30	0.030	0.030			
	L320 X46	0.28		1.40	0.030	0.030			
	L360 X52	0.28		1.40	0.030	0.030			
	L390 X56	0.28		1.40	0.030	0.030			
	L415 X60	0.28		1.40	0.030	0.030			
	L450 X65	0.28		1.40	0.030	0.030			
	L485 X70	0.28		1.40	0.030	0.030			

◎化学成分，质量分数（%） Chemical composition, mass fraction(%)

品种 Type	钢级 Grade	C	Si	Mn	P	S	V	Nb	Ti
		max	max	max	max	max	max	max	max
PSL2	L245R BR L245N BN	0.24	0.40	1.20	0.025	0.015			0.04
	L290R X42R L290N X42N	0.24	0.40	1.20	0.025	0.015	0.06	0.05	0.04
	L320N X46N	0.24	0.40	1.40	0.025	0.015	0.07	0.05	0.04
	L360N X52N	0.24	0.45	1.40	0.025	0.015	0.10	0.05	0.04
	L390N X56N	0.24	0.45	1.40	0.025	0.015	0.10	0.05	0.04
	L415N X60N	0.24	0.45	1.40	0.025	0.015	0.10	0.05	0.04
	L245Q BQ	0.18	0.45	1.40	0.025	0.015	0.05	0.05	0.04
	L290Q X42Q	0.18	0.45	1.40	0.025	0.015	0.05	0.05	0.04
	L320Q X46Q	0.18	0.45	1.40	0.025	0.015	0.05	0.05	0.04
	L360Q X52Q	0.18	0.45	1.50	0.025	0.015	0.05	0.05	0.04
	L390Q X56Q	0.18	0.45	1.50	0.025	0.015	0.07	0.05	0.04
	L415Q X60Q	0.18	0.45	1.70	0.025	0.015			
	L450Q X65Q	0.18	0.45	1.70	0.025	0.015			
	L485Q X70Q	0.18	0.45	1.80	0.025	0.015			
	L555Q X80Q	0.18	0.45	1.90	0.025	0.015			
PSL2 酸性 服役 For sour service	L625Q X90Q	0.16	0.45	1.90	0.020	0.010			
	L690Q X100Q	0.16	0.45	1.90	0.020	0.010			
	L245NS BNS	0.14	0.40	1.35	0.020	0.003			0.04
	L290NS X42NS	0.14	0.40	1.35	0.020	0.003	0.05	0.05	0.04
	L320NS X46NS	0.14	0.40	1.40	0.020	0.003	0.07	0.05	0.04
	L360NS X52NS	0.16	0.45	1.65	0.020	0.003	0.10	0.05	0.04
	L245QS BQS	0.14	0.40	1.35	0.020	0.003	0.04	0.04	0.04
	L290QS X42QS	0.14	0.40	1.35	0.020	0.003	0.04	0.04	0.04
	L320QS X46QS	0.15	0.45	1.40	0.020	0.003	0.05	0.05	0.04
	L360QS X52QS	0.16	0.45	1.65	0.020	0.003	0.07	0.05	0.04
	L390QS X56QS	0.16	0.45	1.65	0.020	0.003	0.07	0.05	0.04
	L415QS X60QS	0.16	0.45	1.65	0.020	0.003	0.08	0.05	0.04
	L450QS X65QS	0.16	0.45	1.65	0.020	0.003	0.09	0.05	0.06
	L485QS X70QS	0.16	0.45	1.65	0.020	0.003	0.09	0.05	0.06

◎化学成分，质量分数（%） Chemical composition, mass fraction(%)

品种 Type	钢级 Grade	C	Si	Mn	P	S	V	Nb	Ti
		max	max	max	max	max	max	max	max
PSL2 海上服役 For offshore service	L245NO BNO	0.14	0.40	1.35	0.020	0.010			0.04
	L290NO X42NO	0.14	0.40	1.35	0.020	0.010	0.05	0.05	0.04
	L320NO X46NO	0.14	0.40	1.40	0.020	0.010	0.07	0.05	0.04
	L360NO X52NO	0.16	0.45	1.65	0.020	0.010	0.10	0.05	0.04
	L245QO BQO	0.14	0.40	1.35	0.020	0.010	0.04	0.04	0.04
	L290QO X42QO	0.14	0.40	1.35	0.020	0.010	0.04	0.04	0.04
	L320QO X46QO	0.15	0.45	1.40	0.020	0.010	0.05	0.05	0.04
	L360QO X52QO	0.16	0.45	1.65	0.020	0.010	0.07	0.05	0.04
	L390QO X56QO	0.16	0.45	1.65	0.020	0.010	0.07	0.05	0.04
	L415QO X60QO	0.16	0.45	1.65	0.020	0.010	0.08	0.05	0.04
	L450QO X65QO	0.16	0.45	1.65	0.020	0.010	0.09	0.05	0.06
	L485QO X70QO	0.17	0.45	1.75	0.020	0.010	0.10	0.05	0.06
	L555QO X80QO	0.17	0.45	1.85	0.02	0.01	0.1	0.06	0.06
	L625QO X90QO	0.14	0.45	1.85	0.02	0.01	0.1	0.06	0.06
	L690QO X100QO	0.14	0.45	1.85	0.02	0.01	0.1	0.06	0.06

