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Heavy Plate

厚 板

Manual of Heavy Plate

厚板产品手册

BAOSTEEL

Build Baosteel into the most
competitive iron & steel enterprise in the world

建成全球最具竞争力的钢铁企业

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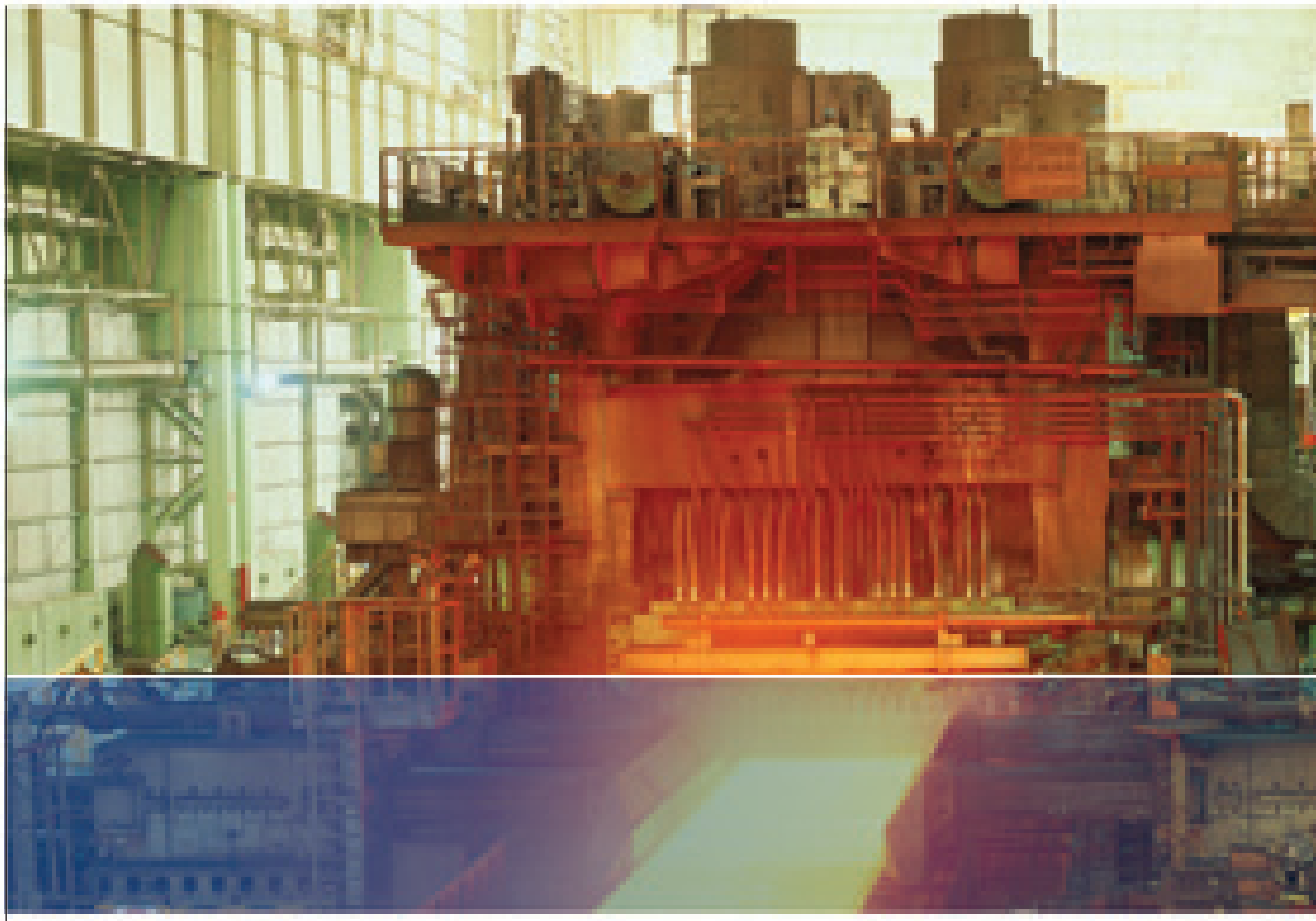


宝钢5m厚板轧机工程是宝钢股份公司“十五”规划建设的最大项目，厚板轧机产品定位是高强度船板、大口径油气输送管线用钢板、高强度建筑结构板、锅炉和压力容器用钢板等高难度厚板产品。

5m轧机工程分两期建设，一期建设一架精轧机，于05年3月建成，年生产规模为140万吨；二期增建一架粗轧机，08年建成，年生产规模为180万吨。

5m厚板厂现有三条连续式热处理线。设备由德国LOI公司设计制造。1#、2#热处理炉采用辐射管加热的无氧化炉，3#热处理炉为明火加热专用回火炉。三条热处理线均采用数学模型控制温度，实行全自动化生产，温度控制精度高，钢板温度均匀。1#热处理炉后带有辊压式淬火机，淬火工艺采用数学模型控制。热处理线可组织生产调质、正火、正火加回火、回火工艺的钢板，年生产能力37万吨。

5m厚板厂广泛采用当今厚板领域最新技术及装备：包括高精度轧制技术、TMCP技术、强力矫直自动化控制技术、自动化剪切技术、在线自动化探伤技术、无氧化热处理技术、自动标记等，以满足用户对高等级厚钢板的高尺寸精度、高性能的要求。

宝钢 5 米厚板产线简介
Introduction of 5-meter Heavy Plate Mill

The 5-meter heavy plate mill is the largest project in 'tenth five-year plan' of Baosteel. The steel grades, which the heavy plate rolling mill can produce, aim at shipbuilding steel plates, oil and gas transportation pipeline steel plates, high strength construction structural steel plates and steel plates for boilers and pressure vessels.

The heavy plate mill project is built in two phases. At the first phase, a set of finish rolling mill has been built with the annual capacity of 1.4 million tons. At the second phase, a set of rough rolling mill will be built and completed at the end of 2008, and the annual capacity will be expanded to 1.8 million tons.

At present the 5-meter heavy plate mill is equipped with three continuous heat treatment furnaces designed and manufactured by German LOI Company. 1 # and 2 # heat treatment furnaces are non-oxidation furnace with radiation tubes. And 3 # heat treatment furnace is tempering furnace. These three heat treatment furnaces use mathematical models to control temperature, bearing the advantages of fully automatic manufacture, high precision of temperature control and even temperature of steel plates.

The product line of heat treatment can manufacture steel plates with quenching and tempering, normalizing, normalizing and tempering, tempering. Its annual production capability can reach 370 thousand tons.

The 5-meter heavy plate mill is extensively adopted the state-of-the-art heavy plate technologies and facilities in the world, including high precision of rolling technique, TMCP technology, automatic control technique for strong leveling process, automatic cutting technique, automatic online ultrasonic detective technique, non-oxidation heat treatment technique and automatic marking, etc. In this way, the requirements of high dimensional accuracy and mechanical property for high grade heavy steel plates from customers can be satisfied.

4.2m 厚板轧机工程位于宝山罗泾地区，于 08 年 3 月份投产。主轧线配置了 4.2 米双机架轧机，轧制力 9000 吨，主体设备从西马克公司引进，控制系统由西门子公司提供，设计能力为年产 160 万吨钢板。产品以特殊专用板为主，兼顾船板、高强度结构板、高强度容器板。

炼铁设备采用世界首座 COREX C3000，及当今最先进的炼铁新工艺，炼钢主要设备有 1 套 150 吨双工位 KR 铁水脱硫装置；2 座 150 吨顶底复吹转炉；150 吨 RH 和 150 吨 LF 精炼设备各一套。

4.2m 厚板产线：采用多功能 AGC 液压厚度控制技术、CVC 板形控制技术、PSG 板形检测技术、低速大压下等多项先进的工艺技术，可极大地改善钢板厚度公差、板形和钢板的性能。ACC 装置：用于实现 TMCP 工艺，可显著改善钢板性能，直接淬火(DQ)装置：用于高效、低成本生产调质钢。一期配置了步进式常化炉和辊底式常化炉 + 压力淬火机各一台，可进行正火、淬火和回火处理，可用于调质钢和多种特殊用钢的生产。

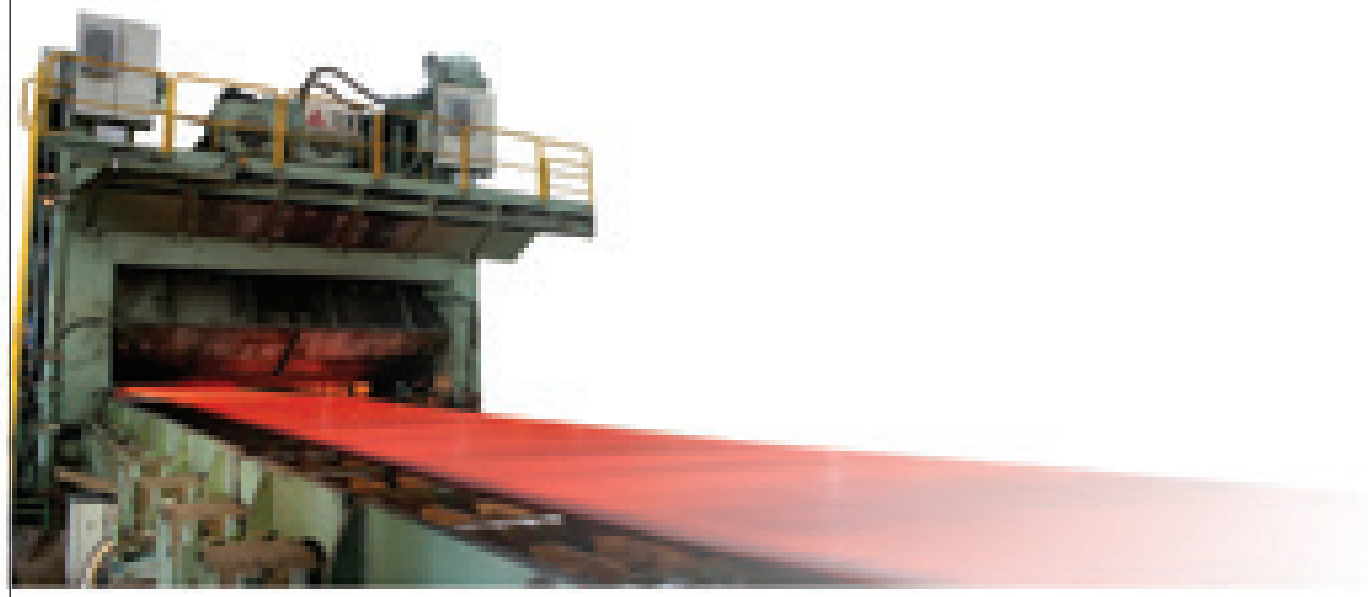
宝钢 4.2 米厚板产线简介
Introduction of 4.2-meter Heavy Plate Mill

