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特殊合金钢管 Special Alloy Steel Tube

宝钢特钢有限公司
BAOSTEEL SPECIAL METALS CO., LTD.

# Special Alloy Steel Tube
# 特殊合金钢管

Product Manual of Special Alloy Steel Tube
特殊合金钢管产品手册

BAOSTEEL


## 宝钢文化 Enterprise Culture

严格苛求的精神
Stringent and exigent spirit

学习创新的道路
Learning and innovation road

争创一流的目标
Striving for first-class objective

## 核心价值 Core Value

诚 信 Good Faith

协 同 Synergy

## 宝钢特钢 BAOSTEEL SPECIAL METALS

宝钢集团是中国最大、最现代化的国有钢铁联合企业，主要生产高技术含量、高附加值钢铁精品，已形成普碳钢、不锈钢、特钢三大产品系列。2012年，宝钢完成钢产量4383万吨，利润总额104亿元，居世界钢铁行业第二位。2013年，宝钢连续第十年进入美国《财富》杂志评选的世界500强榜单，位列第222位，并连续当选为“全球最受赞赏的公司”。

宝钢特钢有限公司是宝钢集团全资子公司，位于上海市宝山区吴淞工业区内，前身为上海第五钢铁厂、上海钢铁研究所和上海浦钢公司，创建于1958年，是我国最早的军工用特殊钢生产基地之一，1998年并入宝钢集团。

宝钢特钢有限公司拥有特种冶金，不锈钢、结构钢、高合金钢长材，合金板带及钢管等多条现代化的生产线，形成了以耐蚀合金、钛及钛合金、高温合金、精密合金、特殊不锈钢、特种结构钢六大类战略产品为核心，聚焦于航空航天、能源电站及交通运输等国民经济关键行业的战略产品群。产品有板、管、棒、丝、盘园、带、饼、环及异型材，广泛应用于航天、航空、核电、汽车、机械、电站、电子仪表和石油化工等行业。

宝钢特钢一直致力于向前沿技术市场、知名大公司、行业领导者、具有社会影响力的客户提供优质服务和开展广泛的合作。按照宝钢集团的发展规划，宝钢特材将打造成为高端的新材料研发和制造基地。

Baosteel Group is China's largest, most modern state-owned iron and steel enterprises, mainly the production of high technology content, high value-added steel products, has formed the common carbon steel, stainless steel, special steel three product series. In 2012, Baosteel steel production of 43830000 tons, a total profit of 10400000000 yuan, ranking second in world steel industry. In 2013, Baosteel for tenth consecutive years to enter the American "fortune" magazine of the world's top 500 list, ranked 222nd, and was elected as a "global Most Admired Companies".

Baosteel Special Metals Co., Ltd. is a wholly owned subsidiary of Baosteel Group, located in Shanghai City, Baoshan District Wusong Industrial Area, formerly known as Shanghai the fifth steel plant, Shanghai iron and Steel Research Institute and the Shanghai Pu steel company, founded in 1958, is China's earliest military use of special steel production base, in 1998 into the Baosteel group.

Baoshan Iron & Steel Co. Ltd. Special Steel Business Unit is located at the northeastern part of Shanghai, China. It grew out Shanghai No.5 Steel Co.(It consists of Shanghai No.5 Steel Works set up in 1958 and Shanghai Iron & Steel Research Institute) and special steel section of Shanghai No.3 Steel Works. It is one of the earliest special steel production bases in China. In 1998, it merged into Baosteel Group. In May 2005, the core assets of Shanghai No.5 Steel Co. was purchased by listed Baosteel, and it became Special Steel Branch of Baosteel.In April 2009, Baosteel set up Special Steel Business Unit with Special Steel Branch wholly affiliated to this Business Unit.With more than 50-year experience, Special Steel Business Unit possesses advanced production lines for special metallurgy,stainless steel, structural steel and high alloy long products,alloy plate & sheet and strip and seamless tube, etc. Forms of products cover bar, wire, plate & sheet, strip, seamless tube,forging, etc. The production system is formed with the dominant products as special metallurgy, stainless steel and structural steel. It focuses on applications in industries of aerospace & aviation, energy resources, automobile (transportation) and 4 key products i.e. tool & die steel, bearing steel, cold-roll & mandrel and stainless steel bar & wire.

Baosteel Special Steel Business Unit has been devoting its efforts to providing quality service to customers among notable companies, industry leaders, social influential entities and frontier technology market. According to the new development strategy of Baosteel, Special Steel Business Unit will be built into an ecologically-friendly global premium special steel manufacturing base taking the leading position domestically with its comprehensive competitiveness, as well as into a special steel R & D base for new materials, new processes and new technology.



# 特殊合金钢管简介
Introduction of Special Alloy Steel Tube

## 宝钢特钢供应能力与优势
### Supply ability and advantage

现代化的装备能力
Advanced production line
完善的质量控制体系
Sophisticated quality system
市场驱动的材料设计理念
Market-driven material design concepts
差异化的产品服务
Customized products service

# 特殊合金钢管简介
## Introduction of Special Alloy Steel Tube

特殊合金钢管是宝钢特钢的重点产品之一，特殊合金钢管产线拥有先进、完整的特殊钢冶炼、锻造、轧坯、无缝管制造和后道检验、检测能力。特殊合金钢管现有 2 个生产基地：宝钢特钢钢管厂、宝银特种钢管有限公司（核电 690 管专业生产线）。宝钢特钢钢管厂（原上海第五钢铁厂六车间）始建于 1963 年，现占地面积约 16 万平方米。该厂是中国最早生产高合金精密无缝钢管的企业；中国第一支奥氏体无缝不锈钢管、核电 690U 形管、镍基合金油井管、超超临界锅炉用 S30432 等钢管的诞生地；核反应堆蒸发器用合金钢管（新 13 号）和 00Cr18Ni5Mo3Si2（3RE60）双相耐腐蚀不锈钢管荣获国家科技进步一等奖；1Cr18Ni9Ti 化工用不锈长钢管荣获国家银质奖…

Special alloy tube is one of the major products of Baosteel special steel Co.,Ltd. This line has advanced and integrated special steel smelting, forging, rolling, seamless tube manufacturing and back end inspection and test capacities.. Special alloy steel tubes existing two production bases: Baosteel Special Steel Plant, Baoyin Special Steel Co., Ltd. (Nuclear 690 professional production line). Baosteel Special Materials Steel Plant (formerly Shanghai Fifth Steel Factory Workshop VI) was founded in 1963, now covers an area of about 160,000 square meters. It is the birthplace of the first austenitic seamless stainless steel tube, nuclear 690 U-tube, nickel-based alloy OCTG, ultra-supercritical boiler steel S30432 ; an evaporator reactor steel pipe (new 13th) and 00Cr18Ni5Mo3Si2 (3RE60) duplex stainless steel pipe corrosion won the National Science and Technology progress Award; 1Cr18Ni9Ti long stainless steel pipe for chemical industry won the national silver medal.....

目前，宝钢特钢是国家航天、航空、军工、核电蒸发器用钢管定点生产基地，石化、油气开发、电站锅炉、海洋工程等民用领域高合金无缝钢管生产基地。现有热挤压产线、特殊合金冷轧无缝钢管产线和航天、航空、军工、核电管专用生产线。宝钢特钢6000吨钢管热挤压产线2009年10月投产，设计年产能直径48~325mm无缝钢管23000t，主要用于生产难变形及特殊合金钢管，也可生产各种断面形状复杂的异型钢材。该生产线包括了热挤压设备和配套冷轧、精整、探伤设备。其中挤压机、穿/扩孔机、感应炉、环形炉等热挤压关键设备均由德国MEER公司、英国英达公司和德国LOI公司提供。产线中主机设备的设计、制造、过程控制和操作系统都具有当前钢挤压机的最先进水平。特殊合金无缝管产线配套设备有德国KPW50VMR、KW75VMR高速轧管机、LG220、LG150、LG110、LD30、3-8等冷轧冷拔机；英国DREVER网带式氢气保护连续热处理炉、真空热处理炉、辊底式固溶炉及德国RS371型八头砂带抛光机、五头砂带抛光机、精密矫直机以及配套德国ROTA40全自动无损检测线、内窥镜设备等。

核电U形管专业产线投产于2010年5月，拥有LG60H、KPW50LC轧机、氢保护热处理炉、真空热处理炉、精密弯管机、矫直机、联合探伤机组等设备。

At present, Baosteel special steel is a national aerospace, aviation, military, nuclear power steam generator tube fixed production base, and also a civilian areas of high alloy seamless steel pipe production base on petrochemical, oil and gas development, power plant boiler, Offshore Engineering, etc. There are hot extrusion production lines, special alloy seamless steel pipe cold roll production line and aerospace, aviation, military, nuclear power pipe production line. Baosteel Special Steel 60MN hot extrusion production line put into operation in October 2009, designed capacity of 51-325mm seamless pipe 23000t annual, mainly for the production of hard distortion and special alloy steel pipe, and also produce a variety of cross-sectional shape of complex shaped steel . The line includes a hot extrusion equipment and auxiliary rolling, finishing, testing equipment. Extrusion machine, piercing machine, induction furnace, rotary furnace and other hot extrusion critical equipment are introduced by Germany MEER, the UK Indah and Germany LOI. Production line in the host device design, manufacturing, process control and operating systems have this steel extruder most advanced level. Special alloy seamless pipe production line equipment from Germany KPW50VMR, KW75VMR high-speed rolling machine, LG220, LG150, LG110, LD30 ,3-8 and other cold drawing machine; British DREVER protection of hydrogen continuous mesh belt furnace, vacuum heat treatment furnace, roller hearth furnaces and Germany RS371-type solid solution eight belt polishing machine, five belt polishing machine, precision straightening machine and supporting German ROTA40 automatic line non-destructive testing, endoscopy equipment.

Nuclear U-tube professional production line put into operation in May 2010, has LG60H, KPW50LC mill, hydrogen protect the heat treatment furnace, vacuum heat treatment furnace, precision bending machine, straightening machine, the joint inspection unit and other equipment.

经过多年的发展，宝钢特钢现已形成了航空、航天、军工管；核电管；油气开采用管；电站锅炉管；石化、海洋工程等用镍基耐蚀合金管、双相钢管、奥氏体不锈钢、特不锈钢管等产品系列（具体请参见各系列产品介绍）。

宝钢特钢钢管产品采用一贯制管理体系。按ISO9001质量体系管理规范，制订发布了质量手册、质量管理程序和作业程序及各种工艺技术操作规程，2001年通过中国冶金和中国进口认证中心ISO9001—2000质量管体体系认证（复审）、2006年通过军工生产体系质量认证、航空产品质量体系认证，外贸产品质量体系认证。2007年完成特种设备（压力管道）制造许可换证。2010年，获得国家环境保护部颁发的《民用核安全机械设备制造许可证》，1级直管（国核证字Z（09）12号）；1级U型管（国核安字Z(10)16号）。2013年通过欧盟PED认证。

After years of development, Baosteel special steel has formed a special material Baosteel aviation, aerospace, military pipe; nuclear pipe; gas open adoption tube; boiler tubes; petrochemical, marine engineering and other nickel-based corrosion resistant alloy tubes, duplex steel, austenitic body stainless steel, special steel pipes and other products (see detailed description of the series).

