



低温容器用06Ni9(9%Ni)合金钢板

06Ni9 (9%Ni) ALLOY STEEL PLATES FOR LOW-TEMPERATURE VESSELS



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Taiyuan Iron and Steel (Group) Co.,Ltd.



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企业使命

用不锈钢智慧创造卓越品质

Enterprise Mission

Create Supereminent Quality by Rustless Wisdom

战略目标

坚持做强主业、延伸发展、多元发展、绿色发展、和谐发展
建设全球最具竞争力的不锈钢企业，成为国内一流、世界著名的大型企业集团

Strategic Target

Strengthen main business, Persist in extension development, diversified development, green development and harmonious development, Build the most competitive stainless steel enterprise in the world, To be a great enterprise group top-ranking in China and well known in the world

核心价值观

以人为本 用户至上 质量兴企 全面开放 不断创新

Core Values

Relying on the People, Putting Customers' Needs First, Rejuvenating Enterprise through Quality, Fully Opening, Keeping Innovative

营销理念

为用户提供更全、更好、更快的解决方案

在长期合作中实现共赢

Marketing Principle

Providing Customer with Better and Faster Solution Package to Realize Long-Term Win-Win Cooperation

太原钢铁 (集团) 有限公司

TAIYUAN IRON & STEEL (GROUP) COMPANY LTD.



太钢是集铁矿山采掘和钢铁生产、加工、配送、贸易为一体的特大型钢铁联合企业，也是目前全球最大、工艺技术装备水平最高、品种规格最全的不锈钢企业，具备年产1000万吨钢（其中300万吨不锈钢）的能力，营业收入连续五年超过1000亿元人民币。

太钢致力于不锈钢、特殊钢和高等级碳素钢的研究开发和生产加工，拥有雄厚的研发实力和可靠的质量保障能力。太钢技术中心在全国729家国家认定企业技术中心中排名第二。目前已形成了以不锈钢、冷轧硅钢、高强韧系列钢材为主的高效节能长寿型产品集群，重点产品批量进入石油、化工、造船、集装箱、铁路、汽车、城市轻轨、大型电站、“神舟”系列飞船等重点领域和新兴行业。铁路行业用钢、双相钢、耐热钢、车轴钢、9%Ni钢等30多个品种国内市场占有率第一。

“十二五”期间，太钢将以科学发展为主题，以转型发展为主线，以科技创新为动力，以能力建设为核心，以队伍建设为保障，全面推进“三个转变”，坚持做强主业、多元发展、延伸发展、绿色发展、和谐发展，建设全球最具竞争力的不锈钢企业，到2015年，营业收入达到2000亿元以上，成为国内一流、世界著名的大型企业集团。

太钢采用先进的低碳、超纯高合金钢冶炼装备、高精度宽厚板生产线，在中国首家生产出高品质的9%Ni钢。根据国标GB/T 221（钢铁产品牌号表示方法），将9%Ni钢命名为06Ni9钢，等同于美标ASTM A553/A553M中的9%Ni型钢和欧标EN10028-4中的X7Ni9钢。太钢06Ni9（9%Ni）钢实物质量达到当今工业先进国家同等水平，且在-196℃温度条件下横（纵）向冲击韧性高于国外同类产品。

As the biggest stainless steel enterprise equipped with globally biggest capacity and most up-to-date technology and equipment, TISCO has developed into an extraordinary large scale iron and steel complex, which is integrated with businesses of iron mining, iron and steel production, processing, delivery and trading. Now, TISCO's annual production capacity is 10 million tons (of which 3 million tons of stainless steel), its operating income surpasses 100 billion Yuan RMB in the past five consecutive years.