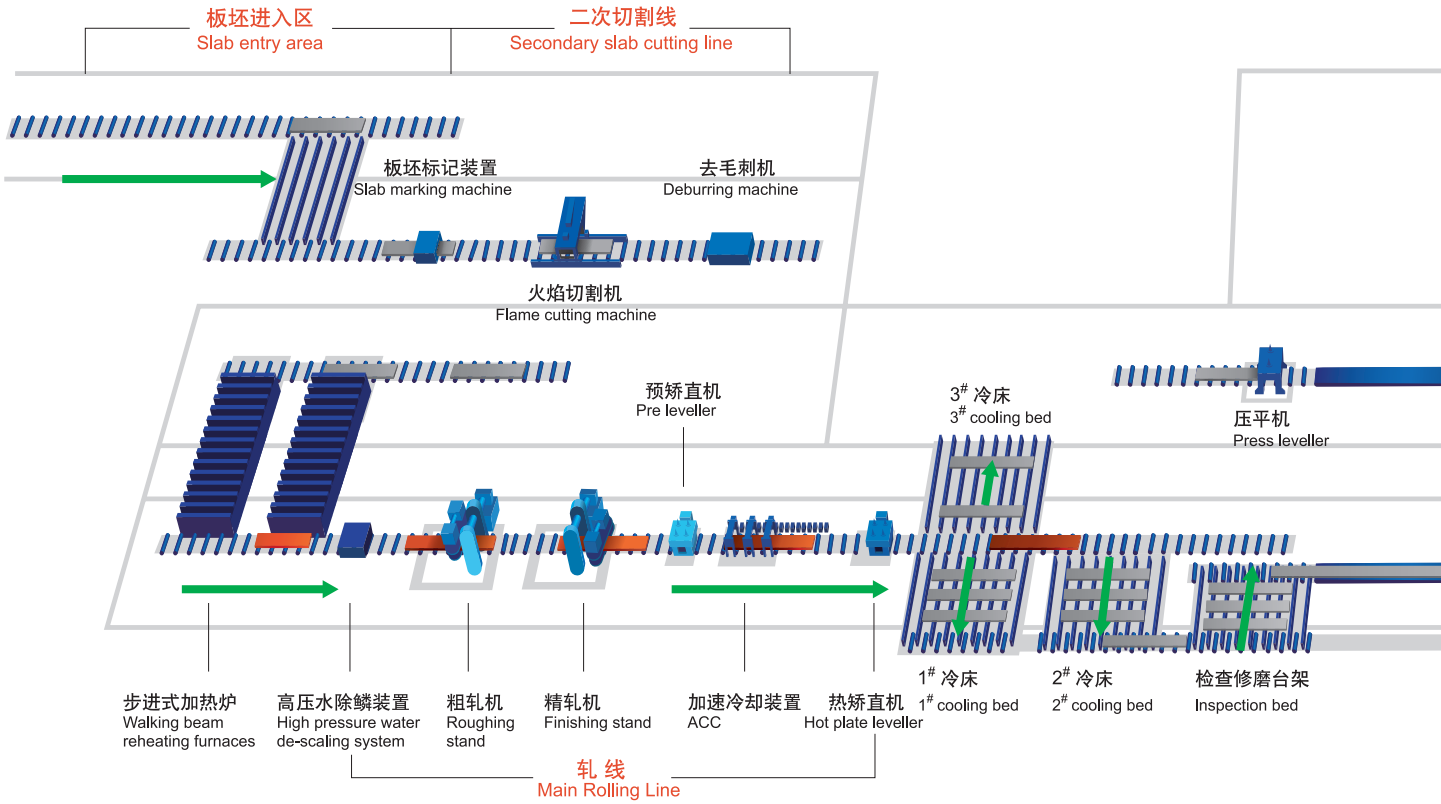
The 4.2-meter heavy plate rolling project is located in Luojing area, Baoshan distract, Shanghai, and was put into operation in March, 2008. Main rolling line is equipped with two-stand mill, Max. rolling force of 9000 tons, The main equipments are imported from SMSD, and the controlling system is supplied by Siemens. Annual design capacity is 1.6 million tons. The heavy plate mill mainly produces plates for special use, as well as shipbuilding plates, high strength structural plates and high strength vessel plates.

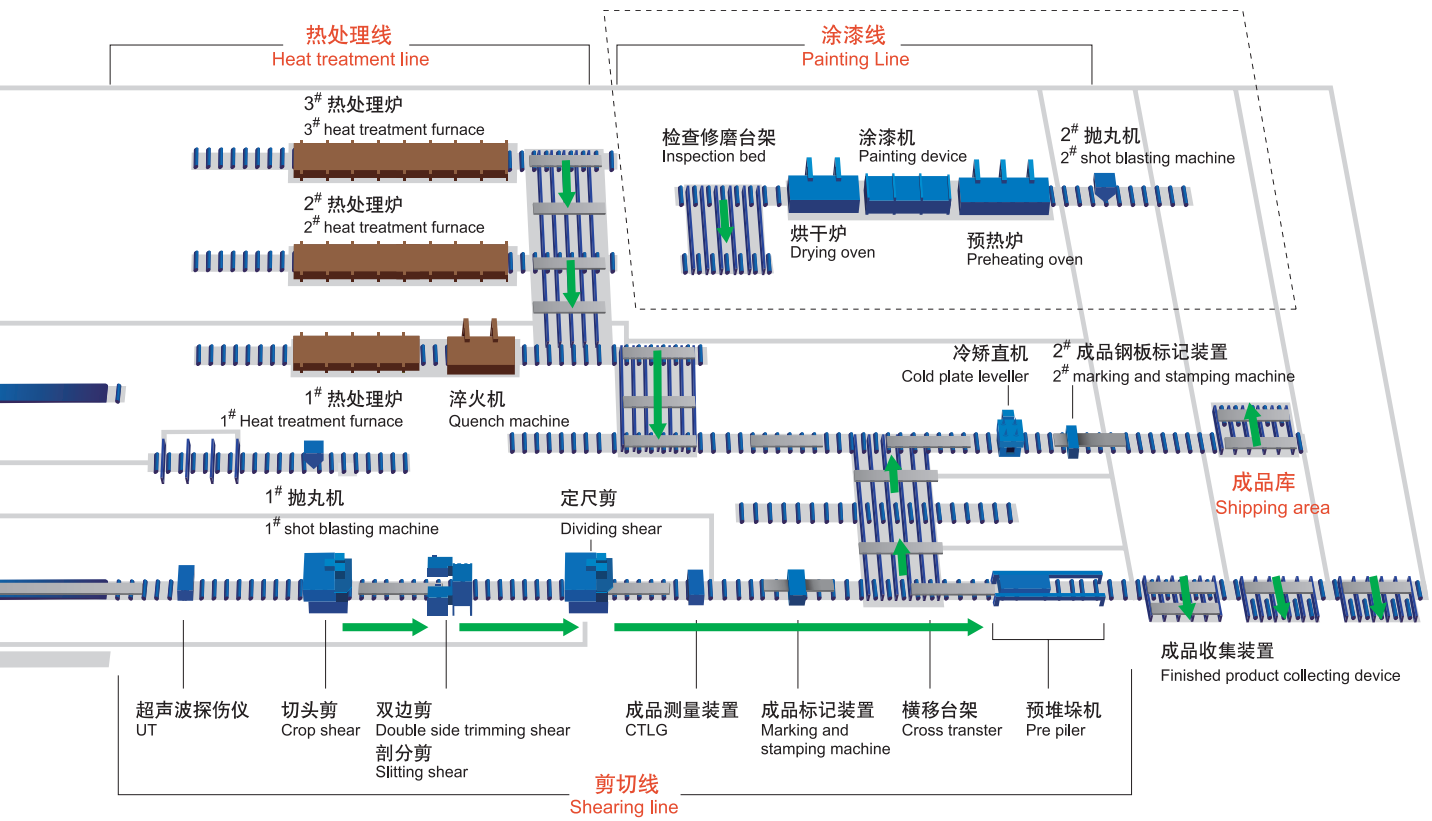
The equipments for iron making are adopted by COREX C3000 which is not only the first built in the world, but also the state-of-the-art iron-making technology in the world. Main equipments are involved with one set of 150 tons dual-station KR hot-metal de-sulfur equipment, two 150 tons top bottom blowing converters, one set of 150 tons RH and LF refining facility respectively.

The 4.2-meter heavy plate production line uses many advanced technologies, such as multi functional AGC hydraulic controlling technique for thickness, CVC plate profile control technique, PSG plate profile detecting technique and heavy reduction with low rolling speed, which can dramatically improve thickness tolerance, plate profile and the property of steel plates. ACC equipments can be used to realize TMCP process and improve the properties of steel plates. DQ equipments can be applied to produce QT plates with high efficiency and low cost. The first phase is equipped with walking beam normalizing furnace, roller hearth normalizing furnace and pressure quenching machine respectively, which can normalize, quench and temper, the process line can produce tempered plates and many special plates.

制造工艺流程
Process Flow (5m Plate Mill)






热处理线
Heat treatment line
涂漆线
Painting Line
3# 热处理炉
3# heat treatment furnace
2# 热处理炉
2# heat treatment furnace
1# 热处理炉
1# Heat treatment furnace
淬火机
Quench machine
检查修磨台架
Inspection bed
涂漆机
Painting device
2# 抛丸机
2# shot blasting machine
烘干炉
Drying oven
预热炉
Preheating oven
冷矫直机
Cold plate leveller
2# 成品钢板标记装置
2# marking and stamping machine
成品库
Shipping area
1# 抛丸机
1# shot blasting machine
定尺剪
Dividing shear
成品收集装置
Finished product collecting device
超声波探伤仪
UT
切头剪
Crop shear
双边剪
Double side trimming shear
剖分剪
Slitting shear
成品测量装置
CTLG
成品标记装置
Marking and stamping machine
横移台架
Cross transter
预堆垛机
Pre piler
剪切线
Shearing line

1、 **钢质纯净：**
[S] ≤ 10ppm、[P] ≤ 50ppm、[O] ≤ 20ppm、[H] ≤ 1.5ppm，钢质纯净保证钢板具有较强的抗氢脆能力（适合于低温钢），高的抗层状撕裂性能（Z向钢），良好的抗 H_2S 腐蚀能力；

2、 **板坯冶金质量优良：**
很小的中心偏析、极低的各类夹杂物、无疏松和内裂；

3、 **高强度厚板：**
最大轧制力达 10000 吨，可生产 1300Mpa 强度级别的高强度钢板，可满足煤矿机械、挖掘机等行业需要；

4、 **极宽的厚板和特厚板：**
产品最大宽度达4800mm，最大厚度为400mm，最大长度为 25m；

5、 **多种交货状态：**
普通轧制态AR、控轧控冷态TMCP、正火态N、调质态 QT（即淬火 + 回火）；

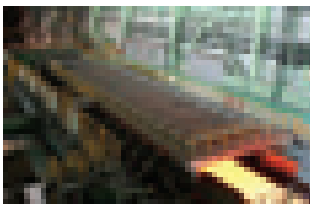
6、 **组板技术及精确定尺：**
计算机自动组板、控制切割，钢板厚度可按0.1mm进级（船板厚度H > 20mm时亦可），长度、宽度可按 1mm 进级，大大提高用户的材料利用率；