Baosteel steel products using special materials consistent system management system. According to ISO9001 quality system management standards, formulated released quality manual, quality management procedures and operating procedures and a variety of technology rules, in 2001, and China through the China Metallurgical Import Certification Center ISO9001-2000 quality management system certification body (review), 2006 through years of military production quality system certification, quality system certification of aviation products, foreign trade product quality system certification. 2007 to complete special equipment (pressure pipe) manufacturing license renewal. 2010, the State Department of Environmental Protection issued a "civil nuclear safety machinery and equipment manufacturing license", a straight tube (National Certification word Z (09) 12 Code); a U-tube (National Nuclear Security word Z (10) 16).2013 through the EU PED certification.

| 产线<br>Production line | 年产能／吨<br>Annual production capacity/t | 规格组距<br>Class interval(mm) | 产品类别 |
|---|---|---|---|
| 热挤压<br>Hot Extruding | 23000 | 外径 External diameter 48-325mm<br>壁厚 wall thickness 4-40mm | 镍基耐蚀合金、双相钢、奥氏体不锈钢、高温合金、高强钢、钛及钛合金等<br>Corrosion resistant alloy austenitic stainless steel, duplex stainless steel, supperalloy, high strength steel, titanium and titanium alloy, etc |
| 冷轧无缝管<br>Cold rolled seamless steel tube | 5000 | 外径 External diameter 1-325mm<br>壁厚 wall thickness 0.1-30mm | |
| 核电 U 形管<br>Nuclear power U shape tube | 1000 | 外径 External diameter 8-45mm<br>壁厚 wall thickness 0.4-4mm | NC30Fe、UNS N06690、NS3105 |

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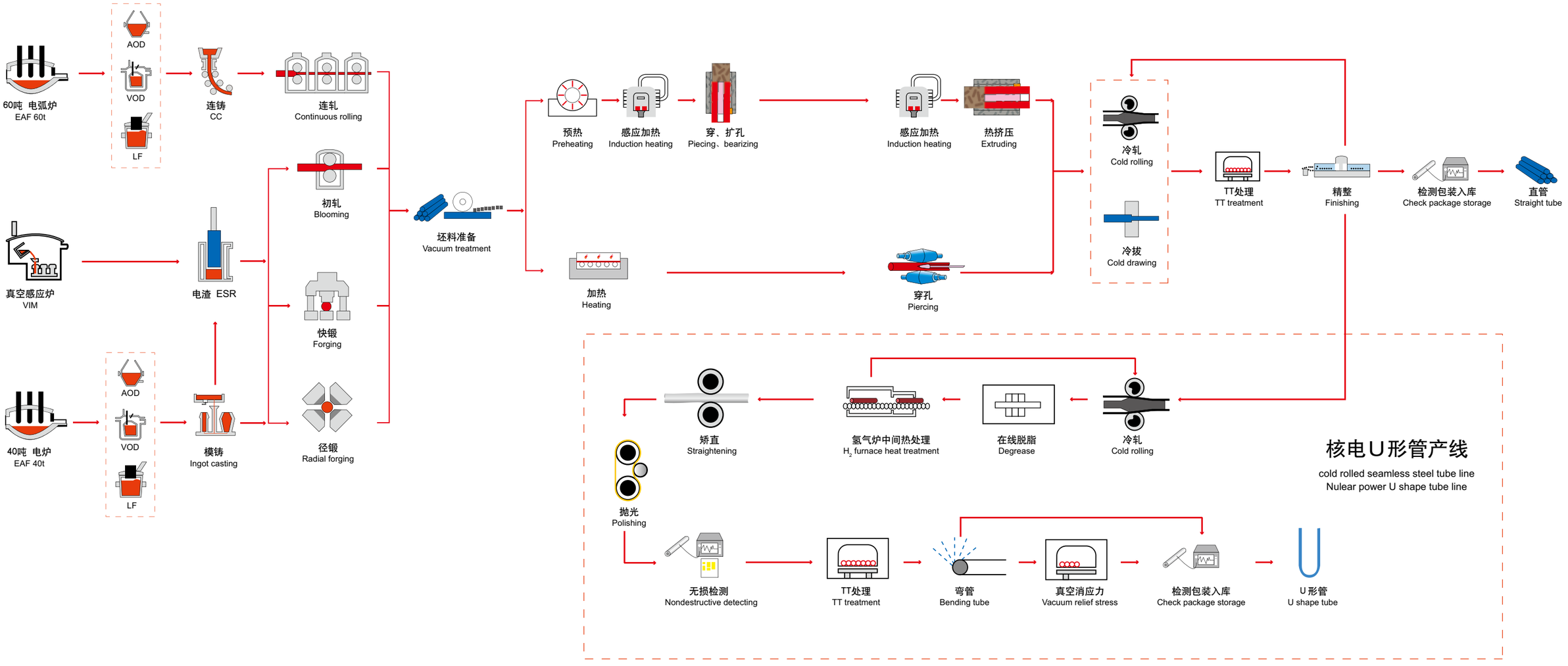
# 产品流程
Process Flow

# 产品流程
# Process Flow

## 无缝钢管产线
Seamless steel pipe production line




## 核电U形管产线
cold rolled seamless steel tube line
Nulear power U shape tube line

# 生产装备
## Production Equipment



## 冶炼、锻造装备及特点
## Smelting & Forging Equipments & Features

电弧炉
Electric arc furnace

**装备：**
40/60吨
(EAF, AOD, VOD/VD, LF)

**Equipments:**
40/60t (EAF, AOD, VOD/VD, LF)

**主要产品：**
镍基合金、耐蚀合金、精密合金

**Main products:**
stainless steel,special stainless steel,nickel base alloy,titanium,high-tensile steel

**装备：**
1t、6t、12t真空感应炉

**主要产品：**
镍基合金、耐蚀合金、精密合金

**Equipments:**
1t,6t,12t VIM

**Main products:**
nickel based alloy, corrosion resistant alloy, precise alloy

真空感应炉
VIM

电渣炉
ESR

**装备：**
ESR（1-20吨）

**主要产品：**
高温合金、耐蚀合金、特殊不锈

**装备特点：**
熔速自动控制 氩气保护

**Equipments:**
ESR(1-20t)

**Main products:**
high-temperature alloy, corrosion resistant alloy, special stainless steel

**Feature:**
automatic control of melting ration, argon protection,

径锻机
Radial forging machine

**装备：**
1300吨径锻机

**主要产品：**
不锈钢、特殊不锈钢、镍基合金、钛合金、高强钢

**Equipments:**
1300 tons radial forging machine

**Main products:**
stainless steel,special stainless steel,nickel base alloy,titanium,high-tensile steel

快锻机
High speed forging machine

**装备：**
40/45MN快锻机

**主要产品：**
不锈钢、特殊不锈钢、镍基合金、钛合金、高强钢

**Equipments:**
High speed forging machine

**Main products:**
stainless steel,special stainless steel,nickel base alloy,titanium,high-tensile steel

## 热挤压钢管设备
## Hot-extrusion steel pipe equipment

环形炉
Circular furnace

**装备：**
环形炉

**主要产品：**
不锈钢系列、镍基合金、钛合金等

**装备参数：**
坯料外径: ø176～416mm
坯料长度: 400～1300mm

**Equipment:**
Circular furnace

**Main product:**
Stainless steel series,nickel base alloy,titanium alloy,etc

**Equipment parameter:**
Outside diameter:ø176~416mm
Billet length:400~1300mm

感应炉
Induction furnace

**装备：**
感应炉

**主要产品：**
不锈钢系列、镍基合金、钛合金等

**装备参数：**
坯料外径: ø176～416mm
坯料长度: 400～1300mm

**Equipments:**
Induction furnace

**Main products:**
Stainless steel series,nickel base alloy,titanium alloy,etc

**Equipemnt parameter:**
Outside diameter:ø176~416mm
Billet length: 400~1300mm

穿（扩）孔机
Piercing(Expanding) press

**装备：**
穿（扩）孔机

**主要产品：**
不锈钢系列、镍基合金、钛合金等

**装备参数：**
穿（扩）孔力25MN

**Equipment:**
Piercing(expanding) press

**Main products:**
Stainless steel series,nickel base alloy,titanium alloy etc,.

**Equipment parameter:**
piercing force 25MN

挤压机
Extruding press

**装备：**
挤压机

**主要产品：**
不锈钢系列、镍基合金、钛合金等

**装备参数：**
挤压力60MN
成品外径: ø48～325mm
成品长度: 5～25m

**Equipment:**
Extruding press

**Main products:**
Stainless steel series,nickel base alloy,titanium alloy etc,.

**Equipment parameter:**
Extrusion force 60MN
Outside diameter:ø48~325mm
Billet length:5~25m



## 冷加工钢管设备
## Special alloy tube equipment

LG 系列冷轧管机
LG series cold pilger mill

**装备：**
LG系列冷轧管机

**装备参数：**
成品外径ø1~325mm，壁厚0.1~30mm

**Equipments:**
LG series cold pilger mill

**Equipment parameter:**
Outside diameter of the finished steel tube is ø1~325mm, Wall thickness is 0.1~30mm

矫直机系列
Straightening machines series

**装备：**
矫直机系列

**装备参数：**
矫直规格ø1~325mm

**Equipments:**
Straightening machines series

**Equipemnt parameter:**
Straightening standard ø1~325mm

固溶炉
Solution Heat Treatment

**装备：**
固溶炉

**装备参数：**
固溶处理外径:ø19~325mm

**Equipments:**
Solution Heat Treatment Fumace

**Equipment parameter:**
Pipe solution treament outside diameter:ø19~325mm

抛光机
Polishing machine

**装备：**
抛光机

**装备参数：**
抛光规格: ø10~250mm

**Equipments:**
Polishing machine

**Equipment parameter:**
Polishing diameter:ø10~250mm

无损检测
NDT

**装备：**
无损检测

**检测内容：**
超声、纵伤、横伤，分层检测，测厚，管端盲检，涡流检测

**Equipments:**
NDT

**detection content:**
Ultrasonic inspection, circumferential notch, Longitudinal notch, thickness measuring, pipe end blind technique, Eddy current testing.

# 核电U形管设备
# Nuclear power U-shape pipe equipment

KPW50LC高速轧管机
KPW50LC high speed tube press

**装备：**
KPW50LC 高速轧管机

**装备参数：**
成品外径:ø8～45mm,壁厚:0.4～4mm

**Equipments:**
KPW50LC high speed tube press

**Equipment parameter:**
Outside diameter : ø8～45mm
Wall thickness : 0.4～4mm

联合探伤机组
Unite fault detection unit

**装备：**
联合探伤机组

**检测内容：**
超声波检测(纵、横伤)、涡流检测、外径、壁厚及长度测量

**Equipment:**
Unite fault detection unit

**Detection content:**
ultrasonic Detection (circumferential notch, Longitudinal notch), eddy current testing, outside diameter, wall thickness and length measurement

真空炉
Vacuum Furnace

**装备：**
真空炉

**装备参数：**
外径:ø12～25.4mm
长度:最长29m

**Equipment:**
Vacuum Furnace

**Equipment parameter:**
Outside diameter :ø12～25.4mm
length:max 29m

氢气保护炉
Hydrogen protection furnace

**装备：**
氢气保护炉

**装备参数：**
处理钢管外径:ø12～38mm

**Equipment:**
Hydrogen protection furnace

**Equipemnt parameter:**
Outside diameter: ø12～38mm

精密弯管机
Precision tube bender

**装备：**
精密弯管机

**装备参数：**
弯曲半径:R40~2200mm

**Equipments:**
Precision tube bender

**Equipment parameter:**
Bending radius: R40~2200mm



# 产品标准
# Products Standard

# 石油化工用无缝钢管
# Seamless pipe in petrochemical industry area

## 镍基耐蚀合金无缝钢管 Nickle based corrision alloy seamless tube

- **用途**：应用于化学和石化工业以及海洋开发制造加热器、换热器、蒸发器、冷凝器以及输送管线等。
- **Usage**：Brief introduction:Application:Widely used in manufacturing of petrochemical industry and ocean exploitation such as heater,heat exchanger,evaporator,condensator and line of pipe,ect.
- **订货标准**：ASME SB163、ASME SB167、ASME SB407、ASME SB444、ASME SB 622、ASME SB423、ASME SB829、企业标准、技术协议
- **Product standard**：ASME SB163、ASME SB167、ASME SB407、ASME SB444、ASME SB 622、ASME SB423、ASME SB829 ect.
- **可供规格Size**：
  热挤压管：外径48-325mm，壁厚4-40mm；
  冷加工管：外径5.8-273mm，壁厚0.3-35mm；
- **Product size**：
  hot extrusion tube：OD: 8-325mm，WTK: 4-40mm；
  Cold rolling tube：OD 5.8-273mm，WTK:0.3-35mm
- **交货状态**：热挤压、冷加工、热处理
- **Product condition**：hot extrusion,cold rolling,heat treatment