◎力学性能 Mechanical properties

品种 Type	钢级 Grade	加载下的总 伸长率 Total elongation under load	屈服强度 Yield strength	抗拉强度 Tensile strength	屈强比 Yield ratio	硬度 Hardness max		
		%	(MPa)	(MPa)		HRC	HBW	HV10
PSL2 酸性服役 For sour service	L245NS BNS L245QS BQS	0.5	245-450	415-655	0.93	22		250
	L290NS X42NS L290QS X42QS	0.5	290-495	415-655	0.93	22		250
	L320NS X46NS L320QS X46QS	0.5	320-525	435-655	0.93	22		250
	L360NS X52NS L360QS X52QS	0.5	360-530	460-760	0.93	22		250
	L390QS X56QS	0.5	390-545	490-760	0.93	22		250
	L415QS X60QS	0.5	415-565	520-760	0.93	22		250
	L450QS X65QS	0.5	450-600	535-760	0.93	22		250
	L485QS X70QS	0.5	485-635	570-760	0.93	22		250
	L245NO BNO L245QO BQO	0.5	245-450	415-655	0.93	25		270
	L290NO X42NO L290QO X42QO	0.5	290-495	415-655	0.93	25		270
PSL2 海上服役 For offshore service	L320NO X46NO L320QO X46QO	0.5	320-520	435-655	0.93	25		270
	L360NO X52NO L360QO X52QO	0.5	360-525	460-760	0.93	25		270
	L390QO X56QO	0.5	390-540	490-760	0.93	25		270
	L415QO X60QO	0.5	415-565	520-760	0.93	25		270
	L450QO X65QO	0.5	450-570	535-760	0.93	25		270
	L485QO X70QO	0.5	485-605	570-760	0.93	30		300
	L555QO X80QO	0.5	555-675	625-825	0.93	33		325
	L625QO X90QO	0.5	625-745	695-895	0.97	33		325
	L690QO X100QO	Rp 0.2	690-810	760-960	0.97	33		325

10 其他产品 OTHER TUBE PRODUCTS

品种 Type	钢级 / 钢号 Grade	执行标准 Standard	典型用途 Application
流体输送用管 Tube for Liquid Service	20#、Q295、Q345	GB/T 8163	输送一般液体、气体、干粉 Transporting common liquid, gas and dry powder
结构管 Tube for Structural	20#、30#、45#、Q345、Q345B、Q345E、20Mn2、20CrMo、42CrMo、St37.0	GB/T 8162 DIN 1629	机械零件、网架等 Machinery parts, grid structure
汽车用无缝钢管 Seamless Steel Tubes for Automobile	45、45Mn2、20Mn2、GB/T 2582	YB/T 5035 GB/T 8162 GB/T 25822	用于汽车车轴、轴套 For manufacturing auto axle and housing
气瓶用无缝钢管 Seamless Steel Tubes for Gas Cylinder	37Mn、30CrMo、34Mn2V、35CrMo、34CrMo4、30CrMnSiA	GB 18248	气瓶制造 For manufacturing gas cylinder
液压支柱用无缝钢管 Tube for hydraulic prop	20#、35#、40#、27SiMn	GB/T 17396	煤矿液压支架和支柱，也可用于其它的液压缸、柱用 Hydraulic support and pillar for coalmine, can also be used for other hydraulic cylinder and pillar
地质钻探管 Tube for Geological Drilling	DZ40、DZ50、DZ60	YB/T 235 GB/T 9808	地钻探用管是供地质部门进行岩心钻探使用的钢管 Ground drilling pipe is a steel pipe for geological departments to drill core
射孔枪管 Tube for Perforating Gun	DLP-PG110、DLP-PG130、DLP-PG140、DLP-PG155	YB/T 4371 技术协议 Technical agreements	用于制造各类高性能油气井射孔枪枪体 For manufacture of perforating gun bod

流体输送用管 Tubes for Conveyance of Fluid

◎标准 Standard:

GB/T 8163 中国国家标准 China National Standard

ASTM A 53M / ASTM A 106M

◎用途 Uses:

用于石油、天然气输送以及其他流体输送

For conveying oil, gas and other fluids

◎化学成分 Chemical Composition (%)

标准 Standard	牌号 Grade	C	Si	Mn	P	S	Ni	Cr	Cu	Mo	V
GB/T 8163	10	0.07-0.13	0.07-0.37	0.35-0.65	<0.035	<0.035	<0.30	<0.15	<0.25		
	20	0.17-0.23	0.17-0.37	0.35-0.65	<0.035	<0.035	<0.30	<0.25	<0.25		
	Q345A	<0.20	<0.50	<1.70	<0.035	<0.035	<0.50	<0.30	<0.30		<0.15
	Q345B	<0.20	<0.50	<1.70	<0.035	<0.035	<0.50	<0.30	<0.30		<0.15
	Q345C	<0.20	<0.50	<1.70	<0.030	<0.030	<0.50	<0.30	<0.30		<0.15
	Q345D	<0.18	C0.50	<1.70	<0.030	<0.030	<0.50	<0.30	<0.30		<0.15
	Q345E	<0.18	<0.50	<1.70	<0.025	<0.020	<0.50	<0.30	<0.30		<0.15
ASTM A 53M	A	<0.25		<0.95	<0.05	<0.045	<0.40	<0.40	<0.40	<0.15	<0.08
	B	<0.30		<1.20	<0.05	<0.045	<0.40	<0.40	<0.40	<0.15	<0.08
ASTM A 106M	A	<0.25	>0.10	0.27-0.93	<0.035	<0.035	<0.40	<0.40	<0.40	<0.15	<0.08
	B	<0.30	>0.10	0.29-1.06	<0.035	<0.035	<0.40	<0.40	<0.40	<0.15	<0.08
	C	<0.35	20.10	0.29-1.06	<0.035	<0.035	<0.40	<0.40	<0.40	<0.15	<0.08