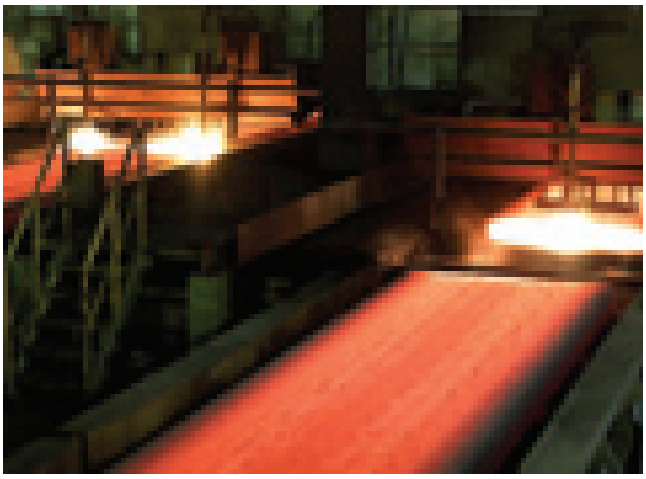
7、 **厚板延伸配送服务：**
拟建的厚板配送中心，对船板等品种进行配送、集批等服务，可充分满足多品种、小订量等“JIT”（Just-in-Time）用户需求。

8、 **表面质量好，钢板板型好。**

9、 **钢种和牌号多，用途广，可满足用户千差万别的要求。**

产线特色
Process Features





1. High purity of steel: [S]⩽ 10ppm, [P]⩽ 50ppm, [O]⩽ 20ppm, [H]⩽ 1.5ppm. The high purity of the steel plates can ensure that the plates have the strong resistance capabilities to hydrogen embrittlement (for low-temperature steel), lamination crack (for Z-orientation steel), and H_2S corrosion, etc.
2. Excellent metallurgical properties of the slab: little center segregation, little inclusion, little porosity and internal crack;
3. High strength heavy plates: owing to 10000 tons of rolling force, the plates with strength level of 1300MPa can be produced, therefor can be satisfied the demands of coal mine machinery and excavating machine industry;
4. Wider and extra heavy plates: the maximum sizes of plates can reach 400mm thick, 4800mm wide and 25000mm long;
5. Many delivery conditions can be available: as-rolled, TMCP, normalized, quenched & tempered, tempered as well as TMCP & tempered;
6. Plate combining technique and precise cut-to-length: the plate combining and cutting is controlled automatically by computers, the thickness of steel plates can be with by step of 0.1mm stepwith (it is available for the shipbuilding plates thicker than 20mm), the length and width can be with by step of 1mm stepwith, the utilization of efficency of plates can be greatly improved.
7. Extended distributing service for heavy plates: In order to satisfy the customers´ demands on the multi-grades and small orders of JIT (Just-in-time), the Heavy Plates Distributing Centre is now being planned to supply the distributing service for shipbuilding plates and other plates for different applications .
8. Excellent surface quality and shape of steel plates.
9. Various grades and specifications of plates with a wide range of usage can meet the different customer's requirements, and most plates are supplied according to technical agreement.

宝钢拥有化学、力学、物理性能检测实验室，有热轧试验机、拉伸试验机、冲击试验机、光学显微镜、透射电镜、热模拟试验机等大型检测设备近百台，为宝钢厚板新产品的开发提供了有力的支持。

Baosteel possesses chemical, mechanical and physics testing laboratory which are equipped with nearly one hundred sets of large scale testing devices such as hot rolling testing machines, tensile testing machines, impact testing machines, optical microscopes, and hot stimulating testing machines, etc. They supply the strong support for the available product testing and new heavy plate product developed by Baosteel.

数控双头铣
Double Head Milling Machine

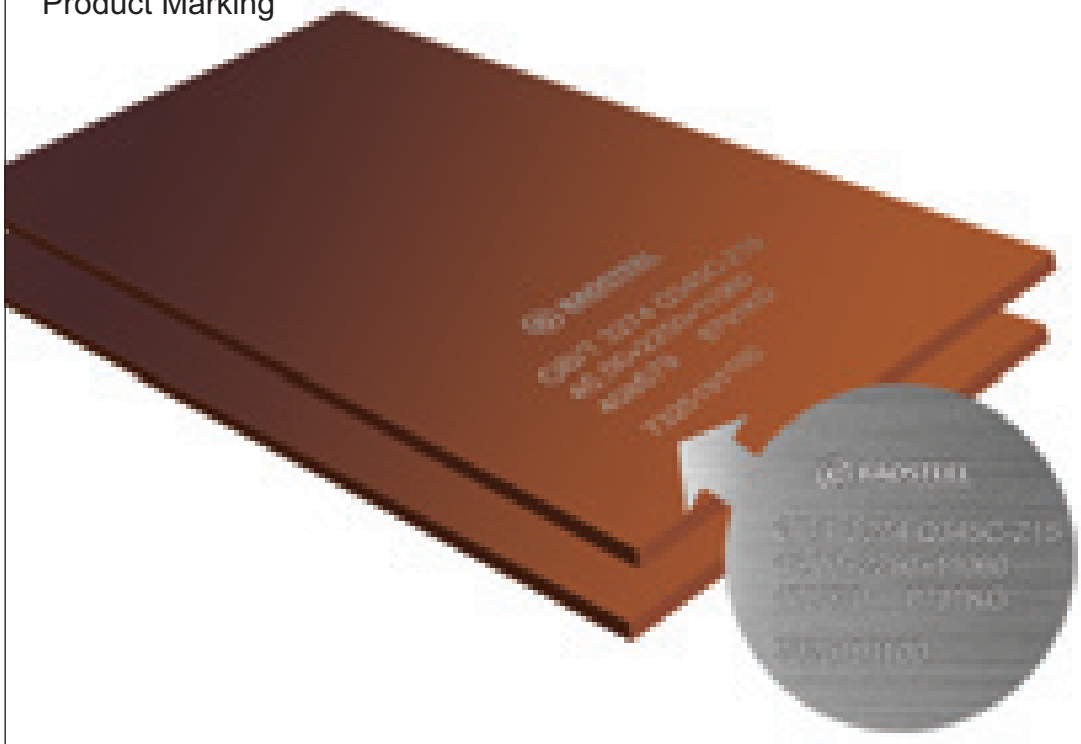
检测设备
Testing Devices and Equipments

冲击试样加工中心
Processing Center for Impact Test Specimen

全自动拉伸试验机
Automatically Tensile Testing Machine

全自动冲击机
Automatically Impact Testing Machine

产品标识
Product Marking



1 产品标识 / Product marking

钢板表面可以根据用户和标准要求进行喷印、刻印，钢板侧面可以进行侧喷，以便于用户识别。

Paint printing and punch marking can be done on the surface of steel plate according to the requirements of customers and standards. Edge marking can also be offered for customers' convenience.

2 喷印 / Paint printing

可选择喷印宝钢标记、公司名称、第三方检验机关标记、协会机关标记、牌号、炉号、板号、制造年月、UT 标准、用户管理号、钢板尺寸、重量、产品认证号、 最终用户代码、交货期等。

Available paint printing: Baosteel logo, company name, label of third-party inspectors, logo of associations, grade, number of the stove, plate number, date of production, UT standard, management number for customers, size, weight, certificate number of products, code of final users and delivery terms, etc.

3 刻印 / Hard punch marking

可选择刻印宝钢标记、第三方检验机关标记、协会机关标记、牌号、炉号、板号、UT 标准、用户管理号、钢板尺寸等。

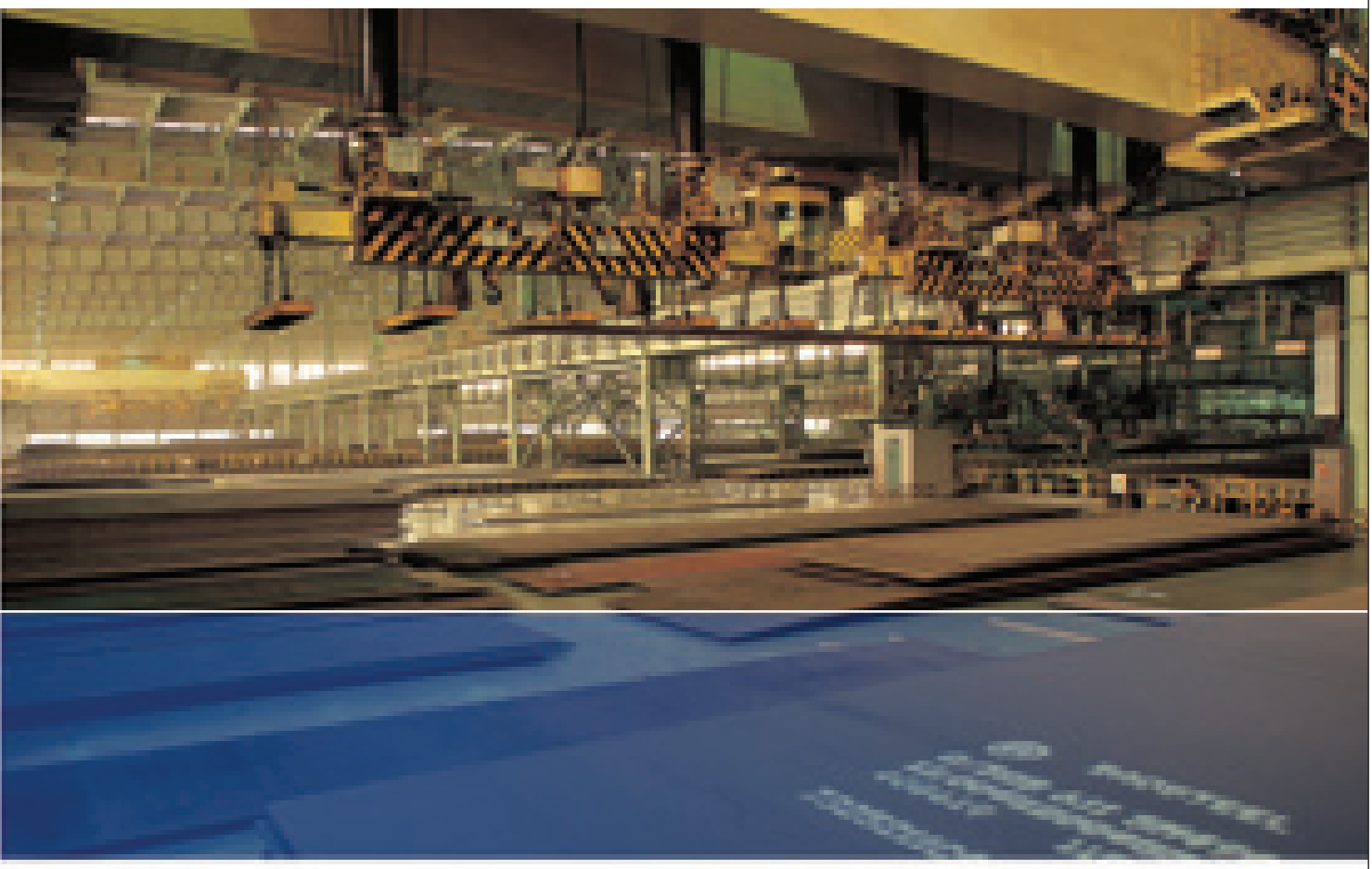
Available punch marking: Baosteel logo, label of third-party inspectors, logo of associations, grade, number of the stove, plate number, UT standard, management number for customers, size, etc.