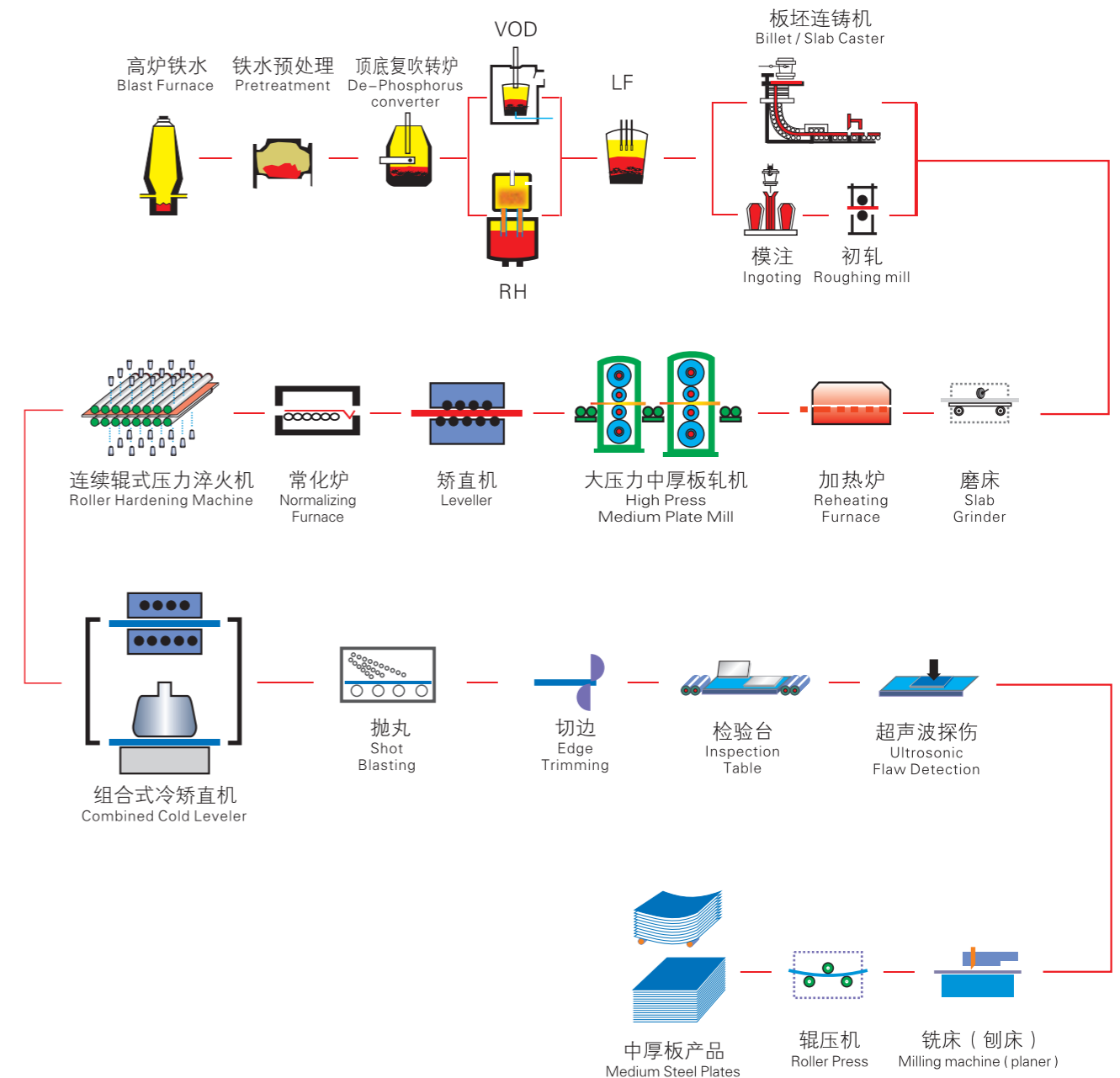
TISCO has been devoted to R & D, production and processing of stainless steel, special steel and high grade carbon steel. The company has enormous R & D force and reliable quality assurance system. Among 729 State determining enterprise technical centers, TISCO Technology Center ranks the second. Now, TISCO has formed an energy-efficient longevity products cluster mainly in stainless steel, cold rolled silicon steel, high-strength-toughness series steel, and key products have entered into key fields and new industries such as petroleum, chemical industry, shipbuilding, container, railway, automobile, urban light rail transit, large power stations, "Shenzhou" series airships and etc. TISCO ranks the domestic first in market shares of railway industry steel, duplex steel, heat-resistant steel, axle shaft steel, 9% Ni steel, etc.

During "the twelfth five-year" period, taking scientific development as the theme, transformation development as the main line, technological innovation as a driving force, the ability construction as the core, and team building as guarantee, TISCO will continue to promote the "three transformations", adhere to the strengthen the main business, with diverse development, extension development, green development and harmonious development, speed up the construction of the world's most competitive stainless steel enterprises. Up to 2015, with business income expecting to reach over 200 billion Yuan, build TISCO to the domestic first-class, the world famous large enterprise group.