### 主要钢种(牌号)的化学成分和性能 Chemical composition and performance of main grade(trademark)

| 宝钢牌号(Baosteel) | ASTM UNS | 化学成分 chemical composition | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Ni | Cr | Mo | Cu | Fe | Si | Mn | S | P | 其他 |
| | | Wt% | | | | | | | | | | |
| BT200 | N02200 | ≤0.15 | ≥99.0 | / | / | ≤0.25 | ≤0.40 | ≤0.35 | ≤0.35 | ≤0.010 | ≤0.03 | / |
| BT201 | N02201 | ≤0.02 | ≥99.0 | / | / | ≤0.25 | ≤0.40 | ≤0.35 | ≤0.35 | ≤0.010 | ≤0.03 | / |
| BT400 | N04400 | ≤0.30 | ≥63 | / | / | 28/34 | ≤2.5 | ≤0.5 | ≤2.0 | ≤0.020 | ≤0.03 | / |
| BT800 | N08800 | ≤0.100 | 30.0/35.0 | 19.0/23.0 | / | ≤0.75 | ≥39.5 | ≤1.0 | ≤1.5 | ≤0.015 | ≤0.02 | Al:0.15/0.60<br>Ti:0.15/0.60 |
| BT800H | N08810 | 0.05/0.10 | 30.0/35.0 | 19.0/23.0 | / | ≤0.75 | ≥39.5 | ≤1.0 | ≤1.5 | ≤0.015 | ≤0.02 | Al:0.15/0.60<br>Ti:0.15/0.60<br>Al+Ti≤0.70 |
| BT800HT | N08811 | 0.06/0.10 | 30.0/35.0 | 19.0/23.0 | / | ≤0.75 | ≥39.5 | ≤1.0 | ≤1.5 | ≤0.015 | ≤0.02 | Al:0.15/0.60<br>Ti:0.15/0.60<br>Al+Ti:0.85/1.2 |
| BT600 | N06600 | ≤0.150 | ≥72.0 | 14.0/17.0 | / | ≤0.50 | 6.0/10.0 | ≤0.5 | ≤1.0 | ≤0.015 | ≤0.03 | / |
| BT690 | N06690 | ≤0.05 | ≥58.0 | 27.0/31.0 | / | ≤0.50 | 7.0/11.0 | ≤0.5 | ≤0.5 | ≤0.015 | ≤0.03 | / |
| BG2830 | N08028 | ≤0.03 | 29.5/32.5 | 26.0/28.0 | 3.0/4.0 | 0.6/1.4 | 余 | ≤1.0 | ≤2.5 | ≤0.03 | ≤0.03 | |
| BG2250 | N06985 | ≤0.015 | 余 | 21.0/23.5 | 6.0/8.0 | 1.5/2.5 | 18.0/21.0 | ≤1.0 | ≤1.0 | ≤0.030 | ≤0.03 | W≤1.5<br>Co≤5.0<br>Nb+Ta≤0.5 |
| BT825 | N08825 | ≤0.050 | 38.0/46.0 | 19.5/23.5 | 2.50/3.50 | 1.5/3.0 | ≥22.0 | ≤0.5 | ≤0.5 | ≤0.03 | ≤0.04 | Al≤0.20<br>Ti :0.6/1.2 |
| BT625 | N06625 | ≤0.100 | ≥58.0 | 20.0/23.0 | 8.00/10.0 | / | ≤5.0 | ≤0.5 | ≤0.08 | ≤0.015 | ≤0.015 | Al≤0.40<br>Ti ≤0.40<br>Nb+Ta:3.15/4.15 |
| BTC276 | N10276 | ≤0.010 | 余 | 14.5/16.5 | 15.0/17.0 | / | 4.0/7.0 | ≤0.08 | ≤0.08 | ≤0.03 | ≤0.04 | W:3.0/4.5<br>Co≤2.5<br>V≤0.35 |



### 牌号对照 Grade parallel table

| 宝钢牌号(Baosteel) | 美国ASTM | 国家牌号GB | 德国DIN | 日本JIS |
|---|---|---|---|---|
| BT200 | N02200 | | | |
| BT201 | N02201 | | 2.4068 | NW2201 |
| BT400 | N04400 | - | 1.1743 | NW4400 |
| BT800 | N08800 | NS1101 | 1.4876 | NCF800 |
| BT800H | N08810 | NS1102 | 1.4876 | NCF800H |
| BT800HT | N08811 | - | 1.4876 | - |
| BT600 | N06600 | NS3102 | 2.4816 | NCF600 |
| BT690 | N06690 | NS3105 | 2.4624 | NCF690 |
| BG2830 | N08028 | - | - | - |
| BG2250 | N06985 | - | - | - |
| BT825 | N08825 | NS1402 | 2.4858 | NCF825 |
| BT625 | N06625 | NS3306 | 2.4856 | NCF625 |
| BTC276 | N10276 | NS3304 | 2.4819 | NW0276 |

### 室温力学性能 Room-temperature mechanical property

| 宝钢牌号(Baosteel) | | 状态condition | 抗拉强度 Rm, min, MPa | 屈服强度 Rp 0.2% min, MPa | 延伸率 A50,min,% |
|---|---|---|---|---|---|
| BT200 | | solution | 379 | 103 | 40 |
| BT201 | | solution | 345 | 83 | 40 |
| BT400 | OD≥127mm | annealing | 480 | 195 | 35 |
| | OD<127mm | annealing | 480 | 170 | 35 |
| BT800 | | solution | 520 | 205 | 30 |
| BT800H | | solution | 450 | 170 | 30 |
| BT800HT | | solution | 450 | 170 | 30 |
| BT600 | OD≥127mm | solution | 550 | 205 | 35 |
| | OD<127mm | solution | 550 | 240 | 30 |
| BT690 | | solution | 586 | 241 | 30 |
| BT028 | | solution | 500 | 214 | 40 |
| BTG3 | | solution | 621 | 214 | 40 |
| BT825 | | solution | 586 | 241 | 30 |
| BT625 | | annealing | 827 | 414 | 30 |
| | | solution | 276 | 690 | 30 |
| BTC276 | | solution | 283 | 690 | 40 |

**备注**：BT800H、BT800HT 晶粒度 5 级或更粗

### 高温力学性能 High temperature mechanical property

| 宝钢牌号(Baosteel) | 机械性能 mechanical property | 状态condition | 温度Temperatuire°C | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 350 | 450 | 550 | 650 | 750 | 850 |
| BT800H | Rm, MPa | 固熔solution | 485 | 490 | 480 | 420 | 270 | 149 |
| | Rp0.2,MPa | | 162 | 165 | 169 | 155 | 125 | 95 |
| | A4.52,% | | 52.5 | 56.0 | 52.5 | 50.0 | 69.5 | 101.5 |
| BT825 | Rm, MPa | 固溶solution | 560 | 550 | 527 | 485 | 345 | 197 |
| | Rp0.2,MPa | | 205 | 195 | 191 | 169 | 170 | 176 |
| | A 4.52,% | | 47.5 | 51.5 | 49.0 | 52.5 | 64.0 | 92.0 |
| BT625 | Rm, MPa | 固溶solution | – | – | – | 610 | 480 | 345 |
| | Rp0.2,MPa | | – | – | – | 210 | 225 | 215 |
| | A4.52,% | | – | – | – | 96.5 | 114.0 | 117.0 |

# 石油化工用无缝钢管
# Seamless pipe in petrochemical industry area

## 物理性能 Physical property

| 宝钢牌号 (Baosteel) | 密度 Density/g·cm³ | 熔点 metaling rane/℃ | 膨胀系数 coefficient of expansion μm/m/℃ | | 导热系数 thermal conductivity W·(m·℃)⁻¹ | | 电阻率 specific resistance μΩ·m | 弹性模量 Modulus of elasticity GPa |
|---|---|---|---|---|---|---|---|---|
| | | | 100℃ | 300℃ | 25℃ | 300℃ | 20℃ | |
| BT400 | 8.80 | 1300-1350 | 14.2 | 15.2 | 22.0 | 26.9 | 0.51 | 26.0 |
| BT800 | 7.94 | 1357-1385 | 14.1 | 16.2 | 11.5 | 16.3 | 0.989 | 196.5 |
| BT600 | 8.47 | 1354-1413 | 10.4 | 14.2 | 14.9 | 19.0 | 1.03 | 214.0 |
| BT690 | 8.19 | 1343-1377 | 14.06 | 14.53 | 13.5 | 17.3 | 1.148 | 211.0 |
| BG2830 | 8.0 | - | 15.0 | 15.9 | 11.4 | 15.3 | 0.99 | - |
| BG2250 | 8.14 | 1260-1343 | 14.6 | 14.6 | 10.0 | 15.9 | 1.12 | 199.0 |
| BT825 | 8.14 | 1370-1400 | 14.1 | 15.3 | 11.1 | 15.4 | 1.13 | 196 |
| BT625 | 8.44 | 1290-1350 | - | - | 9.8 | 14.1 | 1.29 | 204.8 |
| BTC276 | 8.89 | 1325-1370 | 12.2 | 12.9 | 11.2 | 14.7 | 1.22 | 205 |

## 晶间腐蚀性能 Inergranular corrosion resistance

按 ASTM G 28 A 法 ( 硫酸铁 - 硫酸法 ) 测定的腐蚀速率

Inergranular corrosion resistance according ASTM G 28 (ferric sulfate - sulfuric acid method )

| 钢种 greade | 状态 condition | 时间 (h) | 腐蚀速率 (mm/a) | 腐蚀深度 ( μm) |
|---|---|---|---|---|
| BT800 | 固熔 solution | 120 | 0.42 | - |
| BT800H | | 120 | 1.464 | - |
| BT600 | | 120 | 0.96 | - |
| BT825 | | 120 | 0.324 | ≤50 |
| BT625 | | 120 | 0.535 | ≤50 |

按 ASTM 262 C 法 65% 硝酸法测定的腐蚀速率

Inergranular corrosion resistance according ASTM 262 (65% $HNO_3$ )

| 钢种 greade | 状态 condition | 腐蚀速率corrosion rate(mm/a) | | | | | 平均腐蚀速率 corrosion rate ( mm/a) |
|---|---|---|---|---|---|---|---|
| | | 一 | 二 | 三 | 四 | 五 | |
| | | 时间/48h | 时间/48h | 时间/48h | 时间/48h | 时间/48h | |
| BT600 | 固熔 solution | 0.288 | 0.30 | 0.324 | 0.432 | 0.528 | 0.371 |
| BT800H | | 0.204 | 0.12 | 0.168 | 0.252 | 1.02 | 0.348 |
| BT825 | | 0.348 | 0.204 | 0.24 | 0.192 | 0.312 | 0.264 |
| BT625 | | 0.556 | 0.454 | 0.489 | 0.466 | 0.471 | 0.489 |

## 应用 Application

氟化工用反应器 ( BT600 )

多晶硅加热器 ( BT800H )

石化空冷器 ( BT825 )



## 超级奥氏体不锈钢无缝钢管 Super austenitic stainless steel tube

- **可供规格：**
  热挤压管：外径48–325mm，壁厚4–40mm；冷加工管：外径5.8–273mm，壁厚0.3–35mm；
- **Product size：**
  hot extrusion tube：OD: 8-325mm，WTK: 4-40mm；old rolling tube：OD 5.8-273mm，WTK:0.3-35mm
- **订货标准：**ASTM A312、ASME SB677、企业标准、技术协议
- **Product standard:** ASTM A312、ASME SB677,ect.
- **交货状态：**热挤压、冷加工、热处理
- **Product condition：**hot extrusion,cold rolling,heat treatment

## 主要钢种(牌号)的化学成分和性能 Chemical composition and performance of main grade(trademark)

| ASTM UNS | 牌号 grade | 化学成分 chemical composition | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Si | Mn | P | S | Ni | Cr | Mo | Cu | N | Fe |
| | | Wt% | | | | | | | | | | |
| N08904 | 904L | ≤0.020 | ≤1.00 | ≤2.00 | ≤0.045 | ≤0.035 | 23.0-28.0 | 19.0-23.0 | 4.0-5.0 | 1.0-2.0 | - | 余 |
| N08637 | AL-6XN | ≤0.030 | ≤1.00 | ≤2.00 | ≤0.040 | ≤0.040 | 23.5-25.5 | 20.0-22.0 | 6.0-7.0 | ≤0.75 | 0.18-0.25 | 余 |
| S31254 | 254SMo | ≤0.020 | ≤0.80 | ≤1.00 | ≤0.030 | ≤0.010 | 17.5-18.5 | 19.5-20.5 | 6.0-6.5 | 0.5-1.0 | 0.18-0.22 | 余 |
| S32654 | 654SMo | ≤0.020 | ≤0.30 | 2.0-4.0 | ≤0.030 | ≤0.005 | 21.0-23.0 | 24.0-25.0 | 7.0-8.0 | 0.3-0.6 | 0.45-0.55 | 余 |