◎机械性能 Mechanical Properties

标准 Standard	钢级 Grade	抗拉强度 (MPa) Tensile strength	屈服强度 (MPa) Yield strength		伸长率 (%) Elongation (min)	冲击实验 Impact test	
			<16mm	>16-30mm		温度 (°C) Temperature	吸收功 (KV/J)
GB/T8163	10	335-475	≥ 205	≥ 195	≥ 24		
	20	410-530	≥ 245	≥ 235	≥ 20		
	Q345A	470-630	345	325	20		
	Q345B	470-630	345	325	20	20	34
	Q345C	470-630	345	325	21	0	34
	Q345D	470-630	345	325	21	-20	34
	Q345E	470-630	345	325	21	-40	27
ASTM A 53M	A	≥ 330	≥ 205		见 ASTM A 53 的表 3 See table 3 of ASTM A 53		
	B	≥ 415	≥ 240				
ASTM A 106M	A	≥ 330	≥ 205		见 ASTM A1 06 的表 4		

结构管 Tubes for Structure

◎标准 Standard:

GB/T 8162 中国国家标准 China National Standard
DIN 1629 德国工业标准 Deutsche Industrie Normen

◎用途 Uses:

用于制造管道、容器、设备、管件及钢结构
For manufacture of pipelines, vessels, equipment, pipe fittings and steel structures

◎化学成分 Chemical Composition (%)

标准 Standard	牌号 Grade	C	Si	Mn	P	S	Cr	Ni	Cu	V
GB/T 8162	10	0.07-0.13	0.17-0.37	0.35-0.65	<0.025	<0.020	<0.15	<0.30	<0.25	
	20	0.17-0.23	0.17-0.37	0.35-0.65	<0.025	<0.020	<0.25	<0.30	<0.25	
	35	0.32-0.39	0.17-0.37	0.50-0.80	<0.025	<0.020	<0.25	<0.30	<0.25	
	45	0.42-0.50	0.17-0.37	0.50-0.80	<0.025	<0.020	<0.25	<0.30	<0.25	
	Q345A	<0.20	<0.55	1.00-1.60	<0.025	<0.020	<0.30	W0.30	<0.30	
	Q345B	<0.20	<0.55	1.00-1.60	<0.025	<0.020	<0.30	<0.30	<0.30	
	Q345C	<0.20	<0.55	1.00-1.60	<0.025	<0.020	<0.30	<0.30	<0.30	0.02-0.15
	Q345D	<0.18	<0.55	1.00-1.60	<0.025	<0.020	<0.30	<0.30	<0.30	0.02-0.15
	Q345E	<0.18	<0.55	1.00-1.60	<0.025	<0.020	<0.30	<0.30	<0.30	0.02-0.15
DIN 1629	St37.0	<0.17	0.17-0.37	0.35-0.65	<0.025	<0.020	<0.25	<0.25	<0.25	
	St44.0	<0.21	0.17-0.37	0.50-0.80	<0.025	<0.020	<0.25	<0.25	<0.25	
	St55	0.33-0.41	0.17-0.37	0.50-0.80	<0.025	<0.020	<0.25	<0.25	<0.25	
	St52.0	<0.22	<0.55	<1.60	<0.025	<0.020	<0.25	<0.25	<0.25	
	CK45	0.42-0.50	0.17-0.37	0.50-0.80	<0.025	<0.020	<0.25	<0.25	<0.25	

◎机械性能 Mechanical Properties

标准 Standard	钢级 Grade	抗拉强度 (MPa) Tensile strength	屈服强度 (MPa) Yield strength		伸长率 (%) Elongation (min)	冲击实验 Impact test	
			<16mm	>16-30mm		温度 (°C) Temperatur	吸收功 (KV/J)
GB/T8163	10	>335	205	195	24		
	20	>410	245	235	20		
	35	>510	305	295	17		
	45	>590	335	325	14		
	Q345A	470-630	345	325	20		
	Q345B	470-630	345	325	20	20	34
	Q345C	470-630	345	325	21	0	34
	Q345D	470-630	345	325	21	-20	34
	Q345E	470-630	345	325	21	-40	27
DIN1629			<16mm	>16mm			
	St37.0	350-480	235	225	25		
	St44.0	420-550	275	265	21		
	St55	540-645	295	285	17		
	St52.0	500-650	355	345	21		
	CK45	590-730	335	325	14		

汽车用无缝钢管 Seamless Hot-rolled Steel Tubes for Automobile

◎标准 Standard:

YB/T 5035 中国冶金工业标准 Standard of China Metallurgical Industry

GB/T 8162 中国国家标准 China National Standard

GB/T 25822 车轴用异型及圆形无缝钢管 Shaped and round seamless steel tubes for axle

◎用途 Uses:

用于汽车车轴、轴套 For manufacturing auto axle and housing

◎化学成分 Chemical Composition (%):

标准 Standard	牌号 Grade	C	Si	Mn	P	S	Cr	Ni	Cu
YB/T 5035	45	0.42-0.50	0.17-0.37	0.50-0.80	≤ 0.030	≤ 0.025	≤ 0.25	≤ 0.25	≤ 0.25
	45Mn2	0.42-0.49	0.17-0.37	1.40-1.80	≤ 0.025	≤ 0.025	≤ 0.30	≤ 0.30	≤ 0.20
GB/T 8162	20Mn2	0.17-0.24	0.17-0.37	1.40-1.80	≤ 0.035	≤ 0.035	≤ 0.25	≤ 0.25	≤ 0.20

注：经协商，也可供应其它牌号的钢管。

Note: Grades other than the a.m. chart can be made available through consultations.