TISCO is the leading company to produce high quality 9% Nickel steel with advanced low carbon and super pure and high alloy steel smelting, and high accuracy superwide and thick plates lines. According to GB/T 221 (for steel grade), 9% Nickel steel is named as 06Ni9, which is equal to type 9%Ni in American standard ASTM A553/A553M or X7Ni9 in European standard EN10028-4. The quality of 06Ni9 (9%Ni) steel reaches the same level as that produced in sophisticated industry company in the world, besides the transverse(longitudinal) impact ductility at temperature of -196℃ is higher than the identical product in the world.

工艺流程 >>>

Process Flow



装备优势 >>>

Equipment and Technology



85吨/180吨顶底复吹转炉 85/180t Top and Bottom Blowing De-Phosphorus Converter

- 采用顶底复吹模式，使用经铁水预处理的高纯净度铁水，配备智能炼钢系统，钢质纯净，是生产超低P、S高合金钢的优势装备。

The use of combined top and bottom blowing technology, with pretreated high purity hot metal, equipped with smart smelting system, produce high purity steel, which is the dominant equipment for production of high alloy steel with super low P&S.



2座180吨双工位LF钢包炉 2 × 180t Twin-Position LF

- 电极加热升温钢液（升温速度：最大5℃/min；），底吹氩气搅拌均匀成分及温度，深脱硫，脱氧，去除钢中夹杂物，微调成分；

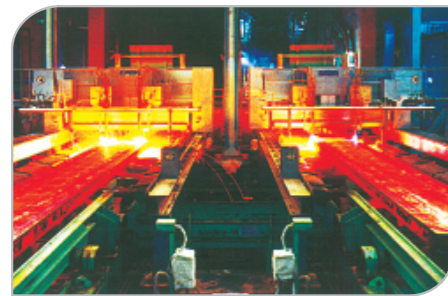
Heating the liquid steel by electrode (heating speed: max 5℃/min), stirring composition and temperature homogenous by bottom blowing argon gas technology, ultra de-S, de-O, remove inclusion in steel and trimming composition



85吨/180吨RH真空处理炉 85/180t RH Vacuum Treatment Furnace

- 高真空度具有良好的循环脱气、去除夹杂效果；
- 钢质纯净度高。

High de-gassing capacity, with well circulation de-gassing and decontamination;
High in steel purity.



直弧型宽板坯连铸机 Vertical-type continuous casting machine

- 是最宽的特殊钢板坯连铸机，采用结晶器二冷动态配水、气雾冷却、液压振动、轻压下等技术，铸坯组织致密。

Vertical-type continuous casting machine with bending mold is the widest continuous casting machine for special steel. The technologies such as dynamic distributing for secondary cooling water in mold, evaporated cooling, hydraulic oscillating and soft reduction are applied to the casting machine, which result in compact structure in slabs.

装备优势 >>>

Equipment and Technology



宽幅中厚板轧机 Broad Plate Mill

- 中厚板最大宽度3000mm、最大厚度100 mm；
- 配备有先进的AGC自动控制系统，产品尺寸精度高，板形好。

Steel plate in max. width of 3000mm and max. thickness of 100mm. Equipped with the advanced AGC automatic control system, its products have high accuracy dimension and good flatness.



中厚板连续辊底式常化炉 Roller Hearth Normalizing Furnace for Medium Plates

- 炉膛尺寸70.2m×3.408m，最高炉温1250℃，年生产能力32万吨，温度控制精度高。

Furnace chamber sized 70.2m×3.408m, maximum temperature 1250℃, annual capacity of 320,000 tons, highly accurate temperature control.



连续性辊式淬火机 Roller Hardening Machine

- 国内首套具有自主知识产权的中厚板辊式淬火机，设有高中低三个冷却区，配有一级二级自动控制系统，可根据钢板规格选择淬火模式和设定淬火工艺参数，并实现淬火过程的自动化控制，可实现快速冷却。

The first medium plate roller hardening machine in China of self propriety is designed of high-, middle- and low-cooling zones and controlled with L1 and L2 system for automatic hardening operation by selecting hardening mode and setting hardening parameters with reference to plate specification. Performing fast cooling down.



中厚板组合式冷矫直机 Combined Cold Leveler

- 十五辊复合矫直机，矫直力60000KN，矫直速度0.25~1m/s，板型好。

15-high combined leveler, with leveling force up to 60000KN and leveling speed 0.25~1m/s, gives perfect flatness result.

研发能力 >>> Research and Development



国家级实验室 National level laboratory



2011年在国家认定的729家企业技术中心中，
太钢技术中心排名第2位。

Tisco technology center ranks 2th place among
enterprise-based 729 technology centers
accredited by the state in 2011.