## 室温力学性能 Room-temperature mechanical property

| ASTM UNS | 热处理温度 Temperature | 抗拉强度 Rm, min, MPa | 屈服强度 Rp0.2% min, MPa | 伸长率 A50,min,% |
|---|---|---|---|---|
| N08904 | ≥1100℃ | 490 | 220 | 35 |
| N08637 | ≥1100℃ | 690 | 310 | 30 |
| S31254 | ≥1150℃ | 675 | 310 | 35 |
| S32654 | ≥1150℃ | 750 | 430 | 35 |

## 晶间腐蚀性能 Inergranular corrosion resistance

按ASTM G 28 A法(硫酸铁-硫酸法)测定的腐蚀速率

Inergranular corrosion resistance according ASTM G 28(ferric sulfate - sulfuric acid method )

| 钢种 greade | 状态 condition | 时间 (h) | 腐蚀速率 mm/a | 腐蚀深度 (μm) |
|---|---|---|---|---|
| N08904 | 固熔 solution | 120 | 0.35 | ≤50 |

按ASTM 262 C法 65%硝酸法测定的腐蚀速率

Inergranular corrosion resistance according ASTM 262 (65% $HNO_3$)

| 钢种 greade | 状态 condition | 腐蚀速率corrosion rate(mm/a) | | | | | 平均腐蚀深度 corrosion rate(mm/a) |
|---|---|---|---|---|---|---|---|
| | | 一 | 二 | 三 | 四 | 五 | |
| | | 时间/48h | 时间/48h | 时间/48h | 时间/48h | 时间/48h | |
| N08904 | 固熔 solution | 0.19 | 0.18 | 0.29 | 0.48 | 0.67 | 0.36 |

# 石油化工用无缝钢管
# Seamless pipe in petrochemical industry area

## 特种不锈钢无缝管 Special seamless stainless tube

### 尿素用不锈钢管 Urea stainless tube

- **用途**：适用于制造尿素生产装置的汽提塔、自汽提一分塔、高压一段分离器、CO2压缩机三段冷却塔、高压管路等设备。
- **Usage:** applied in manufacturing the devices as air stripping towwe, high pressure seperator, CO2 compressor cooling tower and high pressure piping,etc.
- **订货标准**： GB13296、ASME SA-213、ASTM A213、JIS G3463等国内外标准，企标
- **Standard:** GB13296、ASME SA-213、ASTM A213、JISG3463, and enprise standards, plant protocol，etc.
- **可供规格Size** ：外径outside diameter 16~219mm，壁厚wall thickness 1~20mm。

### 主要钢种(牌号)的化学成分和性能 Chemical composition and performance of main grade(trademark)

| 牌号 trademark | 化学成分 chemical composition | | | | | | | | | 力学性能 echanical property | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | Cr | Ni | Mo | N | S | P | Rm | Rp0.2 | A |
| | Wt% | | | | | | | | | MPa | MPa | % |
| 316Lmod | ⩽0.03 | ⩽2.0 | ⩽1.0 | 17.0 - 18.5 | 13.0 - 15.0 | 2.2 - 3.0 | ⩽0.22 | ⩽0.030 | ⩽0.030 | ⩾ 520 | ⩾ 206 | ⩾ 35 |
| 2RE69 ( 00Cr25Ni22Mo2N) | ⩽0.02 | ⩽1.5 | ⩽0.4 | 24.0 - 26.0 | 21.0 - 23.0 | 2.0 - 3.0 | 0.10 - 0.14 | ⩽0.015 | ⩽0.020 | ⩾ 539 | ⩾ 225 | ⩾ 30 |
| 0Cr17Mn13Mo2N (A4) | ⩽0.08 | 12.0- 15.0 | ⩽0.7 | 16.5 - 18.5 | - | 1.8 - 2.2 | 0.20 - 0.30 | ⩽0.020 | ⩽0.045 | ⩾ 736 | ⩾ 441 | ⩾ 30 |

**注**：根据用户需要可生产上表以外的牌号。

**Note:**According to the requirement of the customers , we can produce the pipe which standard is not mentioned above.

1991年起国家冶金部主持立项开发尿素工业高压系统设备及工艺管线级不锈钢管材研究，我厂是主要参加单位之一。
Since 1991, ministry of metallugical industry of PRC set up the research project on urea industrial seamless tube material of high pressure system and process line, and SPECIAL STEEL was one of the partipants.

1997年5月，国家冶金部召开了“尿素高压设备和工艺管线用尿素级不锈钢技术开发鉴定会”我厂研制的00Cr25Ni22Mo2N钢管通过鉴定。
In May of 1997, ministry of metallugical industry held the evaluation meeting on urea industrial seamless tube material of highpressure system and process line, steel grade 00Cr25Ni22Mo2N developed by SPECIAL STEEL was certified.

1998年《尿素工业高压系统设备及工艺管线用尿素级不锈钢管材的开发》获上海市科技进步二等奖。
“Development of urea industrial seamless tube material of high pressure system and process line” won the second prize of Shanghai Technology Innovation Award.



## 双相不锈钢管 Duplex stainless tube

- **用途**：适用于原油脱盐装置中的热交换器和管道；甲醇生产制作管式反应器的催化剂管束；氯乙烯生产制作预冷凝器；纸浆和造纸工业硫酸蒸煮液预热器管束；陆上和海上油气工业的输送输道和集气管；海上石油平台的热交换器、水处理和供水系统、消防系统、喷水系统、稳水系统；化工系统加工和运输各种化学品的压力容器、管道、罐和热交换器。
- **Usage**：heat exchanger and tube on oil desalt device, catalyst tubebank of tubular reactor for methanol manufactering, precondenser for VCM, convey pipe and header of land/ocean oil/gas industry; heat exchanger, water treatment and supply system, fire extinguishing system, spraying system and water stablizing system of onsea petrol platform; pressure vessel, chanels, tanks, and heat exchanger used in chemicals process and transportation in chemical industry.
- **综合性能 general characteristic**：
  具有高的强度与韧性，综合机械性能好。High intensity and tenacity, excellent mechnical performance.
  良好的抗点蚀及缝隙腐蚀能力。Good resistance to corrosive pitting and crevice corrosion.
  良好的抗应力腐蚀破裂能力。Good resistance to stress corrosion craking.
  高的抗均匀腐蚀能力。Good resistance to uniform corrosion.
  导热系数大，线膨胀系数小。The material has bigger heat conductiovity, and smaller linear exppansibility.
  良好的可焊性，热裂倾向小。Good welding performance, small tendency of hot cracking.
- **牌号对照 grade**

| 中国 China | | 美国 US | 瑞典 SW | 德国 DE |
|---|---|---|---|---|
| GB/T21833 钢号 | 原习惯用钢号 | | | |
| 022Cr19Ni5Mo3Si2N | 00Cr18Ni5Mo3Si2 | S31500 | 3RE60 | 1.4424 |
| 022Cr22Ni5Mo3N | 00Cr22Ni5Mo3N | S31803 | – | 1.4462 |
| 022Cr23Ni5Mo3N | 00Cr22Ni5Mo3N | S32205 | SAF2205 | – |
| 022Cr25Ni7Mo4N | 00Cr25Ni7Mo4N | S32750 | SAF2507 | 1.4410 |

### 主要钢种(牌号)的化学成分 Chemical composition of main steel grade (trademark)

| 钢号 grade | 化学成分 chemical composition | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | P | S | Si | Ni | Cr | Mo | N | Cu |
| | Wt% | | | | | | | | | |
| 022Cr19Ni5Mo3Si2N | ⩽0.030 | 1.2-2.0 | ⩽0.030 | ⩽0.030 | 1.4-2.0 | 4.30-5.20 | 18.0-19.0 | 2.50-3.00 | 0.05-0.10 | – |
| 022Cr22Ni5Mo3N | ⩽0.030 | ⩽2.0 | ⩽0.030 | ⩽0.020 | ⩽1.0 | 4.50-6.50 | 21.0-23.0 | 2.50-3.50 | 0.08-0.20 | – |
| 022Cr23Ni5Mo3N | ⩽0.030 | ⩽2.0 | ⩽0.030 | ⩽0.020 | ⩽1.0 | 4.50-6.50 | 22.0-23.0 | 3.00-3.50 | 0.14-0.20 | – |
| 022Cr25Ni7Mo4N | ⩽0.030 | ⩽1.2 | ⩽0.035 | ⩽0.020 | ⩽0.8 | 6.00-8.00 | 24.0-26.0 | 3.00-5.00 | 0.24-0.32 | ⩽0.5 |

# 石油化工用无缝钢管
## Seamless pipe in petrochemical industry area

主要钢种(牌号)的力学性能 Mechanical property of main grade(trademark)

| 钢号 grade | Rm (MPa) | Rp0.2 (MPa) | $A_{[50]}$% | HRC |
|---|---|---|---|---|
| 022Cr19Ni5Mo3Si2N | ⩾630 | ⩾440 | ⩾30 | ⩽30 |
| 022Cr22Ni5Mo3N | ⩾620 | ⩾450 | ⩾25 | ⩽30 |
| 022Cr23Ni5Mo3N | ⩾655 | ⩾485 | ⩾25 | ⩽30 |
| 022Cr25Ni7Mo4N | ⩾800 | ⩾550 | ⩾15 | ⩽32 |

物理性能 Physical property

| | | 20˚C | 100˚C | 200˚C | 300˚C |
|---|---|---|---|---|---|
| 密度（Density） | Kg/dms | 7.8 | – | – | – |
| 电阻（Electric resistivity） | μΩm | 0.80 | 0.85 | 0.90 | 1.00 |
| 热导率（Thermal conductivity） | W/m˚C | 15 | 16 | 17 | 18 |
| 比热容（Thermal capacity） | J/kg˚C | 500 | 530 | 560 | 590 |
| 弹性模量（Modulus of elasticity） | GPa | 200 | 194 | 186 | 180 |
| 柏松比（Poissons ratio） | | 0.3 | | | |
| 线膨胀系数（室温-T）(Linear expansion(Room temperature)) | $X10^{-6}$/˚C | | 13.0 | 13.5 | 14.0 |

**金相组织** Metallographic structure

固溶状态下的金相组织为铁素体－奥氏体双相，其奥氏体含量为 40~60%，不允许有σ相等脆性相析出。

Duplex of ferrite-austenite under solution condition, content of austenite is 40~60%, no brittleness precipitation of σ ,etc.

**产品标准**：GB/T21833-2008、ASTM A789/ASME SA789、ASTM A789/ASME SA790、企标等。

**Standard**：GB/T21833-2008,ASTM A789/ASME SA789,ASTM A789/ASME SA790,and enterprise standards, etc.

**产品规格 size**：外径（OD）16~219 mm，壁厚（WTK）1~20 mm。

国标 GB/T 21833-2008 奥氏体－铁素体型双相不锈钢无缝钢管，起草负责单位

Our company drafted out and in charged of the GB/T 21833-2008 austenitic-ferritic duplex stainless steel seamless tube.