标准 Standard	钢级 Grade	抗拉强度 (MPa) Tensile strength	屈服强度 (MPa) Yield strength	延伸率 (%) Elongation	布氏硬度 HBW
		不小于 /not less than			
YB/T 5035	45	590	335	14	
	45Mn2	885	735	10	217 ~ 269
GB/T 8162	20Mn2	785	590	10	

气瓶用无缝钢管 Seamless Steel Tubes for Gas Cylinder

◎标准 Standard:

GB 18248 中国国家标准 China National Standard

◎用途 Uses:

用于各种气瓶制造 For manufacturing gas cylinder

◎化学成分 Chemical Composition (%):

标准 Standard	牌号 Grade	C	Si	Mn	P	S	Cr	Mo	V	Ni	Cu
GB 18248	37Mn	0.34-0.40	0.10-0.30	1.35-1.75	≤ 0.020	≤ 0.020	≤ 0.30			≤ 0.30	≤ 0.20
	30CrMo	0.26-0.34	0.17-0.37	0.40-0.70	≤ 0.020	≤ 0.020	0.80-1.10	0.15-0.25		≤ 0.30	≤ 0.20
	34Mn2V	0.30-0.37	0.17-0.37	1.40-1.75	≤ 0.020	≤ 0.020	≤ 0.30		0.07-0.12	≤ 0.30	≤ 0.20
	35CrMo	0.32-0.40	0.17-0.37	0.40-0.70	≤ 0.020	≤ 0.020	0.80-1.10	0.15-0.25		≤ 0.30	≤ 0.20
	34CrMo4	0.30-0.37	≤ 0.40	0.60-0.90	≤ 0.020	≤ 0.020	0.90-1.20	0.15-0.30		≤ 0.30	≤ 0.20
	30CrMnSiA	0.28-0.34	0.90-1.20	0.80-1.10	≤ 0.020	≤ 0.020	0.80-1.10	≤ 0.10		≤ 0.30	≤ 0.20

◎机械性能 Mechanical Properties

标准 Standard	钢级 Grade	抗拉强度 (MPa) Tensile strength	屈服强度 (MPa) Yield strength	伸长率 (%) Elongation	冲击功 (J) Impact energy	
					温度 (°C) Temperature	吸收功 (KV/J) Absorbed energy
					不小于 /not less than	
GB 18248	37Mn	750	630	16	-50	27
	30CrMo	930	785	12	-50	27
	34Mn2V	745	530	16	-20	27
	35CrMo	980	835	12	-50	27
	34CrMo4	980	835	12	-50	27
	30CrMnSiA	1080	885	10	室温 Room temperature	27

注：经协商，也可供应其它牌号的钢管。

Note: Grades other than the a.m. chart can be made available through consultations.

液压支柱用管 Seamless Hot-rolled Steel Tubes for Hydraulic Pillar Service

液压支柱管是在优质碳素结构钢基础上，适当地加入一种或几种合金元素，用来提高钢的强度、韧性和淬透性能。与优质碳素结构钢相比较，具有良好的综合力学性能。

Hydraulic prop pipe is based on high-quality carbon structural steel, and one or several alloy elements are appropriately added to improve the strength, toughness and hardenability of the steel. Compared with high-quality carbon structural steel, it has good comprehensive mechanical properties.

◎用途 Uses:

煤矿液压支架和支柱的缸、柱，也可用于其它的液压缸、柱用。
For manufacturing cylinder and piston of hydraulic props for coal mine or other purposes

◎标准 Standard:

GB/T 17396 中国国家标准 China National Standard

◎化学成分 Chemical Composition (%):

标准 Standard	C	Si	Mn	S	Cr	Ni	Cu
20	0.17-0.24	0.17-0.37	0.35-0.65	<0.015	<0.25	<0.25	<0.20
35	0.32-0.40	0.17-0.37	0.50-0.80	<0.025	<0.25	<0.25	<0.20
40	0.42-0.50	0.17-0.37	0.50-0.80	<0.025	<0.25	<0.25	<0.20
27SiMn	0.24-0.32	1.10-1.40	1.10-1.40	<0.020	<0.25	<0.25	<0.25
30MnNbRe	0.27-0.36	0.20-0.60	1.20-1.60	<0.035	<0.030 Nb 0.02-0.05	<0.030	<0.030 Re 0.02-0.04

◎机械性能 Mechanical Properties

钢级 Grade	屈服强度 (MPa) Yield strength (min)	抗拉强度 (MPa) Tensile strength (min)	伸长率 (%) Elongation (min)	冲击功 (J) Impact energy (min)	退火状态 布氏硬度 HRB
20	245	400	20		
35	305	510	17		
45	335	590	14		
27SiMn	835	980	12	39	217
30MnNbRe	725	850	13	49	

◎规格 Product size

外径 Diameter: 159-325mm; 壁厚 Thickness: 4-30mm

地质钻探用管 Tube for Geological Drilling

◎应用 Uses

地钻探用管是供地质部门进行岩心钻探使用的钢管，主要有地质钻杆、地质套管、岩心管、钻铤、主动钻杆和钻头。

Ground drilling pipe is a steel pipe for geological departments to drill core, mainly including geological drill pipe, geological casing, core pipe, drill collar, active drill pipe and bit.