透射电镜
Transition Electron
Microscope



扫描电镜
Scanning Electron Microscope



热模拟试验机
Thermal Simulating Tester



热分析仪
Thermal Analyser

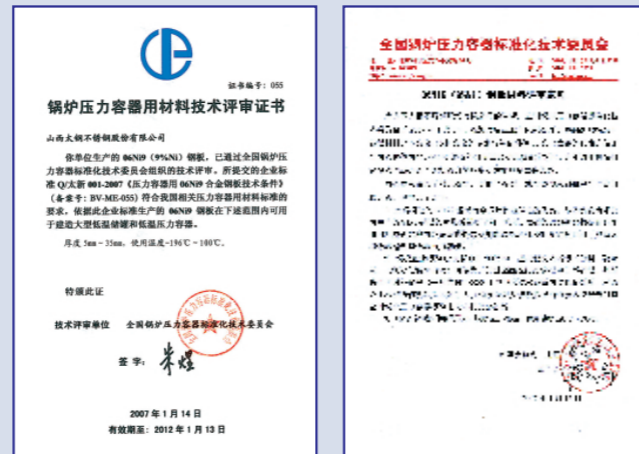
荣誉证书 >>> Honors & Awards



质量保证体系 >>> Quality Assurance System



通过权威机构评审 >>> Certification of Authorities



2007年1月, 太钢的“9%Ni钢板材料”和“低温压力容器用06Ni9合金钢板技术标准”通过中国全国锅炉压力容器标准化技术委员会专家组的鉴定审查, 中海油、中石油、中石化等公司的技术专家和LNG项目代表参加了评审会议, 与会专家和代表均给予了高度评价。

On Jan,2007,TISCO “9% Nickel steel” and “06Ni9 alloy steel plate standard for low temperature pressure vessels” examined and certified by China Standardization Committee on Boilers and Pressure Vessels with presence of specialist and LNG representatives from China National Offshore Oil Co.Ltd., China petrochemical Co.Ltd., Petro China Company Ltd., who gave high appraisal of them.

规格及尺寸精度 >>> Specification & Dimension Accuracy

◆ 产品规格 Product Specification (mm)

厚度 Thickness	宽度 Width	长度 Length
5 ~ 35	1000 ~ 3000	5000 ~ 12000

◆ 尺寸精度 Dimensional Precision

钢板厚度 (mm) Thickness	厚度允许公差 (mm) Allowable Thickness tolerance
5.0 ~ 20.0	0 ~ +0.4
>20.0 ~ 35.0	0 ~ +0.5

项目 Item	精度 (mm) Precision
宽度精度 Width Precision	0 ~ +10
长度精度 Length Precision	0 ~ +25
对角线 Diagonal Precision	≤10
垛板精度 Stacking Accuracy	沿长度方向 (Lengthwise): 0 ~ 3.0 沿宽度方向 (Widthwise): 0 ~ 2.0