双相不锈钢 00Cr18Ni5Mo3Si2 钢管获国家科技进步一等奖

The duplex stainless steel 00Cr18Ni5Mo3Si2 tube gain the first award of National science and technology progress



# 石油化工用无缝钢管
## Seamless pipe in Petroleum chemical industry and ocean engineering

### 普通奥氏体不锈钢无缝管 Common austenitic stainless steel seamless pipe

- **用途**：适用于锅炉、热交换器、冷凝器、石油裂化管以及流体输送用普通奥氏体不锈钢无缝管
- **Usage**：applied to common austenitic stainless steel seamless pipes which are used in boiler,heat exchanger,condenser,cracking tube and fluid transportation .
- **订货标准Order norm**：GB/T14976、GB13296、GB9948、ASME SA213、ASTM A213、JIS G3463、EN 10216等etc,
- **可供规格Offer specification**：外径outside diameter 6~325mm，壁厚wall thickness 0.5~40mm

## 石油化工用无缝钢管
## Seamless pipe in Petroleum chemical industry and ocean engineering

| 牌号 trademark | 化学成分 chemical composition | | | | | | | | 力学性能 mechanical property | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | P | S | Ni | Cr | 其他 others | Rm | Rp0.2 | A |
| | Wt% | | | | | | | | MPa | MPa | % |
| 0Cr18Ni9 | ≤0.07 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 8.0 – 11.0 | 17.0 - 19.0 | | ≥520 | ≥205 | ≥35 |
| 1Cr18Ni9 | 0.04 - 0.10 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 8.0 - 11.0 | 18.0 - 20.0 | | ≥520 | ≥205 | ≥35 |
| 1Cr25Ni20Si2 | ≤0.20 | 1.5-2.5 | ≤1.5 | ≤0.035 | ≤0.30 | 19.0- 22.0 | 24.0 - 26.0 | | ≥520 | ≥205 | ≥35 |
| 00Cr19Ni10 | ≤0.03 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 8.0 - 12.0 | 18.0 - 20.0 | Ti:5(C%-0.02)~0.80 | ≥480 | ≥175 | ≥35 |
| 0Cr23Ni13 | ≤0.08 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 12.0 - 15.0 | 22.0 - 24.0 | | ≥520 | ≥205 | ≥35 |
| 2Cr23Ni13 | ≤0.20 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 12.0 - 15.0 | 22.0 - 24.0 | | ≥520 | ≥205 | ≥35 |
| 0Cr25Ni20 | ≤0.08 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 19.0 - 22. 0 | 24.0 - 26.0 | Ti:5C%~0.70 | ≥520 | ≥205 | ≥35 |
| 2Cr25Ni20 | ≤0.25 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 19.0 - 22.0 | 24.0 - 25. 0 | | ≥520 | ≥205 | ≥35 |
| 0Cr18Ni10Ti | ≤0.08 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 9.0 - 12.0 | 17.0 - 19.0 | Ti:≥5C% | ≥520 | ≥205 | ≥35 |
| 1Cr18Ni11Ti | 0.04 - 0.10 | ≤0.75 | ≤2.0 | ≤0.035 | ≤0.030 | 9.0 - 13.0 | 17.0 - 20.0 | Ti:4C%~0.60 | ≥520 | ≥205 | ≥35 |
| 0Cr18Ni11Nb | ≤0.08 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 9.0 - 13.0 | 17.0 - 19.0 | Nb:≥10C% | ≥520 | ≥205 | ≥35 |
| 1Cr19Ni11Nb | 0.04 - 0.10 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 9.0 - 13.0 | 17.0 - 20.0 | Nb+Ta:≥8C%~1.00 | ≥520 | ≥205 | ≥35 |
| 0Cr17Ni12Mo2 | ≤0.08 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 10.0 - 14. 0 | 16.0 - 18.5 | | ≥520 | ≥205 | ≥35 |
| 1Cr17Ni12Mo2 | 0.04 - 0.10 | ≤0.75 | ≤2.0 | ≤0.035 | ≤0.030 | 11.0 - 14.0 | 16.0 - 18.0 | Mo:2.0~3.0 | ≥520 | ≥205 | ≥35 |
| 00Cr17Ni14Mo2 | ≤0.03 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 12.0 - 15.0 | 16.0 - 18.0 | Mo:2.0~3.0 | ≥480 | ≥175 | ≥35 |
| 0Cr19Ni13Mo3 | ≤0.08 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 11.0 - 15.0 | 18.0 - 20.0 | Mo:2.0~3.0 | ≥520 | ≥205 | ≥35 |
| 00Cr19Ni13Mo3 | ≤0.03 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 11.0 - 15.0 | 18.0 - 20.0 | Mo:3.0~4.0 | ≥480 | ≥175 | ≥35 |
| 0Cr18Ni12Mo2Ti | ≤0.08 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 11.0 - 14.0 | 18.0 - 20.0 | Ti:5(C%-0.70) Mo:3.0~4.0 | ≥530 | ≥205 | ≥35 |
| 1Cr18Ni12Mo2Ti | ≤0.12 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 11.0 - 14.0 | 16.0 - 19.0 | Ti:5(C%-0.02)~0.80 Mo:1.8~2.5 | ≥530 | ≥205 | ≥35 |
| 0Cr18Ni12Mo3Ti | ≤0.08 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 11.0 - 14.0 | 16.0 - 19.0 | Ti:5C%~0.70 Mo:1.8~2.5 | ≥530 | ≥205 | ≥35 |
| 1Cr18Ni12Mo3Ti | ≤0.12 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 11.0 - 14.0 | 16.0 - 19.0 | Ti:5(C%-0.02)~0.80 Mo:2.5~3.5 | ≥530 | ≥205 | ≥35 |
| 0Cr18Ni12Mo2Cu2 | ≤0.08 | ≤1.0 | ≤2.0 | ≤0.035 | ≤0.030 | 11.0 - 14.0 | 17.0 - 19. 0 | Cu:1.0~2.5 Mo:2.5~3.5 | ≥520 | ≥205 | ≥35 |



## 油气田开采用无缝钢管
## Seamless tube in oil-gas field offtake

- **用途**：油井管、油套管及工具适用于含氯离子、硫化氢、二氧化碳等腐蚀介质的油气田开采领域
- **Usage**：Tubing, casing and tools suitable for chlorine ion, hydrogen sulfide, carbon dioxide, and other areas of the corrosive medium of oil and gas field exploitation.
- **订货标准 Standard**：ISO13680、ISO 15156-3
- **可供规格**：油管外径26.67–298.5mm，壁厚2.87–22.22mm；接箍按油(套）管规格配套。
- **Product specification**：Ouside diameter26.67-298.5mm，Thickness2.87-22.22mm；Coupling will meet tubing&casing.

耐蚀合金油井管产品制造过程实行一贯制质量管理，确保了产品质量受控；宝钢是国内唯一一家具有全流程生产镍基耐蚀合金油套管的企业。

Corrosion resistant alloy pipe manufacturing process to construct the quality management, ensure the product quality control; Baosteel is also the only domestic production of whole process of nickel base corrosion resistant alloy oil casing of the enterprise.

### 主要钢种(牌号)的化学成分 Chemical composition of main grade (trademark)

| 材料类型 Material Group | 宝钢牌号 Baosteel NO.grade | UNS编号 standard | 化学成分 chemical composition | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | Cr | Ni | Fe | Mn | Si | Mo | Co | Cu | P | S | 其它 others |
| | | | Wt% | | | | | | | | | | | |
| 4c | BG2830 | N08028 | 0.030 | 26.0-28.0 | 29.5-32.5 | bal. | 2.50 | 1.00 | 3.0-4.0 | - | 0.6-1.4 | 0.030 | 0.030 | - |
| | BG2532 | N08035 | 0.030 | 24.0-27.0 | 29.0-36.5 | bal. | 1.00 | 0.50 | 2.5-4.0 | - | 1.50 | 0.030 | 0.030 | - |
| | BG2235 | N08135 | 0.03 | 20.5-23.5 | 33.0-38.0 | rem | 1.00 | 0.75 | 4.0-5.0 | - | 0.70 | 0.030 | 0.030 | W0.2-0.8 |
| 4d | BG2242 | N08825 | 0.050 | 19.5-23.5 | 38.0-46.0 | bal. | 1.00 | 0.05 | 2.5-3.5 | - | 1.5-3.0 | 0.030 | 0.030 | Ti0.6-1.2 |
| | BG2250 | N06985 | 0.015 | 21.0-23.5 | bal. | 18.0-21.0 | 1.00 | 1.00 | 6.0-8.0 | 5.0 | 1.5-2.5 | 0.040 | 0.030 | Nb+Ta0.50,W1.5 |
| | BG2050* | N06950 | 0.015 | 19.0-21.0 | 50.0min | 15.0-20.0 | 1.00 | 1.00 | 8.0-10.0 | 2.5 | 0.5 | 0.040 | 0.015 | Nb+Ta0.50, V0.04,W1.0 |
| 4e | BG1570* | N10276 | 0.020 | 14.5-16.5 | bal. | 4.0-7.0 | 1.00 | 0.08 | 15.0-17.0 | 2.5 | - | 0.040 | 0.030 | V0.35,W3.0-4.5 |

注：*在研制中。

### 主要钢种(牌号)的力学性能 Mechanical property of main grade (trademark)

| 牌号 grade | 钢级 class | 交货状态 delivery condition | $Rp_{0.2}$ (MPa) | | Rm (MPa) | 延伸率e % | HRC |
|---|---|---|---|---|---|---|---|
| | | | min | max | min | min | max |
| BG2830 | 110 | 冷加工硬化 (CH) | 758 | 965 | 793 | 11 | 35 |
| | 125 | 冷加工硬化 (CH) | 862 | 1034 | 896 | 10 | 37 |
| | 140 | 冷加工硬化 (CH) | 965 | 1103 | 1000 | 9 | 38 |
| BG2532 | 110 | 冷加工硬化 (CH) | 758 | 965 | 793 | 11 | 35 |
| | 125 | 冷加工硬化 (CH) | 862 | 1034 | 896 | 10 | 37 |
| | 140 | 冷加工硬化 (CH) | 965 | 1103 | 1000 | 9 | 38 |
| BG2235 | 110 | 冷加工硬化 (CH) | 758 | 965 | 793 | 11 | 35 |
| | 125 | 冷加工硬化 (CH) | 862 | 1034 | 896 | 10 | 37 |
| BG2242 | 110 | 冷加工硬化 (CH) | 758 | 965 | 793 | 11 | 35 |
| | 125 | 冷加工硬化 (CH) | 862 | 1034 | 896 | 10 | 37 |
| BG2250 | 110 | 冷加工硬化 (CH) | 758 | 965 | 793 | 11 | 35 |
| | 125 | 冷加工硬化 (CH) | 862 | 1034 | 896 | 10 | 37 |
| | 140 | 冷加工硬化 (CH) | 965 | 1103 | 1000 | 9 | 38 |

# 油气田开采用无缝钢管
# Seamless tube in oil-gas field offtake

## 常用油套管规格 Specified dimension and masses of pipe

| 代号 Labels | | 外径 Outside diameter | 壁厚 thickness | 内径 Inside diameter | 通径直径 Drift diameter | 替代通径直径 Alternative Drift diameter | 平端管米重 Mass Plain end |
|---|---|---|---|---|---|---|---|
| | | D | t | d | | | Wpe |
| 1 | 2 | mm | mm | mm | mm | mm | kg/m |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2-7/8 | 6.40 | 73.02 | 5.51 | 62.00 | 59.62 | - | 9.17 |
| 3-1/2 | 9.20 | 88.90 | 6.45 | 76.00 | 72.82 | - | 13.12 |
| 3-1/2 | 10.20 | 88.90 | 7.34 | 74.22 | 71.04 | - | 14.76 |
| 4-1/2 | 11.60 | 114.30 | 6.35 | 101.60 | 98.42 | - | 16.91 |
| 4-1/2 | 13.50 | 114.30 | 7.37 | 99.56 | 96.38 | - | 19.44 |
| 4-1/2 | 15.10 | 114.30 | 8.56 | 97.18 | 94.00 | - | 22.32 |
| 4-1/2 | 26.10 | 114.30 | 16.00 | 82.30 | 79.12 | - | 38.79 |
| 5 | 18.00 | 127.00 | 9.19 | 108.62 | 105.44 | - | 26.70 |
| 5 | 21.40 | 127.00 | 11.10 | 104.80 | 101.62 | - | 31.73 |
| 7 | 23.00 | 177.80 | 8.05 | 161.70 | 158.52 | 158.75 | 33.70 |
| 7 | 26.00 | 177.80 | 9.19 | 159.42 | 156.24 | - | 38.21 |
| 7 | 35.00 | 177.80 | 12.65 | 152.50 | 149.32 | - | 51.52 |
| 7-5/8 | 39.00 | 193.68 | 12.70 | 168.28 | 165.10 | - | 56.68 |
| 8-5/8 | 49.00 | 219.08 | 14.15 | 190.78 | 187.60 | - | 71.51 |

a d = D – 2t。
b 通径直径= d –常数 (油管为0.094或0.125；套管0.125或0.156)。Drift diameter=d-constant
c 重量(Mass)= 0.024 661 5 × (D – t) × t – t为不同组材料需要乘以的系数(for the multiplication facters with regards to the groups)。