◎执行标准 Standard

GB/T 9808-2008 《钻探用无缝钢管》

YB/T 235-1970 《地质钻探用钢管》

YB/T 528-1965 《石油钻探管》

YB/T 691-1970 《石油钻铤专用无缝管》

◎化学成分，质量分数（%） Chemical composition, mass fraction(%)

牌号 Material	钢级 Grade	C	Si	Mn	P	S	Cu	Cr	Ni	Mo	V	B
45MnB	DZ40 (ZT380)	0.42-0.49	0.20-0.40	1.10-1.40	<0.040	<0.040						0.001-0.0035
50Mn		0.48-0.56	0.17-0.37	0.70-1.00	<0.040	<0.040						
40Mn2	DZ50 (ZT490)	0.37-0.44	0.20-0.40	1.40-1.80	<0.040	<0.040						
40Mn2Si		0.37-0.45	0.40-0.70	1.30-1.80	<0.040	<0.040						
45MnMoB	DZ60 (ZT590)	0.41-0.49	0.17-0.37	0.90-1.20	<0.040	<0.040				0.20-0.30		0.001-0.005
42MnMo7	STM-R780 (ZT520)	0.38-0.45	0.15-0.35	1.55-1.85	<0.025	<0.02	<0.20	<0.30	<0.30	0.15-0.2		
36Mn2V	STM-R780-1	0.35-0.40	<0.65	1.30-1.70	<0.025	<0.02					0.08-0.20	

力学性能 Mechanical properties

钢级 Grade	屈服强度 (MPa) Yield strength (min)	抗拉强度 (MPa) Tensile strength (min)	延伸率 (%) Elongation (min)
DZ40	380	640	14
DZ50	490	690	12
DZ60	590	770	12
STM-R780	520	780	15
STM-R780-1	520	780	15
DZ75	740	840	10
DZ85	840	940	10
DZ95	940	1030	10

规格 Product size

公称外径：Φ73.02mm~Φ219.1mm；壁厚：6.25mm~20.0mm；长度：6.0m~12.0m

尺寸精度 Dimension tolerance

外径偏差：-0.5%D~+1.0%D，壁厚偏差：-10%S~+12.5%S，弯曲度：≤ 1.5mm/m。

射孔枪管 Tube for Perforating Gun

射孔枪管是制造各类高性能油气井射孔枪的主要原材料。射孔枪管在射孔作业时不仅要承受射孔弹高载荷高速冲击作用，还要承受射孔弹碎片对管材反向撞击作用。这样不仅对射孔枪管冲击韧性的要求非常高，对其屈服强度的要求也非常高，以承受较高的撞击载荷。

Tube is the main raw material for manufacturing various high-performance oil and gas well perforating guns. The tube not only withstands the high-speed impact of perforating bullets during perforating operations, but also bears the reverse impact of perforating bullet fragments on the pipe. In this way, not only the impact toughness of the perforating barrel is very high, but also the yield strength is also very high to withstand high impact loads.

用途 Uses:

用于制造各类高性能油气井射孔枪枪体

For manufacture of perforating gun body

标准 Standard:

YB/T 4371-2014 油气井射孔枪用无缝钢管

YB/T 4371-2014 Seamless steel tubes for perforating guns for oil and gas wells

化学成分 Chemical Composition (%):

牌号 Grade	C	Si	Mn	P	S	Cr	Mo	V
32CrMo4	0.29-0.36	0.17-0.37	0.50-0.80	<0.015	<0.010	0.90-1.20	0.20-0.30	
25Mn2MoV	0.21-0.29	0.15-0.50	1.30-1.90	<0.015	<0.010		0.10-0.30	0.05-0.20

力学性能 Mechanical properties

牌号 Grade	规定延伸强度 Yield strength MPa	抗拉强度 Tensile strength MPa	伸长率 Elongation %	横向冲击功 Transverse Impact energy, J	纵向冲击功 Longitudinal Impact energy, J	硬度 Hardness HRC
DLP-PG110	758-965	≥ 862	≥ 17	42	84	26-33
DLP-PG130	896-1103	≥ 930	≥ 14	42	84	>30
DLP-PG140	965-1172	≥ 1000	≥ 11	42	84	>33
DLP-PG155	1068-1275	≥ 1137	≥ 10	42	84	>33

规格 Product Size:

外径 /Outside diameter mm	壁厚 /Wall thickness mm
73.00	5.51、7.82、9.19
82.50	9.00
83.00	9.00
88.90	6.45、7.10、8.00、8.80、9.19、10.00、12.00
95.00	8.00、10.00
96.00	10.00
101.60	7.00、9.00、9.50、10.00、11.00
108.00	8.00
114.30	8.50、9.50、10.00、11.10、12.50、13.00
127.00	9.50、11.00、12.50

长度 Length: 8-12m。

11 智能制造 INTELLIGENT MANUFACTURING

达力普智能制造体系实现从销售订单到排产计划、物料调配、生产控制、产品入库、销售发货等整个业务流程的智能化管理和运行控制。

The Dalipal intelligent manufacturing system is designed to intelligent management and production operations of the entire business process from ordering to production scheduling, material preparation, production control, product warehousing, and shipment.