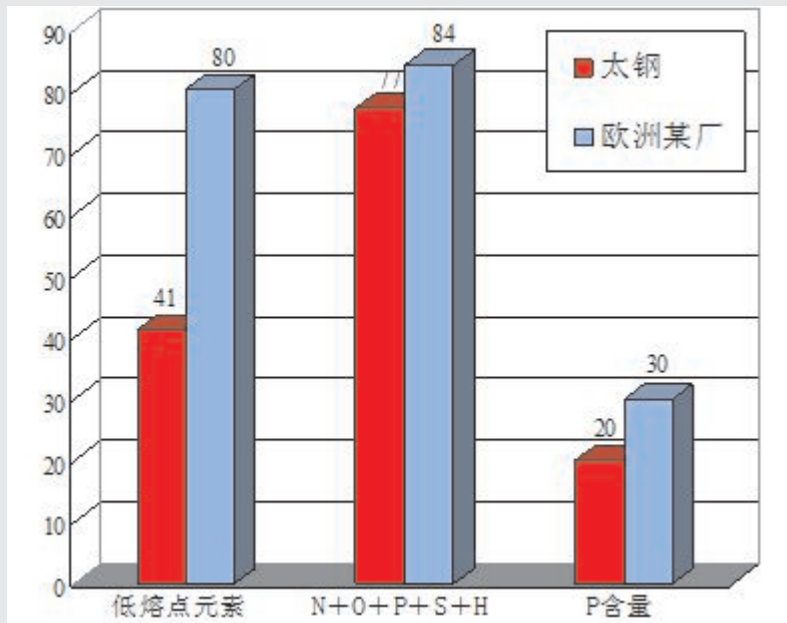
产品优势 >>>

Advantages of Product

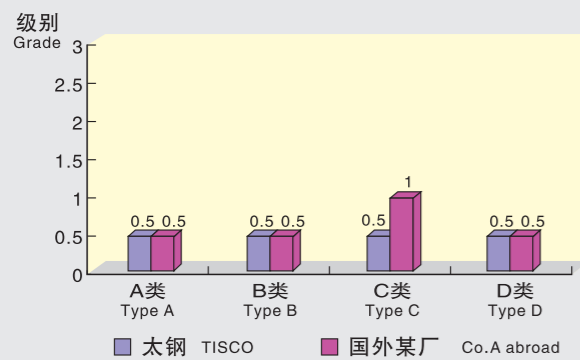
太钢06Ni9 (9%Ni) 钢主要化学成分、力学性能与国外产品相当，-196℃低温韧性优于国外产品。

Tisco 06Ni9 (9%Ni) main chemical composition, mechanical performance is equal to the products in the world, with -196℃ low temperature ductility higher than that in the world.

◆ 钢质纯净度 Steel Purity



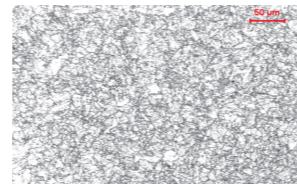
低熔点杂质元素含量对比
Low Smelting Point Element Comparison



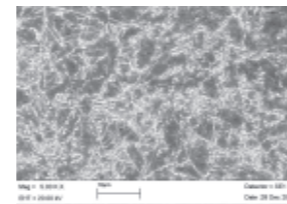
夹杂物 (细系) 含量对比
Inclusion Content Comparison

◆ 显微组织 Microscopic Organization

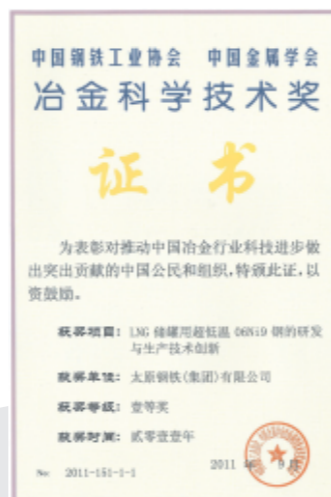
钢板显微组织均匀，晶粒细小，回火充分。
Uniform, fine crystal grain and full tempering