4 侧标 / Edge marking

可喷印牌号、钢板号、合同号、用户管理号、一贯管理番号、尺寸等。

Available edge marking: grade, plate number, contract number, management number for customers, management number of going through and size, etc.

宝钢厚板产品注册商标
Trade Mark of Steel Plates



宝钢厚板产品注册商标

- 优质焊接结构钢：注册商标为“BWELDY”和“宝威迪”。
  如：BWELDY™700QL0
- 装甲用钢：注册商标为“BARMOY”和“宝甲迪，宝铠迪”。
  如：BARMOY™300
- 工具钢：注册商标为“BTOOLY”和“宝拓迪”。
  如：BTOOLY™ 33
- 耐磨钢：注册商标为“BHARDY”和“宝赫迪”。
  如：BHARDY™ 450

Trade mark for the grade of Baosteel steel plates

- High quality steels for welded structure: its registered trademark is “BWELDY” and “宝威迪”.
  Example: BWELDY™700QL0
- Steels for armored vehicle: its registered trademark is “BARMOY” and “宝甲迪”.
  Example: BARMOY™300
- Tool steels: its registered trademark is “BTOOLY” and “宝拓迪”.
  Example: BTOOLY™ 33
- Wear resistant steels: its registered trademark is “BHARDY” and “宝赫迪”.
  Example: BHARDY™ 450

产品规格
Available Sizes

产品 Product	厚度(mm) Thickness	宽度(mm) Width	长度(mm) Length	单重(t) Unit weight	最大厚度差(mm) Thickness difference
普通轧制产品 As rolled product	5～400	900～4,800	max.25,000	max.45	-
TMCP产品 TMCP product	5～100			max.24	
热处理产品（包括正火、调质及回火等热处理工艺生产的产品） Heat treatment product (including products treated by normalizing, quenching and tempering process)	5～400			max.45	
涂漆产品 Painting product	5～100			max.24	
楔形板（LP板）产品 Longitudinal profiled steel plate (LP plate)	10～300	max.4,800		max.24	45

注：产品即可以切边和定尺状态交货，也可根据用户要求，以毛边状态交货。

Remarks: The delivery condition of the products can either be edge-cutting and cut-to-length, or raw edge required by the customer.

普通轧制工艺(AR)极限规格表 / Range of sizes as rolling condition

厚度(mm) Thickness			宽度/width (mm)																																					
			⩽1300	⩽1400	⩽1600	⩽1800	⩽1900	⩽2000	⩽2100	⩽2200	⩽2300	⩽2400	⩽2500	⩽2600	⩽2700	⩽2800	⩽2900	⩽3000	⩽3100	⩽3200	⩽3300	⩽3400	⩽3500	⩽3600	⩽3700	⩽3800	⩽3900	⩽4000	⩽4100	⩽4200	⩽4300	⩽4400	⩽4500	⩽4600	⩽4700	⩽4800
5.0	⩽t⩽	6.0	25																																					
6.0	＜t⩽	7.0	25																																					
7.0	＜t⩽	8.0	25																																					
8.0	＜t⩽	9.0	25																																					
9.0	＜t⩽	10.0	25																																					
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16.0	＜t⩽	22.0	25																																					
22.0	＜t⩽	25.4	25																																			24	23	
25.4	＜t⩽	26.0	25																																			23		22
26.0	＜t⩽	28.0	25																											24	23	23	22	22	21	21				
28.0	＜t⩽	30.0	25																							24	24	23	22	22	21	21	20	20	19					
30.0	＜t⩽	32.0	25																				24	23	23	22	21	21	20	20	19	19	19	18						
32.0	＜t⩽	34.0	25																		24	23	22	22	21	21	20	20	19	19	18	18	18	17						
34.0	＜t⩽	36.0	25																	24	23	22	22	21	21	20	19	19	18	18	18	17	17	17	16					
36.0	＜t⩽	38.0	25															24	23	23	22	21	21	20	19	19	18	18	17	17	17	16	16	16	15					
38.0	＜t⩽	40.0	25														24	23	22	21	21	20	20	19	18	18	17	17	17	16	16	15	15	15	14					
40.0	＜t⩽	45.0	25									24	23	23	22	21	20	20	19	18	18	17	17	16	16	15	15	15	14	14	14	13	13	13					
45.0	＜t⩽	50.0	23	22	22	23	21	23	22	23	22	23	22	21	20	20	19	18	18	17	16	16	16	15	15	14	14	14	13	13	13	12	12	12	11				
50.0	＜t⩽	55.0	25	25	25	23	21	21	20	21	20	21	20	19	18	18	17	16	16	15	15	14	14	14	13	13	13	12	12	12	11	11	11	11	10				
55.0	＜t⩽	60.0	25	25	23	21	20	19	18	19	18	19	18	17	17	16	16	15	15	14	14	13	13	12	12	12	11	11	11	11	10	10	10	10	9				
60.0	＜t⩽	65.0	25	25	22	19	18	17	17	17	17	18	17	16	15	15	14	14	13	13	13	12	12	11	11	11	10	10	10	10	10	9	9	9	9				
65.0	＜t⩽	70.0	23	23	20	18	17	16	15	16	15	16	16	15	14	14	13	13	12	12	12	11	11	11	10	10	10	10	9	9	9	8	8	8	8				
70.0	＜t⩽	75.0	21	21	19	16	16	15	14	15	14	15	14	14	13	13	12	12	12	11	11	10	10	10	10	9	9	9	9	8	8	8	8	8	7				
75.0	＜t⩽	80.0	20	20	17	15	15	15	14	15	14	15	14	14	13	13	12	12	12	11	11	10	10	10	10	9	9	9	9	8	8	8	8	8	7				
80.0	＜t⩽	85.0	19	19	16	14	14	13	13	13	13	13	13	12	12	11	11	10	10	10	9	9	9	9	8	8	8	8	8	7	7	7	7	7	7				
85.0	＜t⩽	90.0	18	18	15	14	13	12	12	12	12	12	12	11	11	11	10	10	10	9	9	9	8	8	8	8	7	7	7	7	7	7	6	6	6				
90.0	＜t⩽	95.0	17	17	15	13	12	12	11	12	11	12	11	11	10	10	10	9	9	9	8	8	8	8	7	7	7	7	7	7	6	6	6	6	6				
95.0	＜t⩽	100.0	16	16	14	12	12	11	11	11	11	11	11	10	10	10	9	9	9	8	8	8	8	7	7	7	7	7	6	6	6	6	6	6	5				
100.0	＜t⩽	105.0	15	15	13	12	11	10	10	9	9	9	8	8	8	7	7	7	7	6	6	6	6	6	5	5	5	5	5	5	5	4	4	4	4				
105.0	＜t⩽	110.0	14	14	13	11	10	10	9	9	9	8	8	8	7	7	7	6	6	6	6	6	5	5	5	5	5	5	5	4	4	4	4	4	4				
110.0	＜t⩽	115.0	14	14	12	11	10	9	9	9	8	8	7	7	7	7	6	6	6	6	6	5	5	5	5	5	5	4	4	4	4	4	4	4	4				
115.0	＜t⩽	120.0	13	13	11	10	10	9	9	8	8	7	7	7	7	6	6	6	6	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4					
120.0	＜t⩽	125.0	13	13	11	10	9	9	8	8	7	7	7	7	6	6	6	6	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4						
125.0	＜t⩽	130.0	12	12	11	9	9	8	8	8	7	7	7	6	6	6	6	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4							
130.0	＜t⩽	135.0	12	12	10	9	8	8	8	7	7	7	6	6	6	6	5	5	5	5	5	4	4	4	4	4	4	4	4	4									
135.0	＜t⩽	140.0	11	11	10	9	8	8	7	7	7	6	6	6	6	5	5	5	5	5	4	4	4	4	4	4	4	4											
140.0	＜t⩽	145.0	11	11	9	8	8	7	7	7	6	6	6	6	5	5	5	5	5	4	4	4	4	4	4	4	4												
145.0	＜t⩽	150.0	10	10	9	8	8	7	7	6	6	6	6	5	5	5	5	5	4	4	4	4	4	4	4	4													

控制轧制工艺(CR)极限规格表 / Range of sizes as control rolling condition

厚度(mm) Thickness			宽度/width (mm)																																					
			⩽1300	⩽1400	⩽1600	⩽1800	⩽1900	⩽2000	⩽2100	⩽2200	⩽2300	⩽2400	⩽2500	⩽2600	⩽2700	⩽2800	⩽2900	⩽3000	⩽3100	⩽3200	⩽3300	⩽3400	⩽3500	⩽3600	⩽3700	⩽3800	⩽3900	⩽4000	⩽4100	⩽4200	⩽4300	⩽4400	⩽4500	⩽4600	⩽4700	⩽4800
7.0	⩽t⩽	8.0	25																																					
8.0	＜t⩽	9.0	25																																					
9.0	＜t⩽	10.0	25																																					
10.0	＜t⩽	12.0	25																																					
12.0	＜t⩽	14.0	25																																					
14.0	＜t⩽	18.0	25																																					
18.0	＜t⩽	25.4	25																																					
25.4	＜t⩽	26	25																												23									
26.0	＜t⩽	28.0	25																										24	23	23	22	22							
28.0	＜t⩽	30.0	25																						24	24	23	22	22	21	21	20								
30.0	＜t⩽	32.0	25																				24	23	23	22	21	21	20	20	19	19								
32.0	＜t⩽	34.0	25																		24	23	22	22	21	21	20	20	19	19	18	18								
34.0	＜t⩽	36.0	25																	24	23	22	22	21	21	20	19	19	18	18	18	17	17							
36.0	＜t⩽	38.0	25															24	23	23	22	21	21	20	19	19	18	18	17	17	17	16	16							
38.0	＜t⩽	40.0	25														24	23	22	21	21	20	20	19	18	18	17	17	17	16	16	15	15							
40.0	＜t⩽	45.0	25									24	23	23	22	21	20	20	19	18	18	17	17	16	16	15	15	15	14	14	14	13							
45.0	＜t⩽	50.0	23	22	22	23	21	23	22	23	22	23	22	21	20	20	19	18	18	17	16	16	16	15	15	14	14	14	13	13	13	12	12							
50.0	＜t⩽	55.0	21	20	20	21	19	21	20	21	20	21	20	19	18	18	17	16	16	15	15	14	14	14	13	13	13	12	12	12	11	11	11							
55.0	＜t⩽	60.0	19	18	19	19	18	19	18	19	18	19	18	17	17	16	16	15	15	14	14	13	13	12	12	12	11	11	11	11	10	10	10							
60.0	＜t⩽	65.0	17	17	17	17	16	17	17	17	17	18	17	16	15	15	14	14	13	13	13	12	12	11	11	11	10	10	10	10	10	9	9							
65.0	＜t⩽	70.0	16	16	16	16	15	16	15	16	15	16	16	15	14	14	13	13	12	12	12	11	11	11	10	10	10	10	9	9	9	8	8							
70.0	＜t⩽	75.0	15	15	15	15	14	15	14	15	14	15	14	14	13	13	12	12	12	11	11	10	10	10	10	9	9	9	9	8	8	8	8							
75.0	＜t⩽	80.0	14	14	14	14	13	14	13	14	13	14	14	13	12	12	12	11	11	10	10	10	10	9	9	9	8	8	8	8	8	7	7							
80.0	＜t⩽	85.0	13	13	13	13	12	13	13	13	13	13	13	12	12	11	11	10	10	10	9	9	9	9	8	8	8	8	8	7	7	7	7							
85.0	＜t⩽	90.0	12	12	12	12	12	12	12	12	12	12	12	11	11	11	10	10	10	9	9	9	8	8	8	8	7	7	7	7	7	7	6							
90.0	＜t⩽	95.0	12	11	12	12	11	12	11	12	11	12	11	11	10	10	10	9	9	9	8	8	8	8	7	7	7	7	7	7	6	6	6							
95.0	＜t⩽	100.0	11	11	11	11	10	11	11	11	11	11	11	10	10	10	9	9	9	8	8	8	8	7	7	7	7	7	6	6	6	6	6							