高端石油管智能制造工厂
Advanced OCTG Intelligent Manufacturer

基于智能生产线、工艺大数据平台，实现基于合金材料的基础原理和生产大数据协同设计、智能制造一体化智能工厂，实现企业可持续发展，推动行业转型升级。
Based on intelligent production line and process big data platform, it realizes the basic principle based on alloy material, collaborative design of production big data and integrated intelligent manufacturing intelligent factory, so as to realize sustainable development of enterprises and promote industrial transformation and upgrading.



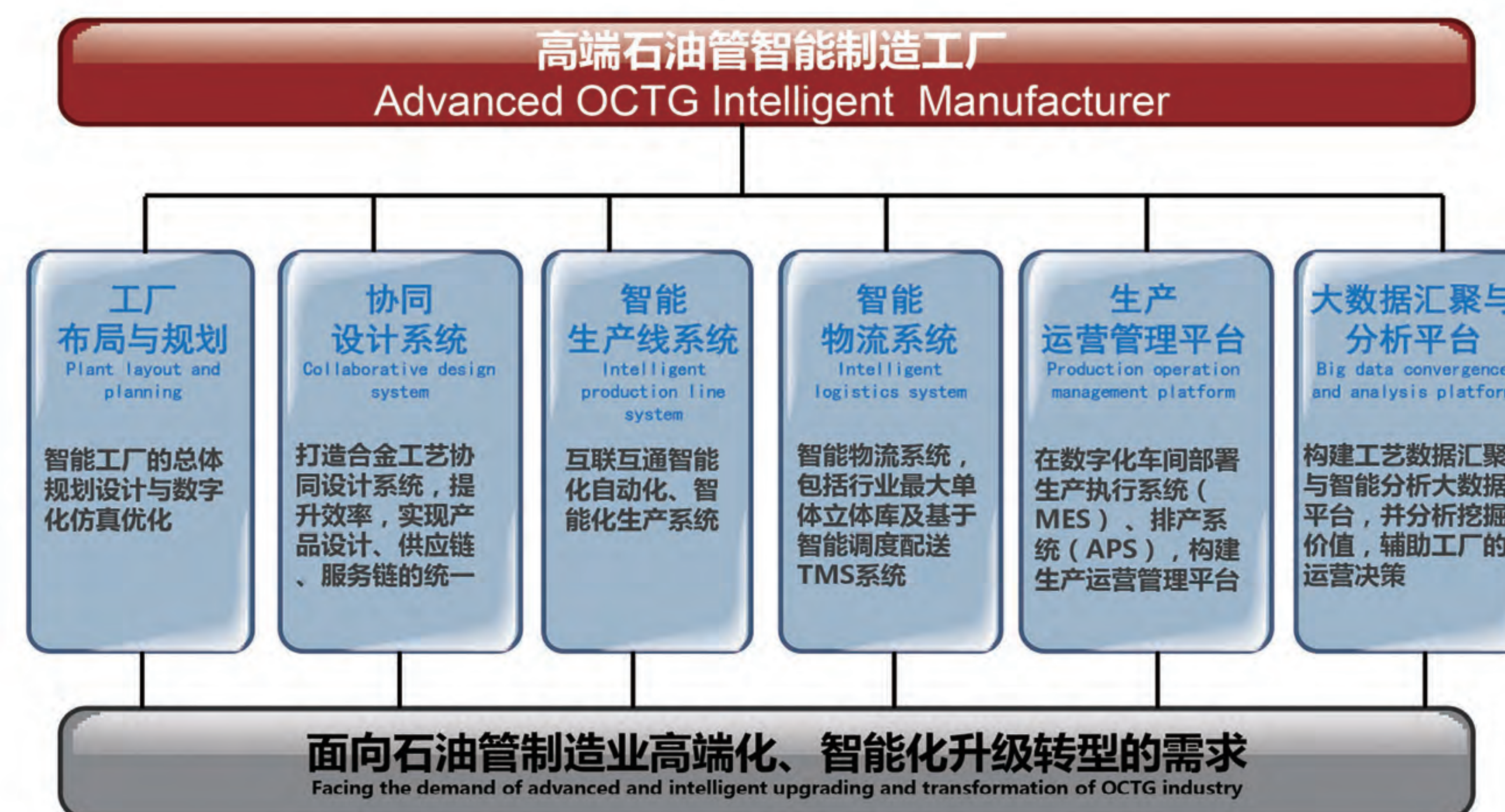
通过构建工艺大数据平台，实现集工艺设计、中试试验、定制生产为一体的企业协同制造体系，以关键工艺智能控制、在线检测模块、智能物流与逐支跟踪系统等技术的应用与开发为载体，与客户群进行深度交互协作，能快速满足个性化的定制需求与服务。



Big data platform built by production processing , process design, pilot test and customization production for the integration of enterprise collaborative manufacturing system, with the key technology of intelligent control, on-line detection module, intelligent logistics and by tracking system application and development as the carrier, such as depth of interactive collaboration with customers, can quickly meet the demand of personalized customization and service.