200X



5000X

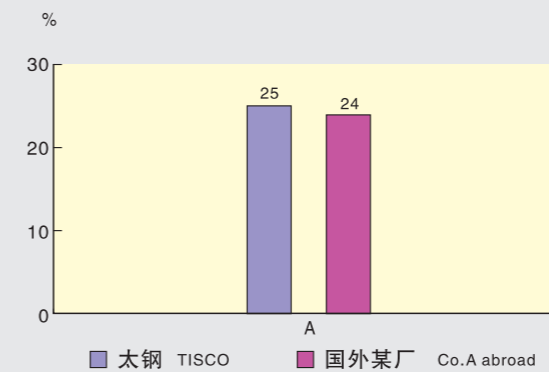


9 Ni 钢冶金科技进步一等奖

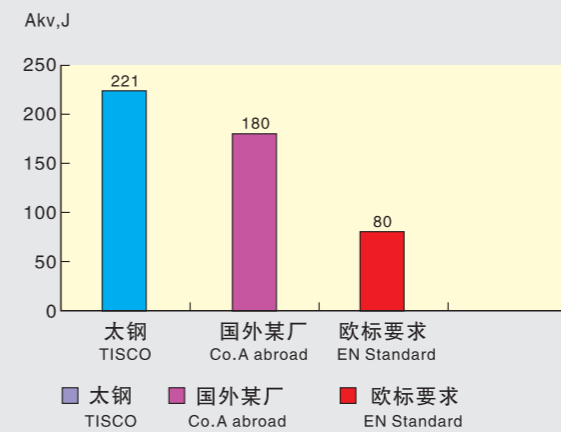
产品优势 >>>

Advantages of Product

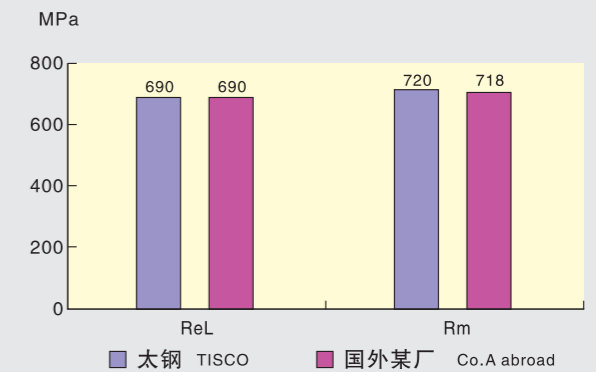
◆ 力学性能 Mechanical Performance



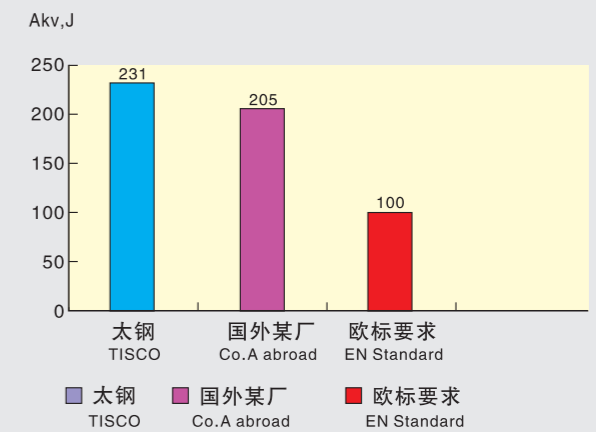
延伸率对比
Elongation Comparison



-196℃低温冲击功对比 (横向试样)
-196℃ low temperature impact ductility comparison (transverse sample)



强度对比
Strength Comparison



-196℃低温冲击功对比 (纵向试样)
-196℃ low temperature impact ductility comparison (longitudinal sample)

产品优势 >>>

Advantages of Product

太钢生产的06Ni9 (9%Ni) 钢碳含量低，钢质纯净，具有良好的焊接性。

06Ni9 (9%Ni) steel produced in TISCO has low carbon content with high steel purity and well weldability.

◆ 典型焊接接头拉伸性能和冷弯性能

Tensile and bending performance for typical welding joint

厚度mm Thickness	Rm MPa	断裂位置 Position of crack	180°侧弯 180° Side bend
20	715, 700	焊缝 Weld seam	合格 Well

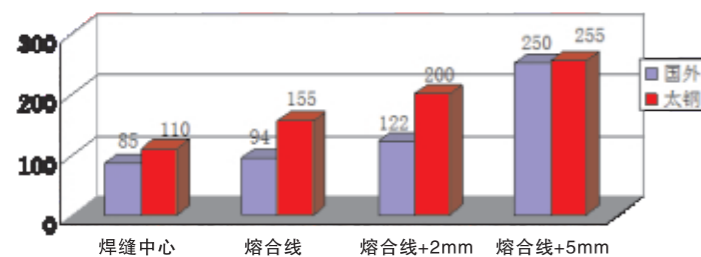
注：弯轴直径40 mm

Note: the diameter of the bending pin 40mm

◆ 典型焊接接头冲击性能

Impact ductility for typical welding joint

20°C Akv J		-196°C Akv J	
焊缝 Weld seam	热影响区 HAZ	焊缝 Weld seam	热影响区 HAZ
99, 109, 111 平均106 99, 109, 111 aver 106	178, 169, 183 平均177 178, 169, 183 aver 177	100, 98, 94 平均97 100, 98, 94 aver 97	146, 150, 157 平均151 146, 150, 157 aver 151



焊接接头
Welding Joint



焊接接头弯曲试样
Welding Joint bending sample

产品标准摘要 >>>

Abstract of Product Standard

太钢企业标准《低温容器用06Ni9 (9%Ni) 合金钢板技术条件》，标准编号为Q/太新001-2007，是根据欧盟EN10028-4: 2003相关技术要求而制定，适用于制造焊接低温储罐和压力容器用要求低温性能的镍系合金钢板。

TISCO standard 《06Ni9 (9%Ni) alloy steel plate technical condition for low temperature pressure vessels》, standard No. is Q/Taixin 001-2007, is formulated according to ASTM A 553/A553M and EN10028-4:2003 corresponding technical requirements, suitable for production of low temperature nickel alloy steel plates for low temperature storage tanks and pressure vessels.