控轧控冷工艺(TMCP)极限规格表 / Range of sizes as TMCP condition

厚度(mm) Thickness			宽度 / Width (mm)																																	
			≤1300	≤1400	≤1600	≤1800	≤1900	≤2000	≤2100	≤2200	≤2300	≤2400	≤2500	≤2600	≤2700	≤2800	≤2900	≤3000	≤3100	≤3200	≤3300	≤3400	≤3500	≤3600	≤3700	≤3800	≤3900	≤4000	≤4100	≤4200	≤4300	≤4400	≤4500	≤4600	≤4700	≤4800
12.0	<t≤	14.0	25																																	
14.0	<t≤	16.0	25																																	
16.0	<t≤	17.0	25																																	
17.0	<t≤	18.0	25																																	
18.0	<t≤	19.0	25																																	
19.0	<t≤	20.0	25																																	
20.0	<t≤	22.0	25																																	
22.0	<t≤	25.4	25																																	
25.4	<t≤	26.0	25																											23					
26.0	<t≤	28.0	25																									24	23	23					
28.0	<t≤	30.0	25																						24	24	23	22	22	21					
30.0	<t≤	32.0	25																				24	23	23	22	21	21	20	20					
32.0	<t≤	34.0	25																		24	23	22	22	21	21	20	20	19	19					
34.0	<t≤	36.0	25																24	23	22	22	21	21	20	19	19	18	18	18					
36.0	<t≤	38.0	25														24	23	23	22	21	21	20	19	19	18	18	17	17	17					
38.0	<t≤	40.0	25													24	23	22	21	21	20	20	19	18	18	17	17	17	16	16					
40.0	<t≤	45.0	25										24	23	23	22	21	20	20	19	18	18	17	17	16	16	15	15	15	14	14					
45.0	<t≤	50.0	23	22	22	23	21	23	22	23	22	23	22	21	20	20	19	18	18	17	16	16	16	15	15	14	14	14	13	13	13					

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一、船用钢板 / Hull structural steel plate

1、可供产品牌号、规格范围及交货状态
Available product grade, specification and delivery condition

船级社 Classification of society	强度级别 Strength grade	钢 级 Steel grade	厚度范围(mm) Thickness	交货状态 Delivery condition	厚度方向性能 Through thickness characteristics
ABS BV CCS DNV GL	普通强度船板 Ordinary-strength hull structural steel plates	NVA/NVB	≤50	NR	Z25/Z35
		NVD	≤35	NR	
		A/B	≤50	AR	
			≤80	N	
		D	≤35	AR	
			≤80	N	
		E	≤80	N	
KR LR NK RINA	高强度船板 Higher-strength hull structural steel plates	AH27S*/DH27S* AH32/DH32 AH36/DH36	≤20	AR	Z25/Z35
			≤40	CR	
			≤80	TM(TMCP)	
			≤80	N	
		EH27S*/EH32/EH36	≤80	TM(TMCP)	
			≤80	N	

注：1、AR— 普通轧制　　CR— 控轧　　N—正火　　TM(TMCP)—热机械轧制　　NR—正火轧制

2、以上牌号、规格已通过ABS、BV、CCS、DNV、GL、KR、LR、NK、RINA等九家船级社认可，用户如有要求，也可按GB712进行供货。

3、* AH27S和DH27S仅为DNV船级社和LR船级社规范中包含。

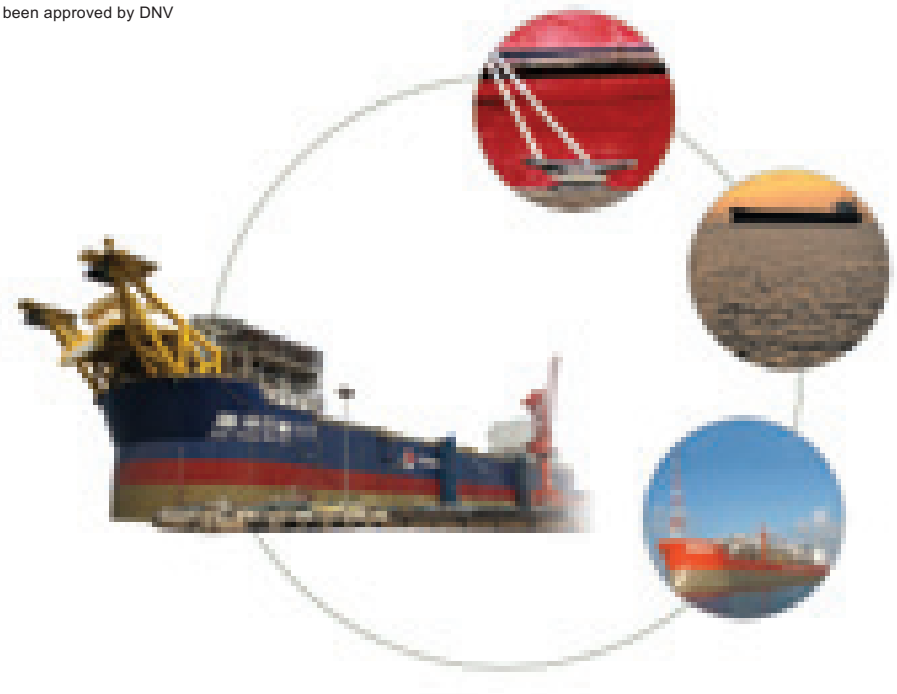
4、NVA, NVB, NVD为通过DNV船级的钢级

Remarks: 1. AR-as rolled, CR-control rolling, N-normalizing, TM(TMCP)-thermomechanical controlled process, NR-normalizing rolling,

2. the above steel grades and specification have been recognized by nine classification of societies, including ABS, BV, CCS, DNV, CL, KR, LR and RINA. GB712 is also available if customers require.

3. AH27S and DH27S are included exclusively in DNV and LR classification of society.

4. NVA, NVB, NVD has been approved by DNV



二、管线用钢板 / Steel plate for pipeline

1、可供产品标准、牌号、规格范围及交货状态
Available product standard, grade, specification and delivery condition

产品标准 Product standard	牌 号 Grade	厚度范围(mm) Thickness	交货状态 Delivery condition
API Spec5L/ISO3183	L245 or Gr.B	⩽40	CR
	L290 or X42	⩽40	CR
	L320 or X46	⩽40	CR
	L360 or X52	⩽40	CR/TMCP
	L390 or X56	⩽40	CR/TMCP
	L415 or X60	⩽40	CR/TMCP
	L450 or X65	⩽40	TMCP
	L485 or X70	⩽40	TMCP
	L555 or X80	⩽35	TMCP
	L625 or X90	⩽30	TMCP
	L690 or X100	⩽30	TMCP
	L830 or X120	⩽25	TMCP
GB9711	L245	⩽40	CR
	L290	⩽40	CR
	L360	⩽40	CR/TMCP
	L415	⩽40	CR/TMCP
	L450	⩽40	TMCP
	L485	⩽40	TMCP
	L555	⩽35	TMCP
DNV–OS–F101	245	⩽40	CR
	290	⩽40	CR
	360	⩽40	CR/TMCP
	415	⩽40	CR/TMCP
	450	⩽40	TMCP
	485	⩽40	TMCP
	555	⩽35	TMCP

2、典型的高等级管线钢板介绍

Introduction of typical high performance pipeline steel plates

高等级管线钢板是制造高压长距离输送天然气管道用直缝埋弧焊管的关键材料。X80管线钢是目前国际上工程应用钢级最高的管线钢，宝钢开发的X80管线钢板已批量应用于目前国际上规模最大、壁厚和口径最大的中国西气东输二线天然气管道工程。同时，宝钢还根据未来天然气管道发展的需求开发了X90、X100和X120等超高强度管线钢板。而X120是目前世界上强度等级最高的管线钢板。

High performance pipeline steel plate is a key material for manufacturing the LSAW line pipe of high-pressure long distance nature gas transportation. X80 pipeline steel is the highest strength grade for engineering application till now in the world. The X80 pipeline steel plate developed by Baosteel has been mass-applied in the Second West-East Nature Gas Pipeline Project in China, which is the largest diameter and the thickest of the line pipe of X80 in the world. Meantime, based on the requirement of development of nature gas pipeline in the coming future, X90, X100 and X120 grade ultra-high strength pipeline steel plates have been developed in Baosteel. The X120 grade is the highest strength grade pipeline steel in the world now.