## 固溶镍基合金用于油井管的环境限制 Chemical composition of main grade (trademark)

| 材料类型 Material Group | 最高温度 ˚C (°F) Maximum service temperature | 最大$H_2S$分压Kpa (psi) Maximum $H_2S$ pressure | 防硫性能 Prevent sulfur performance | 备注 Remarks |
|---|---|---|---|---|
| 4c，4d 和 4e 冷加工合金钢 Cold Steel | 232 (450) | 0.2 (30) | No | 任何Cl–1 含量及pH 值 |
| | 218 (425) | 0.7 (100) | No | |
| | 204 (400) | 1 (150) | No | |
| | 177 (350)<br>132 (270) | 1.4 (200)<br>见“备注” | No<br>Yes | 任何H2S含量，Cl–1 含量及pH 值 |
| 4d 和 4e 冷加工合金钢 Cold Steel | 218 (425) | 2 (300) | No | 任何H2S含量，Cl–1 含量及pH 值 |
| | 149 (300) | 见“备注” | Yes | 任何H2S含量，Cl–1 含量及pH 值 |
| 4e 冷加工合金钢 Cold Steel | 232 (450) | 7 (1000) | Yes | 任何H2S含量，Cl–1 含量及pH 值 |
| | 204 (450) | 见“备注” | Yes | 任何H2S含量，Cl–1 含量及pH 值 |

# 航空航天用管
# Pipe for aero-space area

## 高温合金无缝管 High-temperature alloy seamless pipe

- **用途**：本产品有优良的高温抗氧化性，高的热强性。用于燃气导管，加力燃烧室尾喷管，航天用摇摆软管、仪表用管等。
- **Usage**：This product has excellent inoxidability in high temperature and high heat resistance,which is used for fuel gas pipe, jet nozzle of tailpipe chamber , waver tube used in aerospace and pipe used in meter etc.
- **订货标准Order norm**：GB/T15062、GJB2297、GJB5060。
- **可供规格Offer specification**：外径(OD) 1~76mm，壁厚(WT) 0.2~7mm。

### 主要钢种(牌号)的化学成分 Chemical composition main steel grade (trademark)

| 牌号 trademark | 化学成分 chemical composition | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Cr | Ni | Mo | Al | Ti | Fe | Mn | Si | P | S | 其它 other |
| | Wt% | | | | | | | | | | | |
| GH1140 | 0.06-0.12 | 20.0-23.0 | 35.0-40.0 | 2.00-2.50 | 0.20-0.60 | 0.70-1.20 | 余 basic | ≤0.70 | ≤0.80 | ≤0.025 | ≤0.015 | W:1.40-1.80 Ce≤0.050 |
| GH3030 | ≤0.12 | 19.0-22.0 | 余 basic | – | ≤0.15 | 0.15-0.35 | ≤1.5 | ≤0.70 | ≤0.80 | ≤0.030 | ≤0.020 | – |
| GH3039 | ≤0.08 | 19.0-22.0 | 余 basic | 1.80-2.30 | 0.35-0.75 | 0.35-0.75 | ≤0.3 | ≤0.40 | ≤0.80 | ≤0.020 | ≤0.012 | Nb:0.90-1.30 |
| GH3600 | ≤0.10 | 14.0-17.0 | 余 basic | – | ≤0.35 | ≤0.50 | 6.0-10.0 | ≤1.00 | ≤0.50 | ≤0.020 | ≤0.005 | Nb≤1.00 |
| GH4169 | ≤0.08 | 17.0-21.0 | 50.0-55.0 | 2.8-3.3 | 0.2-0.6 | 0.65-1.15 | 余 basic | ≤0.035 | – | ≤0.015 | ≤0.015 | B≤0.006 Nb:4.75-5.50 |

### 主要钢种(牌号)的力学性能 mechanical property of main steel grade (trademark)

| | | |
|---|---|---|
| GH3030, GH1140 | Rm≥590 MPa | A≥35% |
| GH3039 | Rm≥635MPa | A≥35% |
| GH3600 | Rm≥550 MPa, Rp0.2≥240 MPa | A≥30% |
| GH4169 | Rm≤1070 MPa, Rp0.2≤655 MPa | A≥30% |

## 不锈钢无缝钢管 Stainless seamless pipe

- **用途**：本产品适用于制造各类歼击机、强击机、轰炸机、运输机、直升机、教练机的燃油、润滑油和液压系统导管。
- Usage：this product applied for manufacturing fuel,lubricant and hydraulic system pipe for all kinds of fighter plane,attack aircraft, bomber, transporter, helicopter and training plane.
- **订货标准** Order norm：GJB2296A(原 originalYB678-71)。
- **可供规格** Offer specification：外径 (OD) 4.0~50mm，壁厚 (WT) 0.5~2mm，长度 (L)1000~7000mm。

### 主要钢种(牌号)的化学成分和性能 Chemical composition and performance of main steel grade (trademark)

| 牌号 trademark | 化学成分 chemical composition | | | | | | | | 力学性能 mechanical property | |
|---|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | P | S | Ni | Cr | Ti | Rm | A |
| | Wt% | | | | | | | | MPa | % |
| 1Cr18Ni9Ti | ≤0.12 | ≤0.80 | ≤2.00 | ≤0.035 | ≤0.025 | 8.00-11.00 | 17.00-19.00 | 5(C%-0.02)-0.80 | ≥550 | ≥40 |
| 0Cr18Ni10Ti | ≤0.08 | ≤1.00 | ≤2.00 | ≤0.035 | ≤0.025 | 9.00-12.00 | 17.00-19.00 | ≥5C% | ≥520 | ≥40 |
| 0Cr18Ni9 | ≤0.07 | ≤1.00 | ≤2.00 | ≤0.035 | ≤0.025 | 8.00-11.00 | 17.00-19.00 | - | ≥520 | ≥35 |

全国最大的不锈航空钢管生产基地。The biggest national stainless aviation pipe production base

产品获国家国防科工委和冶金部颁发的奖励证书。
Product Gains the certificate rewarded by State Commission of Science and Technoligy for National Defense Industry and Ministry of Metallurgical Industry.

不锈航空管国军标起草负责单位。Stainless aviation pipe GJB responsible department

# 航空航天用管
# Pipe for aero-space area

## 超高强度钢无缝钢管 Ultra-high Strength Steel Seamless Pipe

- **用途**：该类产品用于制造各类导弹发动机壳体、飞机零部件等。
- **Usage**：Products in this category are applied to manufacture rocket motor casings in aerospace industry and aircraft components in aviation industry.
- **订货标准Order norm**： GJB 5513，GJB 1951 and other specs customers require
- **可供规格Offer specification**：外径(OD) 80~320mm, 壁厚(WT) 15~30mm, 长度(L) 1000~7000mm

**主要钢种(牌号)的化学成分和性能** Chemical composition and performance of main steel grade (trademark)

| 牌号 trademark | 化学成分 chemical composition | | | | | | | | | | | | 力学性能 mechanical property | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | S | P | Si | Ni | Cr | Mo | Ti | Al | Co | V | Rm | A |
| | Wt% | | | | | | | | | | | | MPa | % |
| C250 | ≤0.030 | ≤0.10 | ≤0.005 | ≤0.008 | ≤0.10 | 17.50<br>19.00 | - | 4.60<br>5.20 | 0.30<br>0.50 | 0.05<br>0.15 | 7.50<br>8.50 | - | ≥1760 | ≥8 |
| T250 | ≤0.030 | ≤0.10 | ≤0.005 | ≤0.008 | ≤0.10 | 18.00<br>20.00 | - | 2.75<br>3.25 | 1.20<br>1.60 | 0.05<br>0.15 | - | - | ≥1760 | ≥8 |
| C300 | ≤0.030 | ≤0.10 | ≤0.005 | ≤0.008 | ≤0.10 | 18.00<br>19.00 | - | 4.60<br>5.20 | 0.50<br>0.80 | 0.05<br>0.15 | 8.50<br>9.50 | - | ≥1930 | ≥8 |
| 30Cr3SiNiMoVA | 0.28<br>0.34 | 0.50<br>0.80 | ≤0.020 | ≤0.020 | 0.90<br>1.20 | 0.80<br>1.20 | 2.80<br>3.20 | 0.60<br>0.80 | - | - | - | 0.05<br>0.15 | ≥1720 | ≥9 |
| 45CrNiMo1VA | 0.43<br>0.46 | 0.60<br>0.90 | ≤0.005 | ≤0.010 | 0.15<br>0.35 | 0.40<br>0.70 | 0.90<br>1.20 | 0.90<br>1.10 | - | - | - | 0.05<br>0.15 | ≥1530 | ≥10 |
| 30CrMnSiNi2A | 0.27<br>0.34 | 1.00<br>1.30 | ≤0.020 | ≤0.020 | 0.90<br>1.20 | 1.40<br>1.80 | 0.90<br>1.20 | ≤0.15 | - | - | - | - | ≥1620 | ≥10 |
| 31Si2MnCrMoVA | 0.27<br>0.32 | 0.70<br>1.00 | ≤0.008 | ≤0.010 | 1.40<br>1.70 | 0.15<br>0.35 | 1.00<br>1.30 | 0.40<br>0.55 | - | - | - | 0.08<br>0.15 | ≥1620 | ≥9 |



# 核电用无缝管
# Seamless pipe in nuclear power

- **用途**：用于各种核反应堆的蒸汽发生器、燃料组件、堆内构件、驱动机构、换热器等一、二、三级用管和输送管道。
- **Usage**：Applied for pipe and transfer piping of all kinds of vapour generator,feul subassembly,in-pile part and actuating mechanism etc,in nulear reactor.
- **订货标准Order norm**：GB13296、GB/T14976、RCCM M4105、NB/T20008.7-2011、ASME SB163、agreement protocol etc,
- **可供规格Offer specification**：外径(OD) 8~325mm，壁厚(WT) 0.5~40mm

**主要钢种(牌号)的化学成分** Chemical composition of main steel grade (trademark)

| 牌号 trademark | 化学成分 chemical composition | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ni | Cr | Fe | Mn | C | Si | S | P | Al | Ti | Cu | 其它 others |
| | Wt% | | | | | | | | | | | |
| 0Cr18Ni9 | 8.0 - 11.0 | 17.0 - 19.0 | 余 bal | ≤2.0 | ≤0.07 | ≤1.00 | ≤0.030 | ≤0.035 | – | – | – | – |
| 00Cr19Ni10 | 8.0 - 12.0 | 18.0 - 20. 0 | 余 bal | ≤2.0 | ≤0.030 | ≤1.00 | ≤0.030 | ≤0.035 | – | – | – | – |
| 0Cr17Ni12Mo2 | 11. 0- 14.0 | 16.0 - 18.5 | 余 bal | ≤2.0 | ≤0.08 | ≤1.00 | ≤0.030 | ≤0.035 | – | – | – | – |
| 00Cr17Ni14Mo2 | 12. 0- 15. 0 | 16.0 - 18.0 | 余 bal | ≤2.0 | ≤0.03 | ≤1.00 | ≤0.030 | ≤0.035 | – | – | – | – |
| 00Cr25Ni35AlTi | 34.0 - 37.0 | 24.0 - 26.5 | 余 bal | 0.5 - 1.5 | ≤0.030 | 0.30 - 0.70 | ≤0.015 | ≤0.015 | 0.15 - 0.45 | 0.15 - 0.60 | ≤0.50 | Co≤0.0 5<br>N≤0.03 |
| UNS N08800 | 30.0 - 35.0 | 19.0 - 23.0 | ≥39.5 | ≤1.5 | ≤0.10 | ≤1.00 | ≤0.015 | – | 0.15 - 0.60 | 0.15 - 0.6 0 | ≤0.75 | – |
| UNS N06600 | ≥72.0 | 14.0 - 17.0 | 6.0 - 10.0 | ≤1.0 | ≤0.15 | ≤0.50 | ≤0.015 | – | – | – | ≤0.5 | – |
| 690<br>(NC30Fe) | ≥58.0 | 28.0 - 31.0 | 8.0 - 11.0 | ≤0.5 | 0.01 - 0.03 | ≤0.50 | ≤0.010 | ≤0.015 | ≤0.50 | ≤0.50 | ≤0.50 | Co≤0.018<br>Nb≤0.10<br>B≤0.003<br>N≤0.05 |
| 690<br>(NS3105) | ≥58.0 | 28.0 - 31.0 | 8.0 - 11.0 | ≤0.5 | 0.010 - 0.03 | ≤0.50 | ≤0.010 | ≤0.015 | ≤0.50 | ≤0.05 | ≤0.05 | Nb≤0.10<br>B≤0.003<br>Co≤0.018<br>N≤0.05 |
| 690(UNS NO6690)<br>ASME SB163及补充技术要求<br>ASME SB163 and additional technical requirements | ≥58.0 | 28.5 - 31.0 | 9.0 - 11.0 | ≤0.5 | 0.015 - 0.02 | ≤0.50 | ≤0.003 | ≤0.015 | ≤0.40 | ≤0.35 | ≤0.05 | Nb≤0.10<br>B≤0.002<br>Co≤0.016<br>N≤0.05<br>Mo≤0.2 |