◆ 化学成分

Chemical Composition

Wt: %

标准 Standard	C	Si	Mn	P	S	Mo	V	Ni
EN10028-4	≤0.10	≤0.35	0.30~0.80	≤0.015	≤0.005	≤0.10	≤0.01	8.50~10.00
Q/太新001-2007 Q/Tai Xin001-2007	≤0.10	≤0.35	0.30~0.80	≤0.008	≤0.005	≤0.10	≤0.01	8.50~10.00

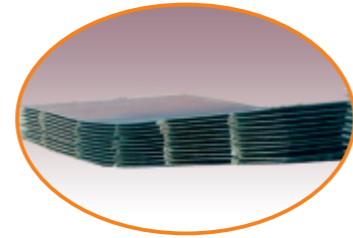
◆ 机械性能

Mechanical Performance

标准 Standard	热处理方式 Heat treatment	屈服强度R _{eL} Yield strength (MPa)	抗拉强度R _m Tensile strength (MPa)	伸长率A Elongation (%)	冲击功Ak _v (-196°C) Impact ductility Ak _v (-196°C) (J)
EN10028-4	淬火+回火 Quenching +tempering	≥585	680~820	18	80 (横向) 80 (transverse)
Q/太新001-2007 Q/Tai Xin001-2007		≥585	680~820	18	80 (横向) 80 (transverse)

主要应用 >>>

Applications



成型后钢板
Finished Plates

- ◆ 采用铁水冶炼，钢质纯净，气体含量低，达到了超纯净钢的水平。
- ◆ 钢板组织均匀，性能优良，特别是具有良好的低温冲击韧性。
- ◆ 钢板具有低的剩磁强度，远远低于标准规定的50Gauss，可有效防止磁偏吹。
- ◆ 钢板超声波探伤执行JB/T4730—2005——《承压设备无损检测》中1级标准。
- ◆ 宽厚板大压力轧机配备先进的AGC自动控制系统，产品尺寸精度高，板形优良，配套设备能够完全去除钢板表面氧化铁磷，保证钢板表面质量。
- ◆ 钢板广泛应用于LNG储罐等低温设备。

- ◆ The hot-iron is applied to steel making processing that has acquired pure steel and low gas solution, and all these has made the plate quality reached to super pure level of steel.
- ◆ The plate is featured by uniform structure and high quality, especially good impact ductility under low temperature.
- ◆ The plate also has low residual magnetization, much lower than 50Gauss stipulated in the standard, which could prevent magnetic blowing effectively.
- ◆ The ultrasonic test is carried out on plates in accordance with Class 1 in JB/T4730—2005 《The pressure vessel non-destructive testing》.
- ◆ The high pressure broad plate mill is equipped with advanced AGC automatic control system. The dimensions of plates are accurate and the quality of flatness is high. The auxiliary equipment could eliminate the scale on the surface of the plate completely to ensure the surface with high quality.
- ◆ The plate is suitable for manufacturing of low temperature vessels such as large LNG tank.

主要业绩

Main outstanding achievement

序号 Sequence number	项目名称 Item	储槽容积(M³) Volume(M³)	建成时间 Time
1	中石油江苏LNG项目 CNPC Jiangsu LNG Project	160000X2	2011.05
2	中石油大连LNG项目 CNPC Dalian LNG Project	160000X2	2011.11
3	东莞九丰LNG项目 Dongguan Jiufeng LNG Project	80000X2	2012
4	延长集团延长LNG项目 Yanchang Petrolenm Yanchang LNG Project	10000X1	2012



大型LNG储罐
Large LNG tanks

包装 >>>

Packaging

包装采用防水材料，加装支架防止钢板变形，具备加工坡口和钢板成型交货的条件。

Waterproofing material packaging, supporting frame to prevent plate from deformation, ready for groove making and delivery in finished product.