产品化学成分要求（最大值）（wt %）

Requriment of product chemical compositions（maxium）(wt%)

钢 级 Steel grade	C[a]	Si	Mn[b]	P	S	V	Nb	Ti	Others	CE_{pcm}
X80	0.11[c]	0.45[c]	1.85[c]	0.025	0.015	d	d	d	e	0.25
X90	0.10	0.55	2.10	0.020	0.010	d	d	d	e,f	0.25
X100	0.10	0.55	2.10	0.020	0.010	d	d	d	e,f	0.25
X120	0.10	0.55	2.10	0.020	0.010	d	d	d	e,f	0.25

注：a) 根据 API 5L 规范规定当 C 含量≤ 0.12% 时,采用 CEpcm 公式限制。CEpcm=C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B

b) 在上述限制条件的最大值内,每减少0.01%C，可以提高0.05%Mn。但是对于 X80Mn 含量不可以超过 2.00%，X80 以上钢级 Mn 含量不可以超过 2.20%。

c) 除非用户同意。

d) 除非用户同意，但是 Nb+V+Ti ≤ 0.15%。

e) 除非用户同意，Ni ≤ 0.50%，Cr ≤ 0.50%，Mo ≤ 0.50%

f) B ≤ 0.004%

Remark: a) Base upon API Spec. 5L, the CEpcm limits apply if the carbon mass fraction is less than or equal to 0.12%. CEpcm=C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B

b) For each reduction of 0.01%below the specified maximum for carbon, an increase of 0.05% above the specified maximum for manganese is permissible.for X80,up to a maximum of 2.00%; and up to a maximum of 2.20%for grades>L555OR X80

c) Unless otherwise agree.

d) Unless otherwise agree, the sum of niobium ,vanadium and titanium concentrations shall be ≤ 0.15%

e) Unless otherwise agree, 0.50% maximum for nickel,0.50%maximum for chromium and 0.50%maximum for molybdenum.

f) 0.004%maximu for boron

产品力学性能要求(横向)

Requirement of product mechanical properties（Transverse）

钢 级 Steel grade	屈服强度[a] Yield stength[a] $R_{t0.5}$, MPa		抗拉强度 Tensile stength Rm, MPa		伸长率[b] Elongation[b] Af %	夏比冲击试验 Charpy impact Test (-20℃)				落锤撕裂试验[c] DWTT [c] (-20℃)	
						冲击值 Impact energy J		断口剪切面积 Fracture area FA%		断口剪切面积 Shear area SA%	
	最小值 Minimum	最大值 Maximum	最小值 Minimum	最大值 Maximum	最小值 Minimum	平均值 Average	最小值 Minimum	平均值 Average	最小值 Minimum	平均值 Average	最小值 Minimum
X80	555	705	625	825	b)	⩾200	150	⩾90	80	⩾85	75
X90	625	775	695	915	b)	⩾200	150	⩾90	80	⩾85	75
X100	690	840	760	990	b)	⩾200	150	⩾90	80	⩾85	75
X120	830	1050	915	1145	b)	⩾200	150	⩾90	80	⩾85	75

注：a) 根据 API 5L 的规定 X80 的屈服强度采用 Rt0.5 测量，X90 以上钢级采用 Rp0.2 测量屈服强度。这里的屈服强度是指制管后管体的屈服强度。

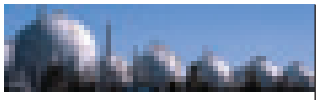
b) 为规定的最小延伸率，根据板厚不同，按照API 5L相应公式计算。$A_f=1940\times A^{0.2}/U^{0.9}$ (其中A是拉伸试样的延伸段横截面积，用mm^2单位，U 为规定的抗拉强度的最小值，用 MPa 单位)

C) 钢板厚度≤ 25.4mm 时适用。钢板厚度大于 25.4mm 时协商确定。

Remark: a) According to API Spec. 5L, X80 should be Rt0.5, X90 , X100 and X120 should be Rp0.2, the specified yield strength is the strength of the pipe that made by plate

b) The specified minimum elongation ,shall be as determined by API Spec. 5L. Af expressed in the percent and round the nearst percent, shall be as determined using the following equation: $A_f=1940\times A_{0.2}/U_{0.9}$ (A is the applicable tensile test piece cross-sectional area, expressed in square millimeters, U is the specified minimum tensile strength, expressed in megapascals)

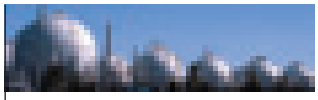
C) It is available when thickness is less than 25.4mm. For thickness > 25.4 mm the DWT test acceptance requirements shall be by agreement.



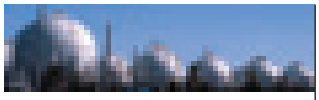
三、能源用钢板 / Steel plate for energy engineering

1、可供产品标准、牌号、规格范围及交货状态
Available product standard, grade, specification and delivery condition

产品标准 Product standard	牌 号 Grade	厚度范围(mm) Thickness	交货状态 Delivery condition
GB713-2008	Q245R(20g、20R)	6~150	AR/CR/N
	Q345R(16Mng、19Mng、16MnR)		AR/CR/N+SR
	Q370R(15MnNbR)		N/N+SR
	18MnMoNbR		N+T/N+T+SR
	13MnNiMoR(13MnNiMoNbg、13MnNiMoNbR)		N+T/N+T+SR
	15CrMoR(15CrMog)		N+T/N+T+SR
	12Cr1MoVR(12Cr1MoVg)		N+T/N+T+SR
	14Cr1MoR		N+T/N+ACC+T+SR
	12Cr2Mo1R		N+T/N+ACC+T+SR
GB3531-1996	16MnDR	6~100	N/N+SR
	15MnNiDR		
	09MnNiDR		
GB19189-2003	07MnCrMoVR	12~60	QT/QT+SR
	07MnNiMoVDR		QT/QT+SR
	12MnNiVR		QT/QT+SR
Q/BQB660	B610CF(07MnMoVR)	12~50	QT/QT+SR
	B610CF-L1(07MnNiMoVDR)		
	B610CF-L2(07MnNiMoVDR)		
	B610E(08MnNiVR)	12~45	QT/QT+SR
ASME SA387/SA387M ASTM A387/A387M	SA387 Gr.12/A387 Gr.12	8~150	A/CR/CR+T/N/N+T+SR /N+ACC+T+SR
	SA387 Gr.11/A387 Gr.11		
	SA387 Gr.22/A387 Gr.22		
ASME SA285/SA285M ASTM A285/A285M	SA285 Gr.A/A285 Gr.A SA285 Gr.B/A285 Gr.B SA285 Gr.C/A285 Gr.C	8~50	AR/CR/AR+SR /CR+SR/N/N+SR
ASME SA299/SA299M ASTM A299/A299M	SA299/A299	8~130	N/N+SR
ASME SA516/SA516M ASTM A516/A516M	SA516Gr.55/A516Gr.55 SA516Gr.60/A516Gr.60 SA516Gr.65/A516Gr.65 SA516Gr.70/A516Gr.70	8~130	AR/CR/N/N+T /N+SR/AR+SR /N+T+SR
ASME SA533/SA533M ASTM A533/A533M	SA533 Type A/A533 Type A SA533 Type B/A533 Type B SA533 Type C/A533 Type C SA533 Type D/A533 Type D	10~130	QT/QT+SR



产品标准 Product standard	牌 号 Grade	厚度范围(mm) Thickness	交货状态 Delivery condition
ASME SA515/SA515M ASTM A515/A515M	SA515Gr.60/A515Gr.60 SA515Gr.65/A515Gr.65 SA515Gr.70/A515Gr.70	8~130	AR/CR/N/N+SR
ASME SA737/SA737M ASTM A737/SA737M	SA737 Gr.B/A737 Gr.B SA737 Gr.C/A737 Gr.C	8~50	N/N+SR/N+ACC+T
ASME SA738/SA738M ASTM A738/SA738M	SA738 Gr.A/A738 Gr.A	8~150	N/N+SR/QT/QT+SR
	SA738 Gr.B/A738 Gr.B	10~100	QT/QT+SR
	SA738 Gr.C/A738 Gr.C	10~150	QT/QT+SR
ASME SA612/SA612M ASTM A612/A612M	SA612/A612	8~25	AR/CR/N/N+SR
ASME SA662/SA662M ASTM A662/A662M	SA662 Gr.A/A662 Gr.A SA662 Gr.B/A662 Gr.B SA662 Gr.C/A662 Gr.C	8~50	CR/N/N+SR
ASME SA455/SA455M ASTM A455/A455M	SA455/A455	8~130	AR/CR/N/N+SR
ASME SA841/SA841M ASTM A841/A841M	SA841 Gr.A/A841 Gr.A SA841 Gr.B/A841 Gr.B SA841 Gr.C/A841 Gr.C	8~65	TMCP/TMCP+T
EN10028-2	P235GH	8~130	AR/CR/NR/N/N+SR
	P265GH	8~130	
	P295GH	8~130	
	P355GH (19Mn6)	8~130	
	16Mo3	8~130	
	20MnMoNi4-5	10~130	QT/QT+SR
EN10028-3	P275NH/NL1/NL2	8~130	N/NR
	P355N/NH/NL1/NL2	8~130	N/NR
	P460NH/NL1/NL2	8~130	N/N+T
EN10028-5	P355M/ML1/ML2	8~80	TMCP/TMCP+T
	P420M/ML1/ML2	8~60	TMCP/TMCP+T
	P460M/ML1/ML2	8~60	TMCP/TMCP+T



产品标准 Product standard	牌 号 Grade	厚度范围(mm) Thickness	交货状态 Delivery condition
EN10028-6	P355Q/QH/QL1/QL2	10~130	QT/QT+SR
	P460Q/QH/QL1/QL2		
	P500Q/QH/QL1/QL2		
	P690Q/QH/QL1/QL2		
协议 / Agreement	BM400 (电磁钢板/Electrical steel)	8~130	N

注：A — 退火　AR — 普通轧制　ACC — 加速冷却　CR — 控轧　N —正火　NR —正火轧制
QT — 调质　SR — 消除应力退火　T — 回火　TM(TMCP)—热机械轧制

Remarks: A-annealing, AR-as rolled, ACC-accelerated cooling, CR-controlled rolling, N-normalizing, NR-normalizing rolling, QT-quenching and tempering, SR- Stress Relieving, T-tempering, TM-thermo-mechanical controlled process

2、部分需协议供货产品

有下列情形之一的，原则上需要与用户单独签定技术条件后供货。

（1） 用作锅炉系统中同时承受高温和压力的钢板；

（2） 按照国家有关条例或标准的规定，需要全国锅炉压力容器标准化技术委员会作为新材料进行评审认定的钢板；

（3） 用于核电站，有核安全等级要求的核电设备或构件用钢板；

（4） 用作石油、化工等领域临氢设备中承受高温和压力的钢板；

（5） 用作低温容器或管道，低温冲击试验温度要求≤-40℃，或设备的服役温度≤-50℃以下低温设备或系统用钢板。

（6） 除满足有关国家标准要求，但设计或用户提出超出标准要求的附加特殊要求的钢板。

（7） 按国外有关锅炉、容器有关标准要求供货的钢板。

（8） 用户所需厚度超过可供钢板规格，而用户又必须订购的钢板。

（9） 用户认为需要单独签定技术条件后，方可生产、供货的钢板。

（10） 欲使用宝钢钢板制造锅炉或容器的制造和生产单位，必须有国家有关行政机构颁发的生产制造许可证书，且允许的制造产品等级或规格应与所采购钢板相符合。

2. Some steel plates used for boilers and pressure vessels supplied with technical agreement

With one of the following conditions, the products provided by Baosteel should be manufactured exclusively after signing technical agreements with customers exclusively in principle.