# 核电用无缝管
# Seamless pipe in nuclear power

- ASTM SB163 and additional technical requirements
- 690（NC30Fe/UNS N06690/NS3105)组织力学性能及尺寸表面要求：

| 技术指标 Standard | | 690(NC30Fe) RCCM M4105 | 690(NS3105) NB/T 20008.7-2011 | 690(UNS NO6690) ASME SB163及补充技术要求 ASME SB163 and additional technical requirements |
|---|---|---|---|---|
| 晶粒度 Grain size | | 5-9 | 5-9，级差3级 | 细于等于5级，级差小于2级 Less than ASTM 5,not exceed two ASTM units |
| 室温拉伸 Room temperature tensile | Rm MPa | ≥630 | ≥630 | ＞585 |
| | Rp0.2 MPa | 275-375 | 275-375 | 275-380 |
| | A% | ≥30 | ≥30 | ≥30 |
| 350℃拉伸 350℃tensile | Rm MPa | ≥533 | ≥533 | ≥550 |
| | Rp0.2 MPa | ≥215 | ≥215 | ＞215 |
| 硬度Hardness | | ≤92 | ≤92 | - |
| 扩口flare | | - | 60° 30% | 60° 30% |
| 尺寸公差 Dimension tolerance | 外径OD mm | 19.05±0.05 | 19.05±0.05 | 17.48±0.05 |
| | 壁厚WT mm | 1.09±0.10 | 1.09±0.10 | 1.01±0.09 |
| | 长度L m | 19-25 | 19-25 | 19-29 |
| U形管椭圆度 U-bend tube ovality | | 1-3排＜5% | 1-3排≤5% | 1-5row＜2.8% |
| | | 4-6排＜4% | 4-6排≤4% | 6-15row＜2.6% |
| | | 7-53排＜3% | 7-53排≤3% | 16-164row＜1.6% |
| 内涡流信噪比 Noise level | | ＞7单点 single point | ≥7单点 single point | ≥20 |
| 水压试验 Hydrostatic | | 14.7MPa×10秒B级水. demineralized water grade B | 14.7MPa×10秒B级水. demineralized water grade B | 21.42MPa ≥5秒 A级水 demineralized water grade A |
| 表面粗糙度 Surface roughness | | 内Ra＜0.8、外Ra＜1.2 Inner Surface Ra＜0.8、Outer surface Ra＜1.2 | 内Ra≤0.8、外Ra≤1.2 Inner Surface Ra≤0.8、Outer surface Ra≤1.2 | 内Ra＜0.5、外Ra＜1.0 Inner Surface Ra＜0.5、Outer surface Ra＜1.0 |
| 晶间腐蚀 Intergranular corrosion | | - | - | ≤20mdd |



# 电站锅炉用无缝钢管
# Seamless tube for station boiler

- **用途**：适用于制造220MW、250MW、300MW、600MW，1000MW等大型电站锅炉用的过热器、再热器用途中增加超临界、超超临界，水冷壁等用管
- **Usage**：Applied to manufacture the pipe for overheater , reheater and so on of 220MW、250MW、300MW、600MW , 1000MW etc. large scale station boiler
- **订货标准Order norm**：GB5310、GB13296、ASME SA-213、ASTM A213、JIS3463等国内外标准etc. domestic and overseas standard.
- **可供规格Offer specification**：外径outside diameter 32~89mm，壁厚wall thickness 3.5~15mm

## 主要钢种(牌号)的化学成分和性能 Chemical composition and performance of main steel grade (trademark)

| 牌号 trademark | 化学成分 chemical composition | | | | | | | | 力学性能 mechanical property | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | Cr | Ni | S | P | 其它 others | Rm | Rp0.2 | A |
| | Wt% | | | | | | | | MPa | MPa | % |
| 1Cr19Ni9 | 0.04 - 0.10 | ≤2.0 | ≤1.0 | 18.0 - 20.0 | 8.0 - 11.0 | ≤0.015 | ≤0.030 | _ | ≥520 | ≥206 | ≥35 |
| SUS304HTB | 0.04 - 0.10 | ≤2.0 | ≤0.75 | 18.0 - 20.0 | 8.0 - 11.0 | ≤0.015 | ≤0.030 | _ | ≥520 | ≥206 | ≥35 |
| TP304H | 0.04 - 0.10 | ≤2.0 | ≤0.75 | 18.0 - 20.0 | 8.0 - 11.0 | ≤0.015 | ≤0.030 | _ | ≥520 | ≥205 | ≥35 |
| 1Cr18Ni11Ti | 0.04 - 0.10 | ≤2.0 | ≤0.75 | 17.0 - 20.0 | 9.0 - 13.0 | ≤0.015 | ≤0.030 | Ti:≥4C%~0.60% | ≥520 | ≥205 | ≥35 |
| SUS321HTB | 0.04 - 0.10 | ≤2.0 | ≤0.75 | 17.0 - 20.0 | 9.0 - 13.0 | ≤0.015 | ≤0.030 | Ti:≥4C%~0.60% | ≥520 | ≥206 | ≥35 |
| TP321H | 0.04 - 0.10 | ≤2.0 | ≤0.75 | 17.0 - 20.0 | 9.0 - 13.0 | ≤0.015 | ≤0.030 | Ti:≥4C%~0.60% | ≥515 | ≥205 | ≥35 |
| 1Cr19Ni11 Nb | 0.04 - 0.10 | ≤2.0 | ≤1.0 | 17.0 - 20.0 | 9.0 - 13.0 | ≤0.015 | ≤0.030 | Nb+Ta≥ 8C%~1.00% | ≥520 | ≥205 | ≥35 |
| SUS347HTB | 0.04 - 0.10 | ≤2.0 | ≤0.75 | 17.0 - 20.0 | 9.0 - 13.0 | ≤0.015 | ≤0.030 | Nb≥8C%~1.00% | ≥520 | ≥206 | ≥35 |
| TP347H | 0.04 - 0.10 | ≤2.0 | ≤0.75 | 17.0 - 20.0 | 9.0 - 13.0 | ≤0.015 | ≤0.030 | Nb+Ta≥ 8C%~1.00% | ≥520 | ≥205 | ≥35 |
| TP347HFG | 0.06 - 0.10 | ≤2.0 | ≤0.75 | 17.0 - 20.0 | 9.0 - 13.0 | ≤0.015 | ≤0.030 | Nb+Ta≥ 8C%~1.00% | ≥550 | ≥205 | ≥35 |
| S30432 | 0.07 - 0.13 | ≤1.0 | ≤0.30 | 17.0 - 19.0 | 7.5 - 10.5 | ≤0.010 | ≤0.030 | Cu：2.50-3.50 | ≥590 | ≥235 | ≥35 |
| S31042 | 0.04 - 0.10 | ≤2.0 | ≤1.00 | 24.0 - 26.0 | 19.0 - 22.0 | ≤0.015 | ≤0.030 | Nb：0.2-0.6; N：0.15-0.35 | ≥655 | ≥295 | ≥30 |
| 正在研制开发700℃超超临界火电站用UNS N06617和UNS N07740等新型镍基合金高压锅炉管 | | | | | | | | | | | |

**注**：根据用户需要可生产上表以外的牌号。

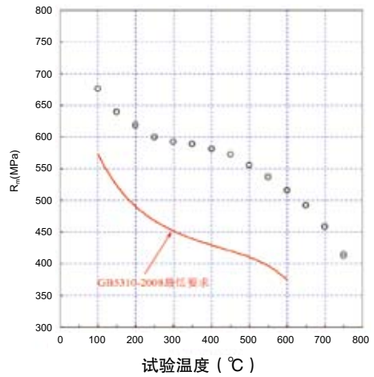
**Note:**According to the requirement of the customers , we can produce the pipe which standard is not mentioned above.

# 电站锅炉用无缝钢管
# Seamless tube for station boiler

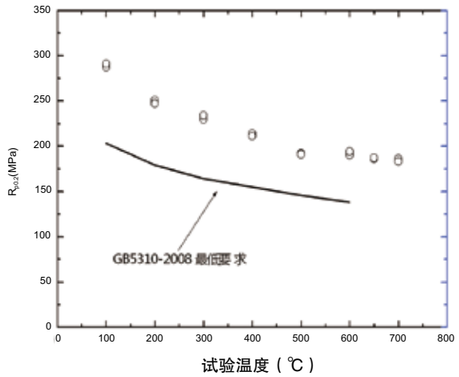
主要牌号的高温规定非比例延伸强度 High temperature regulation extension strength of the main grades

| 牌号 Grades | 高温规定非比例延伸强度 $R_{p0.2}$/MPa ≥ high temperature regulation extension strength | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 温度/℃temperature | | | | | | | | | | |
| | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
| 07Cr19Ni10 | 170 | 154 | 144 | 135 | 129 | 123 | 119 | 114 | 110 | 105 | 101 |
| 10Cr18Ni9NbCu3BN ( S30432 ) | 203 | 189 | 179 | 170 | 164 | 159 | 155 | 150 | 146 | 142 | 138 |
| 07Cr25Ni21NbN[a] ( S31042 ) | 573 | 523 | 490 | 468 | 451 | 440 | 429 | 421 | 410 | 397 | 374 |
| 07Cr19Ni11Ti | 184 | 171 | 160 | 150 | 142 | 136 | 132 | 128 | 126 | 123 | 122 |
| 07Cr18Ni11Nb ( TP347H ) | 189 | 177 | 166 | 158 | 150 | 145 | 141 | 139 | 139 | 133 | 130 |
| 08Cr18Ni11NbFG ( TP347HFG ) | 185 | 174 | 166 | 159 | 153 | 148 | 144 | 141 | 138 | 135 | 132 |

a 表中07Cr25Ni21NbN的数据为材料在该温度下的抗拉强度
Tab.a Data for the material 07Cr25Ni21NbN under the temperature the tensile strength




S31042的高温短时抗拉强度随温度变化曲线
high temperature short time tensile strength changes with the temperature curve of S31042




S30432的高温短时屈服强度随温度变化曲线
high temperature short time tensile strength changes with the temperature curve of S30432

主要牌号的 100 000h 持久强度推荐数据 100 000 h lasting intensity recommended data of the main grades

| 牌号 Grades | 100 000h持久强度推荐数据/MPa, ≥ 100 000 h lasting intensity recommended data | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 温度/℃temperature | | | | | | | | | | |
| | 600 | 620 | 650 | 670 | 690 | 700 | 710 | 720 | 730 | 740 | 750 |
| 07Cr19Ni10 | 96 | 81 | 63 | 52 | 44 | 40 | 37 | 34 | 31 | 28 | 26 |
| 10Cr18Ni9NbCu3BN ( S30432 ) | - | 137 | 117 | 97 | 79 | 71 | 64 | 57 | 50 | 45 | 39 |
| 07Cr25Ni21NbN[a] ( S31042 ) | 160 | 142 | 103 | 85 | 69 | 62 | 56 | 51 | 46 | - | - |
| 07Cr19Ni11Ti | 89 | 72 | 55 | 46 | 38 | 35 | 32 | 29 | 26 | 24 | 22 |
| 07Cr18Ni11Nb ( TP347H ) | 132 | 110 | 82 | 66 | 54 | 48 | 43 | 38 | 34 | 31 | 28 |
| 08Cr18Ni11NbFG ( TP347HFG ) | - | 132 | 99 | 81 | 66 | 59 | 53 | 48 | 43 | - | - |

2012年宝钢特钢实现了S30432和TP310HCbN(S31042)钢管国内首次批量化生产，各项性能达到和超过国外产品水平，得到业界和制作单位认可，打破了国外的垄断。这也是国内首次在同一台超超临界机组锅炉上使用国产S30432和TP310HCbN(S31042)钢管。

Baosteel special steel in 2012 achieved S30432 and TP310HCbN (S31042) steel pipe domestic mass production for the first time, the performance reached the level and more than foreign products, recognised by industry and production unit, to break the foreign monopoly. This is the first time at home on the same unit ultra supercritical boiler using domestic S30432 and TP310HCbN (S31042) steel pipe.