在各生产环节采用当今世界上最先进的智能控制模型，达到高质量、低成本、柔性批量生产高端石油管和各类无缝钢管。通过采用智能传感器、机器人、人工智能检测、无人化智能仓储系统等最先进的装备和技术，以 ERP、MES、LIMS、WMS、工业互联网信息化系统为支撑，以自动智能检测装置，如智能流量计、智能电度表、智能压力、扭矩和位置传感器、智能温度检测装置、射频识别 (RFID) 和条码识别技术为载体，实现生产工艺参数的自动采集，智能识别和判断，提升生产过程控制精准度和追溯性，制造出优质产品，满足客户的订单化需求。

All the production links adopt the most current intelligent control model in the world to ensure the production of high-end petroleum tubes and all types of seamless steel in large flexible batches and at a low cost. Relying on the most advanced equipment and technologies, such as intelligent sensors, robots, AI testing, and unmanned intelligent warehousing system, using MES, LIMS, WMS, ERP, and industrial internet information systems as support and taking automatic intelligent test devices to be carriers – such as the intelligent flow meter, intelligent kilowatt-hour meter, intelligent pressure/torque/position sensor, intelligent temperature testing devices, RFID and bar code identification technology, the company will be able to achieve the automatic capture of production process parameters. This is in addition to intelligent identification and judgment, improving the control precision and traceability of the production process, manufacturing high-quality products, and meeting customers' order-oriented demands.



智能检测系统 Intelligent test system

检测试验中心采用 LIMS 系统与大数据平台互联互通，及时准确的将检测结果反馈至生产系统，为产品质量控制提供决策依据。

The test center integrates the LIMS system and the big data platform and timely feeds testing results accurately back to the production system, providing a basis for decision making of quality control.



智能物流系统 Intelligent logistics system

智能电子物流系统与智能门岗、称重系统对接，结合移动互联网、云服务技术实现车辆进厂、车辆排号、进厂称重、质检、出厂称重和车辆出厂信息化管理，实现云端监控功能。

The intelligent electronic logistics system aligns successfully with intelligent access control and the weighing system. In combination with mobile internet and cloud service technology, information-based management and cloud monitoring are achieved. This includes incoming vehicles, vehicle numbering, weighing of incoming, quality control, and weighing outgoing vehicles.



智能周转库 Intelligent turnover warehouse

智能库是在石油专用管制造行业的首次应用。该智能周转库通过先进的管理调度系统与自动化输送系统的有机集成，形成高度智能化的物料周转及仓储管理，实现轧管线、加厚线、热处理线和管加工线等多条产线、工序的物料统一管理和调度。智能周转库提升了物料周转的智能化管理，提高了物料周转速度，缩短了存储周期，降低了工序间的物料库存，为订单化生产提供了坚实基础。

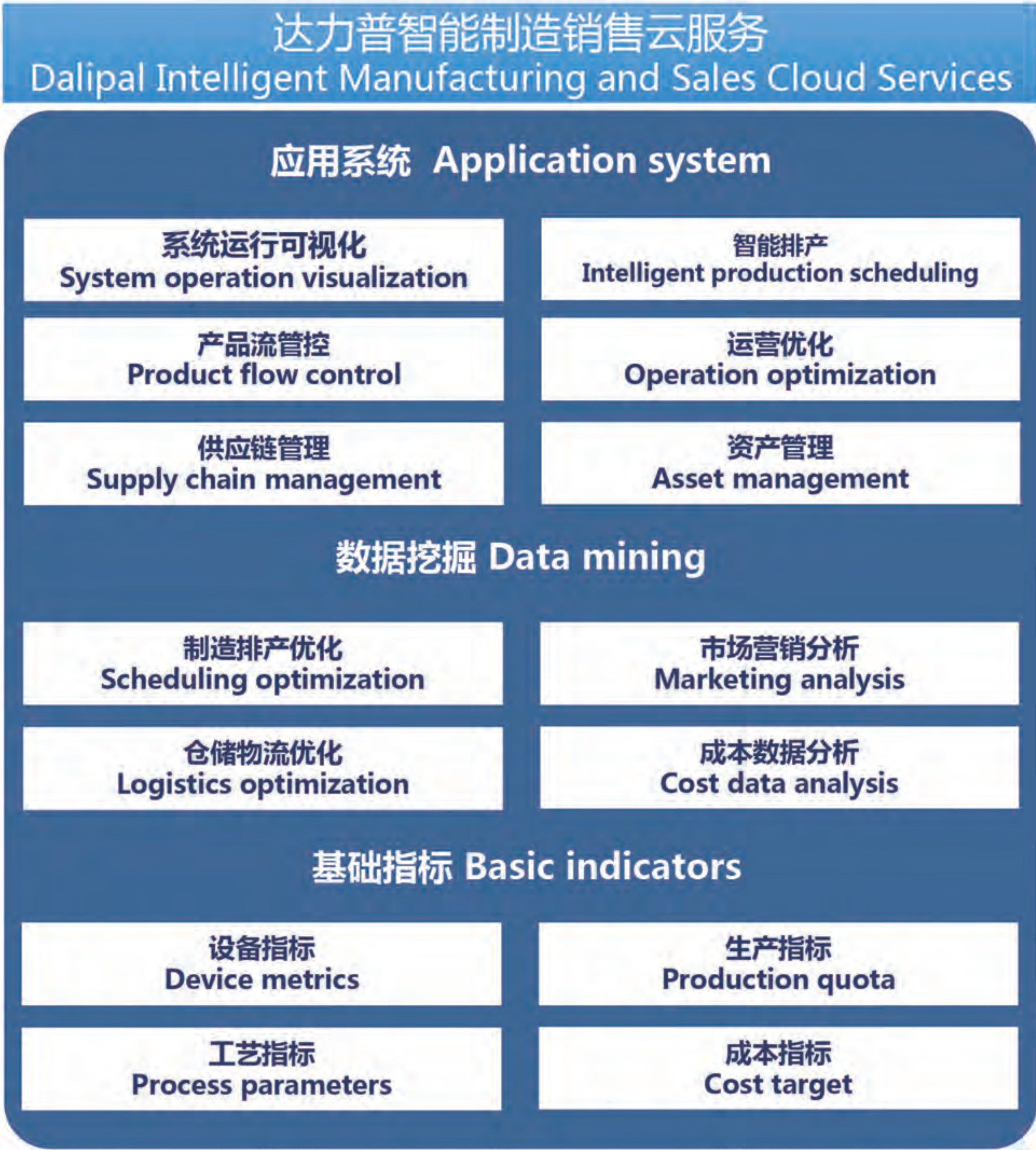
For the first time, an intelligent warehouse system is adopted in the OCTG manufacturing industry. This intelligent turnover warehouse is organically integrated with the advanced management dispatching system and the automatic conveying system. This will lead to the formation of highly intelligent material turnover and warehouse management, and produce uniform management and dispatch of materials of several production lines and processes, including the