（1） the steel plates which are designed to resist both high temperature and pressure in boiler system.

（2） The steel plate is taken for as new materials by the obliged regulations or rules stipulated by national or administrative department. and nation obliged standard, and have to be appraised by China Standardization Committee on Boilers and Pressure Vessels(CSCBPV) or other institutes.

（3） The steel plates are used for nuclear power equipment or component requiring nuclear safety classification in nuclear power station.

（4） The steel plates are used for equipments under critical hydrogen atomsphere bearing high temperature and pressure in the fields of such as petrochemical and chemical industry.

（5） For the low-temperature vessels and pipelines, the steel plates for low temperature equipment or system requiring impact test temperature is lower than -40℃ and under in temperature, as well as the equipment service temperature of -50℃ and under.

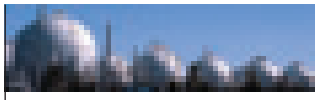
（6） Besides the requirement of related national standards, the additional special requirement for the steel plate is required by designer or customer or beyond the standard requirement by customers.

（7） The steel plates is required according to foreign boiler and pressure vessel standard.

（8） The steel plate thickness required or ordered by a customers is more than the available thickness by Baosteel

（9） Only after a technical agreement is signed by customers with Baosteel, the steel plate can be manufactured and supplied.

（10） The manufactures unit or customer's, who plan to use Baosteel's steel plate to manufacture the boilers and pressure vessels, must own the manufacture license or qualification issued by related national or local administrative department or institution. The grade and specification of the manufacture's product should be in conformity with the purpose or function of ordered steel plate.

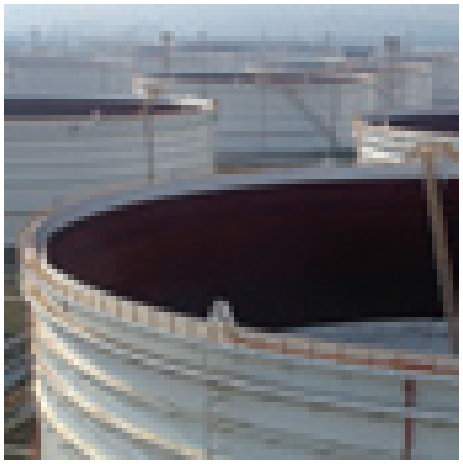


3、典型能源用钢产品

Typical steel plates for energy engineering

（1）大型原油储罐用 B610E（08MnNiVR）高强度调质钢板

B610E (08MnNiVR) high strength Q&T steel plate for large crude oil tank



2005 年 8 月试制成功 B610E（08MnNiVR），同年 11 月通过全国锅炉压力容器标准化技术委员会的专家技术评审。12～45mm B610E（08MnNiVR）钢板可用于建造大型原油储罐。2006 年 1 月，B610E（08MnNiVR）钢板通过 10 万立方米原油储罐的现场焊接工艺试验评审；2007 年 3 月在国内首家通过 15 万立方米原油储罐用 40mm 及其以下厚度 B610E（08MnNiVR）钢板国产化建造技术及焊接工艺评审。宝钢是目前国内唯一可供应 15 万立方米原油储罐用高强度调质钢板的钢铁企业。

The B610E (08MnNiVR) high strength quenched & tempered (Q&T) steel plate is trial-produced by Baosteel on the production line of 5-meter heavy plate mill in August, 2005, and it is evaluated and appraised by the experts organized by The China Standardization Committee on Boilers and Pressure Vessels (CSCBPV) in November, 2005. The B610E (08MnNiVR) steel plate with thickness of 12mm~45mm can be employed to construct the large crude oil storage tank. In January 2006, the B610E (08MnNiVR) steel plate is qualified by field welding procedure qualification of the crude oil storage tank with volume of 100,000m^3. In March, 2007, The B610E (08MnNiVR) steel plate with the thickness of 40mm and under and its welding procedure qualification is firstly appraised in China and can be used to construct the crude oil storage tank with volume of 150,000 m^3. Baosteel is the sole steel enterprise in China supplying B610E (08MnNiVR) high strength Q&T steel plate for construction of 150,000m^3 crude oil storage tank.

B610E（08MnNiVR）高强度调质钢板的力学性能

Mechanical properties of the B610E (08MnNiVR) high strength Q&T steel plate

牌 号 Grade	厚度范围 Thickness mm	拉伸试验（横向） Tensile test (transverse)				冲击试验（横向） Impact test (transverse)		弯曲试验 Bend test
		下屈服强度 Lower yield stength ReL,MPa	抗拉强度 Tensile stength Rm,MPa	伸长率A，%, Elongation（$L_0=5.65\sqrt{S_0}$） 厚度 mm Thickness		温度 Temperature ℃	冲击值 Impact energy J	180°，b＝2a （a＝试样厚度，b＝试样宽度，d＝弯心直径） (a=Thickness for test piece, b=Width for test piece, d=Inside diametre)
				<20	⩾20			
B610E (08MnNiVR)	12~45	⩾490	610~730	⩾17	⩾18	-20	⩾100	d=3a

注：1. 屈服现象不明显时，采用$R_{p0.2}$。

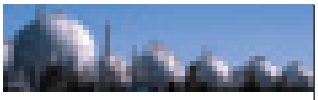
2. B610E牌号的含义：“B”代表宝钢，“610”代表钢的抗拉强度(MPa)，“E”代表大线能量焊接特性。

3. B610E(08MnNiVR)完全满足GB19189-2003中12MnNiVR要求。

Remark: 1. The yield strength value applies to the $R_{p0.2}$, if the yield strength is not pronounced.

2. The meanings of B610E: "B" represents "Baosteel", "610" represents minimum tensile strength and "E" represents energy, the welding high heat input characteristic.

3. The B610E (08MnNiVR) completely meets the requirements of 12MnNiVR in the state standard of GB19189-2003.



（2）球罐用低焊接裂纹敏感性B610CF系列高强度调质钢板

B610CF series high strength Q&T steel plates with low sensitive welding cracking for spherical tank

2005年12月试制成功12～50mm低焊接裂纹敏感性B610CF系列高强度调质钢板，2006年6月，通过全国锅炉压力容器标准化技术委员会技术评审。12～50mm厚B610CF系列钢可用于制造与其服役温度相匹配的球罐。目前，宝钢批量生产的B610CF系列高强度调质钢板已大量于制造氧气、氮气、丙烯、乙烯等不同介质和体积的低温球罐。

The B610CF series high strength Q&T steel plates with low susceptibility to welding crack with the thickness from 12mm to 50mm are successfully developed by Baosteel in December 2005, and are appraised by the experts organized by the China Standardization Committee on Boilers and Pressure Vessels(CSCBPV) in June, 2006. The B610CF series steel plates with the thickness from 12mm to 50mm can be used to build the spherical tanks or vessels whose service temperature is matched to the temperature ranges authorized by CSCBPV. The B610CF series steel plates have been used to fabricate the low temperature spherical tanks with the different volumes for the medium of oxygen gas, nitrogen gas, ethylene, propylene etc.

球罐用B610CF系列高强度调质钢板力学性能

Mechanical properties of the B610CF series high strength Q&T steel plates for spherical tank

牌 号 Grade	厚度范围 Thickness mm	拉伸试验（横向） Tensile test (transverse)			冲击试验（横向） Impact test (transverse)		弯曲试验 Bend test 180°，b＝2a (a＝试样厚度，b＝试样宽度，d＝弯心直径) (a=Thickness for test piece, b=Width for test piece, d=Inside diametre)
		下屈服强度 Lower yield stength ReI, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率A，% Elongation （$L_0=5.65\sqrt{S_0}$）	温度 Temperature ℃	冲击值 Impact energy J	
B610CF (07MnMoVR)	12~50	⩾490	610~730	⩾17	-20	⩾100	d=3a
B610CF-L1 (07MnNiMoVDR)	12~50	⩾490	610~730	⩾17	-40	⩾100	d=3a
B610CF-L2 (07MnNiMoVDR)	12~50	⩾490	610~730	⩾17	-50	⩾100	d=3a

注：1. 屈服现象不明显时，采用$R_{p0.2}$。

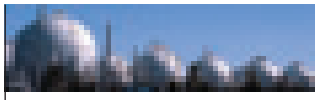
2. B610CF(-L)牌号的含义：B610CF(-L)中的“B”代表宝钢，“610”代表钢的抗拉强度(MPa)，“CF”表示低焊接裂纹敏感性(Crack Free)。质量等级中要求-20℃冲击韧性时缺省，要求更低(-40℃、-50℃)冲击韧性时以“Low temperature”中字母“L”表示，并后缀“1”、“2”区分其适用的最低温度-40℃、-50℃。

3. B610CF(07MnMoVR)、B610CF-L1(07MnNiMoVDR)分别满足GB19189-2003中07MnCrMoVR和07MnNiMoVDR化学成分和力学性能要求。B610CF-L2(07MnNiMoVDR)满足-50℃工作条件要求。

Remark: 1. The yield strength value applies to the $R_{p0.2}$, if the yield strength is not pronounced.

2. The meaning of B610CF(-L): "B" represents Baosteel, "610" represents minimum tensile strength(MPa), and "CF" represents crack free.The quality class can be omitted at -20℃ impact toughness, the capital initial letter L of low temperature represent the quality class is at -40℃ or below -40℃ impact toughness. the "1" is at -40℃ impact toughness and "2" is at -50℃ impact toughness.

3. B610CF(07MnMoVR), B610CF-L1(07MnNiMoVDR) respectively meet the requirements of chemical composition and mechanical property of 07MnCrMoVR and 07MnNiMoVDR in the state standard of GB19189-2003. B610CF-L2 (07MnNiMoVDR) can meet to the requirement of lowest to -50℃ service temperature.



（3）大型水电站金属构件用低焊接裂纹敏感性B610CFH高强度调质钢板

B610CFH series high strength Q&T steels with low sensitive welding cracking for metal components of large-scale hydropower station

宝钢开发的用于大型水电站金属构件（如水电站压力钢管、蜗壳、岔管等）制作的低焊接裂纹敏感性高强度调质钢板有B610CFHL2、B610CFHL4，最低服役温度分别为-20℃或-40℃，目前可供厚度范围从10mm～100mm。也可供B690CFHL2、B690CFHL4、B780CFHL2和B780HL2等更高强度级别的钢板用于水电站建造。

The B610CFHL2、B610CFHL4 high strength Q&T steel plates with low sensitive welding cracking are developed by Baosteel and can be used to construct and manufacture of large-scale hydropower station (such as penstock, spiral case and bifurcated pipe in hydropower station). The lowest service temperatures of those plates are -20℃ or -40℃ respectively. Currently the available thickness is from 10mm to 100mm. Higher strength steel plates, such as B690CFHL2、B690CFHL4、B780CFHL2 and B780HL2 can be available for the construction of hydropower station.