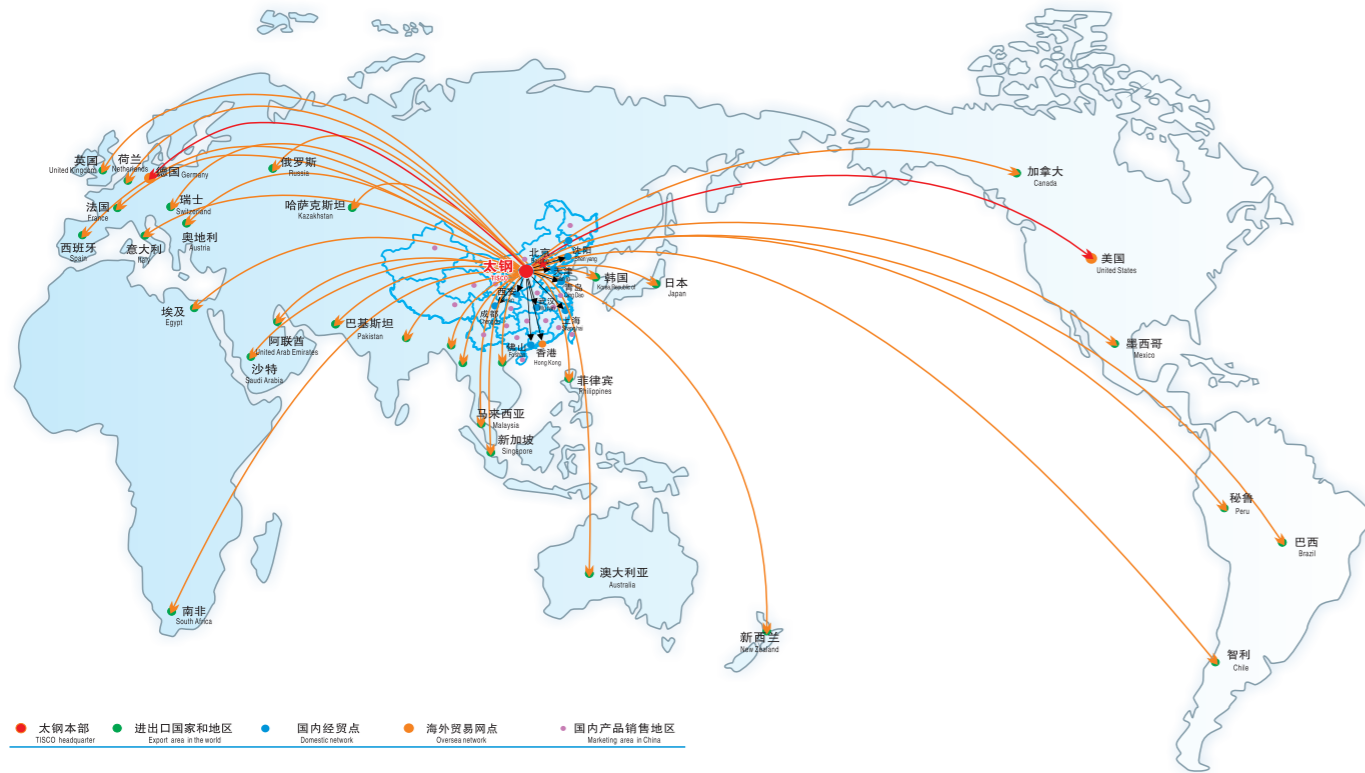
服务承诺 >>>

Service Commitment

- 交货期不超过60天，如果增加坡口、成型等后续加工，则交货期不超过90天。
- 为用户在选材、焊接、加工等方面提供技术支持。
- 对用户投诉，在24小时内答复，一周内结案。
- Lead time is within 60 days,if successive processing is necessary such as groove cutting,lead time is within 90 days.
- Providing technical support to customers in selecting materials,weling technology,processing etc.
- Consumer's complains will be answered within 24 hours and settled within a week.

太钢产品及贸易全球分布图

TISCO products distribution and marketing network in the world



太钢加工配送营销网络布局图

Marketing network of TISCO service centers



- 太钢本部加工配送中心 TISCO home-based service center
- 已建成的加工配送中心 Service center in operation
- 在建中的加工配送中心 Service center under construction
- 规划建立的加工配送中心 Service center under planning

主要业务部门联系方式 >>>

Contacting Manners of the Main Business Sections

股份公司主要业务部门 Main business department of Co.,Ltd	业务功能 Functions	联系电话 Telephone	E-mail
营销部 Marketing Department	合同管理、订货、异议、 投诉受理及出口贸易 Contract and order management Complaint and claim handing Exports business	0351-3017285 400-653-1998 800-806-1998 +86 (0)351-3017169 +86 (0)351-3017525 +86 (0)351-3013905	Xsczjbk@tisco.com.cn Tgyhfwk@tisco.com.cn Tghwb@tisco.com.cn
技术中心 Technoigy center	技术咨询服 Technical consultation service	0351-3013795	Tgjszxbc@tisco.com.cn

国际分公司联系方式 Contacting manners of international trading Co.,Ltd.

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国内分公司联系方式 Contacting manners of deomestic trading Co.,Ltd

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太钢东北区销售公司 TISCO sales company in Northeast of China	沈阳 Shenyang	电话 (Tel) 024-24232050 沈阳 Shenyang 电话 (Tel) 024-24232051 哈尔滨 Harbin 电话 (Tel) 0451-87905777
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