rolling production line, thickening production line, heat treatment production line, and tube processing line. The intelligent turnover warehouse improves the intelligent management of material turnover, improves the material turnover speed, shortens the storage cycle, reduces material inventory between processes, and provides a solid foundation in order-oriented production.

销售云服务平台 Cloud sales service platform

达力普销售平台系统具有开放的信息管理接口，客户的信息管理系统可以与达力普的 ERP 系统、生产监控系统和电子物流系统进行对接，实现客户订单的实时跟踪。

The Dalipal sales platform system is designed with open information management interfaces. Customers' information management systems can connect to Dalipal's ERP system, the production monitoring system, and the electronic logistics system to obtain real-time tracking of orders.



销售与服务

SALES AND SERVICES

达力普公司是一家全流程制造服务商，以销售合金管坯、无缝钢管、油套管等产品为主。

作为合金管坯制造商，生产的优质合金管坯供给各类钢管制造企业。

作为无缝钢管制造商，生产的优质无缝钢管供给各类油套管加工企业、气瓶加工企业、汽车制造企业、液压支柱制造企业等。

作为油套管制造商，生产的优质油套管产品销往中东、北美、南美、中亚、非洲等国家和地区的油田市场，并供给中国各大油田。

Dalipal is an all-inclusive manufacturing process service provider and is mainly engaged in the sales of alloy billets, seamless steel tubes, and tubing and casing.

As an alloy billets manufacturer, the company produces high-quality alloy billets for steel tube manufacturing enterprises.

As a seamless steel tube manufacturer, high-quality seamless steel tubes manufactured by the company are supplied to tubing and casing processing enterprises, cylinder processing enterprises, automobile manufacturing enterprises, and hydraulic column manufacturing enterprises.

As a tubing and casing manufacturer, high-quality tubing and casing products manufactured by the company are sold to oilfield markets in the Middle East, North America, South America, Central Asia, Africa, and other countries and regions, and are also provided for oilfields in China.

达力普公司始终坚持为客户提供优质有竞争力的产品和服务为出发点，从售前咨询、生产控制、检验、发运、使用等各环节满足客户的需求，为客户提供全方位的服务。公司设有由技术、生产、质检、销售等部门组成的专业的服务队伍，定期走访客户，征询客户的反馈意见。对于客户的需求，实行 24 小时响应机制。

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，我们将予以即时答复。

Dalipal insists on providing its customers with high-quality and competitive products and services, and to meet customers' demands in all areas, including pre-sales consulting, production control, inspection, shipment, and usage, and provide users with inclusive services. The company has a professional service team composed of personnel from the technology department, production department, quality control department, and the marketing department. The team visits users regularly to obtain and collate feedback from users. The company applies the 24h response mechanism while handling customers' demands.

We thank you very much for your attention and use of our products and warmly welcome your comments and suggestions.

We should be glad to give you a prompt response, if you contact us for any things about grade, specification or special requirement beyond this catalog.

达力普云服务平台通过移动互联网、云服务、大数据技术实现订单管理、过程管理、物流管理、质量管理、现场管理、系统管理等全流程的实时呈现，让客户随时掌握订单产品的进度状态。

The Dalipal cloud service platform produces real-time simulations of the entire process, including order management, process management, logistics management, quality management, site management, and system management by using the mobile internet, cloud service, and big data, thus enabling customers to master the schedule status of ordered products.

达力普云服务平台涵盖售前咨询、订单确认、制造追踪、过程检测、产品使用等全过程，为客户提供各种条件，满足客户的各种需求，实现订单化服务。

Dalipal cloud service platform covers pre-sales consulting, order confirmation, manufacturing tracking, process inspection, product use, etc., provide different conditions for customers, meet customers' demands, and achieve order-oriented services.