# 质量保证
## Quality Guarantee



# 质量认证
## Quality certificates

- 宝钢特钢从1995年开始逐步按照ISO9001、AS9100B、GJB9001A、HAF003、ISO/TS16949标准以及顾客的特殊要求，建立航空航天、军工、核电及汽车质量管理体系，并形成一整套质量体系文件。
- 宝钢特钢确定并运行的质量体系过程共有21个，包括：管理策划过程、管理评审过程、内部审核过程、纠正预防措施改进过程、数据分析和利用过程、顾客满意度监视和测量过程、需求识别和评审过程、设计和开发过程、生产过程、交付过程、服务过程、生产计划过程、设备和工装管理过程、文件管理过程、人力资源管理过程、采购和供方管理过程、产品防护过程、检验和试验管理过程、测量设备管理过程、标识和可追溯性管理过程、不合格品控制过程。
- 宝钢特钢通过制定和落实质量目标、定期开展内部质量审核和管理评审等，持续改进质量体系。
- 宝钢特钢的各类质量体系均通过了第三方的认证。

- Since 1995, Baosteel has established aviation and aerospace, military, nuclear and automotive quality management system and formed a complete set of quality system documents in accordance with ISO9001, AS9100B, GJB9001A, HAF003, ISO/TS16949 standard and specific requirements of customer
- Baosteel also determines and runs a quality system which has totally 21 processes,including: Management planning process, management review process, internal checking process, corrective and preventive measures to improve the process, data analysis and use processes, customer satisfaction monitoring and measurement process, needs identification and assessment process, the design and development process, production process, delivery process, service process, production planning process, equipment and tooling management processes, document management process, human resource management processes, procurement and supplier management processes, product protection, process, inspection and test management processes, measuring equipment management processes, identification and traceability management process and nonconforming product control process.
- Through the development and implementation of quality objectives, regularly carrying out internal quality checking and management reviews, etc., Baosteel continues to improve the quality system
- All kinds of quality system had gotton certificates given by the third-party.



航空航天质量体系认证
Aerospace Quality System Certification

# 质量认证
# Quality certificates



中国质量认证中心
ISO9001:2008质量管理体系认证
China Quality Certification Center ISO9001: 2008 quality management system certification



中国合格评定国家认可委员会
ISO/IEC 17025:2005实验室认可证书
CNAS ISO/IEC 17025：2005 laboratory accreditation certificate



北京国金恒信管理体系
BG/T19001-2008—ISO 9001:2008质量管理体系认证
GHC BG/T19001-2008—ISO 9001：2008 quality management system certification



中启计量体系认证中心
ISO 10012:2003测量管理体系认证
Certificate of conformity for measurement management systems, ISO 10012:2003

# 质量认证
# Quality certificates


中华人民共和国民用核安全设备制造许可证
People's Republic of civil nuclear safety equipment manufacturing license


特种设备制造许可证（不锈钢管）
Manufacturing License of Special Equipment
(Stainless steel pipe)


PED 97/23/EC欧盟压力设备指令
PED 97/23/EC and AD2000-W0/TRD 100


PED 97/23/EC欧盟压力设备指令
PED 97/23/EC and AD2000-W0/TRD 100


S30432锅炉压力容器用材料技术评审证书
S30432 boiler and pressure vessel materials technology assessment certificate


S31042锅炉压力容器用材料技术评审证书
S31042 boiler and pressure vessel materials technology assessment certificate



双相不锈钢管资质证书
Duplex stainless steel pipe Certificate

# 质量检测
# Quality Inspection

## 化学检测 Chemical examination

电感耦合等离子体发射光谱仪
ICP

AA300火焰原子吸收光谱仪
AA300 FAES

EMIA-820V 红外碳硫分析仪
EMIA-820V CS Analyzer

EMGA-620W氧氮联测仪
EMGA-620W Oxygen and Nitrogen comparison Analyzer

AA600石墨炉原子吸收光谱仪
AA600 Graphite Furnace Atomic Absorption Spectrophotometer

ARL4460光电直读光谱仪
ARL4460 OES

## 物理检测 Physical examination

50吨万能试验机
50t universal tester

高温拉力机
Hyperthermia tensile machine

硬度计
Sclerometer

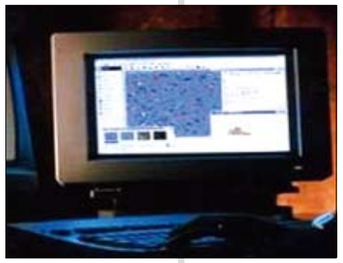
疲劳试验
Fatigue test

微机控制摆锤式冲击试验机
Pendulum impact testing machine with micro computer control

电子蠕变试验机
Creep testing machine

# 质量检测
# Quality examination

## 金相分析 Metallographic Analysis



金相图像分析系统
Metallographic Analysis system

大型金相显微镜
Large metallscope

金相自动磨样机
Metallographic microsection machine



# 用户服务
# Customer Service

# 技术支撑
# Technical support

**客户代表**
是用户使用宝钢特钢产品的技术联络人，负责为用户提供选材咨询、订货、物流跟踪、货款结算、质量异议处理、使用技术指导、信息沟通等全方位服务。

**产品工程师**
来自宝钢特钢制造单元的资深工程师，为用户提供各类产品的生产、使用技术服务，并根据用户的特殊需求进行个性化的质量设计，与客户代表共同解决技术难题，必要时提供现场服务。

**技术专家与首席工程师**
来自宝钢特钢研究部门、制造单元的专业技术专家与首席工程师，针对用户和市场的需求，研发特钢新产品，并提供产品检测、腐蚀、焊接、热处理等用户技术服务。

**产销研一体化小组**
由宝钢特钢制造、销售、研发等各单元的骨干力量组成，以专业的团队方式解决用户使用及生产、研发方面的问题，提高宝钢特钢产品的市场竞争力。



**Sales representative**
Technical contact person, to provide customer service concerning products advisory, order placing, logistic tracing, loan and accounts, objection handling, operation guide etc.

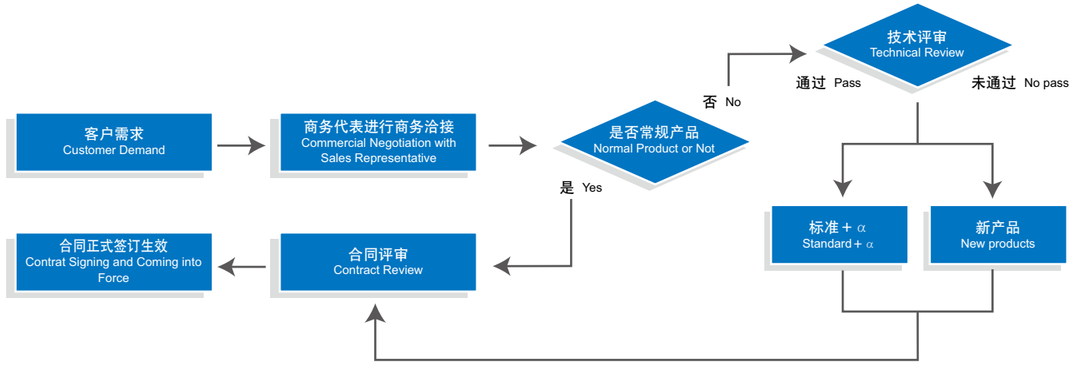
**Production engineer**
Senior engineers from special steel division, to provide technical support concerning production and quality design; onsite service available if necessary

**Technique experts and chief engineer**
Researching on developing of new products to meet the requirements of the market; provide post service such as inspection, corrosion test, welding, heat treatment etc.

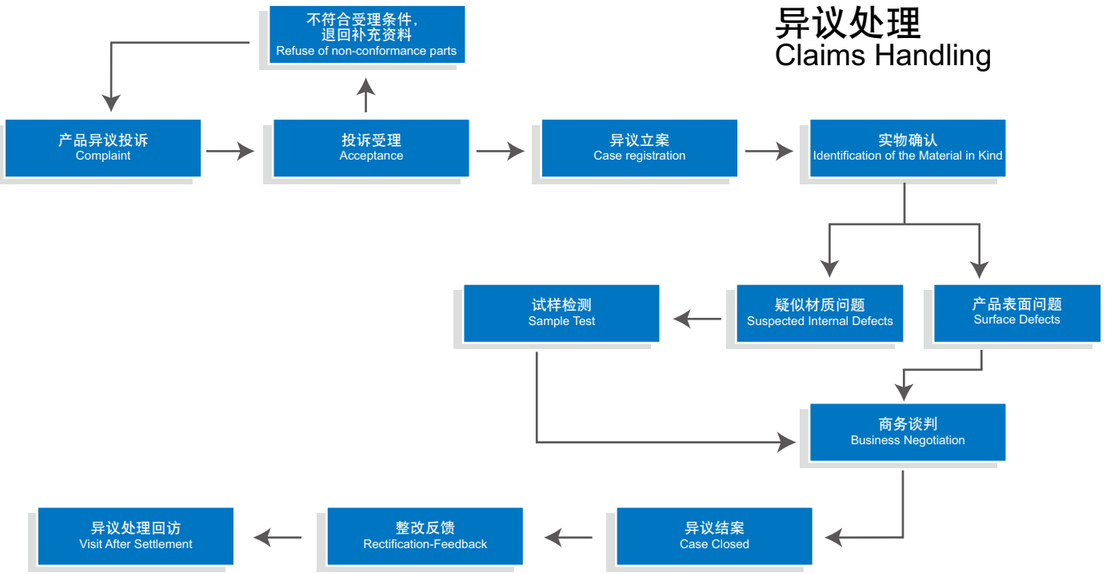
**Production, sales, research team (PSRT)**
Consist of people from different departments of Production, sales, research; the team is to solve the problems of the customers on using, production and researching.



# 合同签订流程
# Procedure of Contract Signig




# 异议处理
# Claims Handling



## 环境方针 Environment Policy

节约资源， 减少排放， 实行全过程污染控制，不断减轻环境负荷。持续改进，遵法守约，推行全方位清洁生产，努力建设绿色特钢。

Saving resources, Reducing emissions, Carrying out pollution control through the process, Reducing environmental load consistently. Continuously improving , Persistently observing the law, Pursuing "clean production", Striving for "Green Special Steel".

## 环境目标 Environment Objective

推行清洁生产审计，建设“绿色特钢”，实现“世界一流清洁钢铁企业”。

Carrying out clean production audits, Building " Green Special Steel", Being a "world-class clean iron and steel enterprise."



OHSAS 18001:2007 职业健康和安全管理体系

OHSAS 18001:2007 Certification



ISO 14001:2004 环境体系认证证书

ISO 14001:2004 Certification