水电站金属构件用B610CFHL2和B610CFHL4钢板力学性能

Mechanical properties of B610CFHL2 & B610CFHL4 steel plates for metal components of hydropower station

牌号 Grade	厚度范围 Thickness mm	拉伸试验（横向） Tensile test (transverse)			冲击试验（横向） Impact test (transverse)		弯曲试验 Bend Test 180°，b=2a (a=试样厚度，b=试样宽度，d=弯心直径) (a=Thickness for test piece, b=Width for test piece, d=Inside diametre)
		下屈服强度 Lower yield stength ReL, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率A，% Elongation ($L_0=5.65\sqrt{S_0}$)	温度 Temperature ℃	冲击值 Impact energy J	
B610CFHL2	10~60	⩾490	610~730	⩾17	-20	⩾100 ⩾80 ⩾47	d=3a
	>60~100	⩾470	590~710				
B610CFHL4	10~60	⩾490	610~730	⩾17	-40	⩾100 ⩾80 ⩾47	d=3a
	>60~100	⩾470	590~710				

注：1. 屈服现象不明显时，采用$R_{p0.2}$。

2. 冲击值要求可由供需双方协商。

3. B610CFHL2和B610CFHL4牌号的含义：牌号中的“B”代表宝钢，“610”代表钢的最低抗拉强度(MPa)，“CF”表示低焊接裂纹敏感性(Crack Free)，“H”代表水电用钢，“L2”表示冲击试验温度为-20℃，“L4”表示冲击试验温度为-40℃。

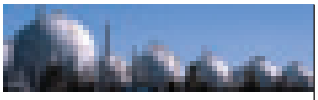
4. 为了区分球罐用钢和水电用钢，将原水电用钢采用的牌号B610CF改为B610CFHL2，B610CF-L1改为B610CFHL4。

Remark: 1. The yield strength value applies to the $R_{p0.2}$, if the yield strength is not pronounced.

2. The requirement of impact energy can be consulted by supplier and purchaser.

3. The meanings of B610CFHL2和B610CFHL4: “B” represents Baosteel, “610” represents minimum tensile strength(MPa), “CF” represents crack free, “H” represents hydropower purpose, "L2" represents the impact test temperature is minus 20℃, and "L4" represents the impact test temperature is minus 40℃.

4. Inorder to distinguish the steel plates for spherical tank and hydropower,the grades of B610CF and B610CF-L1 originally used for hydropower purpose are revised into B610CFHL2 and B610CFHL4.



（4.1）AP-1000核电站安全壳用SA738Gr.B高强度调质钢板

SA738 Gr.B high strength Q&T steel plate for the containment vessel in the AP-1000 nuclear power station

宝钢2006年开发成功美国西屋第三代AP-1000核电站安全壳用SA738Gr.B高强度调质钢板。该钢在调质态和模拟焊后热处理状态下，除满足ASME SA738Gr.B标准要求外，还满足ASME锅炉和压力容器第二卷和第三卷MC部件NE分卷的有关要求。在低至-45℃条件下，具有良好的低温冲击韧性。该钢目前可供厚度范围从10mm～100mm。

The SA738 Gr.B high strength Q&T steel plate is successfully developed by Baosteel in 2006 and can be used to manufacture the Containment Vessel in the 3rd generation AP-1000 Nuclear Power Station. Under the delivery of quenched and tempered, and simulated post weld heat treatment, the steel plate can meet the requirements of ASME SA738Gr.B or ASTM A738 Gr.B, and also fulfill the relative requirements in the Section Ⅱ and Section Ⅲ of ASME Boiler and Pressure Vessel Code, as well as Class MC Components, Subsection NE. the steel plate also has good toughness at lowest to minus 45℃.Currently, the available thickness is from 10mm to 100mm.

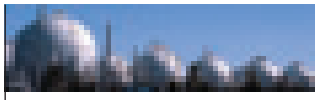
SA738Gr.B 高强度调质钢板的力学性能

The mechanical properties of SA738 Gr.B high strength Q&T steel plate

牌 号 Grade	厚度范围 Thickness mm	拉伸试验（横向） Tensile test (transverse)			冲击试验 Impact test		
		下屈服强度 Lower yield stength ReL, MPa	抗拉强度 Tensile Stength Rm, MPa	伸长率 (50mm标距) Elongation in 50mm A, %	温度 Temperature ℃	方向 Direction	冲击值 Impact energy J
ASME SA738Gr.B (ASTM A738Gr.B)	10~100	⩾415	585~705	⩾20	-30	横向 Transverse	按照ASTM A20或ASME SA20或NE2332.1的要求 According to the requirements of ASTM A20 or ASME SA20, and/or NE2332.1
					-45	纵向 Longitudinal	

注：冲击值要求可由供需双方协商。

Remark: Supplier and purchaser can also consult the requirement of impact energy.



（4.2）核电站压力容器用SA533Type B高强度调质钢板

SA 533 Type B high strength Q&T steel plate for pressure vessels in nuclear power station

宝钢可以提供符合ASME标准要求的SA533Type B高强度调质钢板，也可根据RCC-M要求，提供16MND5、18MND5钢板，用于有核级安全要求的压力容器。目前，宝钢可供钢板最大厚度130mm，最大单重15.5吨。

Baosteel can produce the SA 533 Type B high strength Q&T steel plate which accord with the ASME standards and also can provide the 16MND5 and 18MND5 steel plates according to the requirements of RCC-M. Those plates can be authorized to manufacture the pressure vessels whose safety requirement is authorized by nuclear Laws, code or standard. At present, the available maximum thickness is 130mm, and maximum delivery unit weight is 15.5 tons.

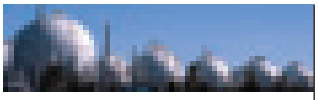
SA533Type B高强度调质钢板的力学性能

Mechanical properties of SA 533 Type B high strength Q&T steel plate

牌 号 Grade	厚度范围 Thickness mm	拉伸试验（横向） Tensile test (transverse)			冲击试验 Impact test		
		上屈服强度 Upper Yield Stength ReH, MPa	抗拉强度 Tensile Stength Rm, MPa	伸长率 (50mm标距) Elongation in 50mm A, %	温度 Temperature ℃	方向 Direction	冲击值 Impact energy J
ASME SA533 TypeB	12~130	⩾485	620~795	⩾16	20	横向 Transverse 纵向 Longitudinal	按照ASTM A20或ASME III 有关要求 According to the requirements of ASTM A20 and/or ASME III
					0		
					-20		

注：冲击值由供需双方协商确定。

Remark: Supplier and purchaser decide the test temperature through negotiation.



（5）锅炉汽包用13MnNiMoR钢板

13MnNiMoR steel plate for steam drum in boiler

宝钢可以提供符合GB713-2008要求的13MnNiMoR钢板，可用于制造锅炉汽包或容器，与DIWA353钢板要求相当。可供厚度范围为30 mm ~150mm。目前，最大单重15.5吨。

Baosteel can supply the 13MnNiMoR steel plate which accords with the requirement of GB713-2008 and can be used to manufacture the steam drum in boiler or vessel. The 13MnNiMoR steel plate corresponds to the DIWA 353 steel plate. The available thickness range is from is 30 mm ~150mm, and the maximum delivery unit weight is 15.5 tons.

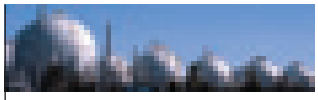
13MnNiMoR 钢板的力学性能

Mechanical properties of 13MnNiMoR steel plate

牌 号 Grade	厚度范围 Thickness mm	拉伸试验（横向） Tensile test (transverse)			冲击试验（横向） Impact test (transverse)		弯曲试验 Bend test
		下屈服强度 Lower yield stength ReL, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率 (50mm标距) Elongation in 50mm A, %	温度 Temperature ℃	冲击值 Impact energy J	180°，b=2a (a=试样厚度，b=试样宽度，d=弯心直径) (a=Thickness for test piece, b=width for test piece, d=inside diametre)
GB713-2008 13MnNiMoR	30~100	⩾390	570~720	⩾18	0	⩾41	d=3a
	＞100~150	⩾380	570~720				

注：其它性能满足GB713-2008要求。

Remark: Other mechanical requirements accord with the GB713-2008.



（6）石化行业临氢设备用12Cr2Mo1R钢板

12Cr2Mo1R steel plate for equipment under hydrogen atmosphere in petrochemical field

宝钢可以提供符合GB713-2008要求的12Cr2Mo1R钢板，可用于制造石化行业用高温高压临氢设备，与ASTM A387Gr.22Cl.2/ASME SA387Gr.22Cl.2钢板要求相当。低J系数的12Cr2Mo1R钢板，经模拟最小和最大焊后热处理后和步冷试验前后，脆化倾向小。可供厚度范围为6 mm ~150mm。最大单重18吨。

Baosteel can supply the 12Cr2Mo1R steel plate which accords with the requirement of GB713-2008 and can be used to manufacture the equipments or vessels worked in high temperature, high pressure and hydrogen atmosphere in petrochemical field. The 12Cr2Mo1R steel plate corresponds to the requirements of ASTM A387Gr.22Cl.2/ASME SA387Gr.22Cl.2 steel plate. The 12Cr2Mo1R steel plate with lower Temper Embrittlement Factor J keeps high toughness after simulated minimum or maximum post weld heat treatment, as well as the lower transition temperature before and after step cool heat treatment. The available thickness range is from is 6 mm ~150mm. and the maximum delivery unit weight is 18 tons at present.

12Cr2Mo1R钢板的力学性能

Mechanical properties of 12Cr2Mo1R steel plate

牌 号 Grade	厚度范围 Thickness mm	拉伸试验（横向） Tensile test (transverse)			冲击试验（横向） Impact test (transverse)		弯曲试验 Bend test
		下屈服强度 Lower yield stength ReL,MPa	抗拉强度 Tensile stength Rm,MPa	伸长率 (50mm标距) Elongation in 50mm A, %	温度 Temperature ℃	冲击值 Impact energy J	180°，b=2a （a=试样厚度，b=试样宽度，d=弯心直径） (a=Thickness for test piece, b=Width for test piece, d=Inside diametre)
GB713-2008 12Cr2Mo1R	6~150	⩾310	520~680	⩾19	20	⩾34	d=3a

注：1、其它性能满足GB713-2008要求。

2、可根据ASTM A387附录进行相关性能的测试并符合其要求。

Remark: 1. Other mechanical requirements accord with the GB713-2008.

2. Some tests can be carried out by the additional supplementary requirements in ASTM A387and meet the relative requirements.

四、结构用钢板 / Structural steel plate

1、可供产品标准、牌号、规格范围及交货状态
Available product standard, grade, specification and delivery condition

产品标准 Product standard	牌 号 Grade	厚度范围(mm) Thickness	交货状态 Delivery condition
GB/T 700	Q235A	8~150	AR
	Q235B/Q235C/Q235D	8~150	AR/CR/N
GB/T 1591	Q345A	8~150	AR
	Q345B/Q345C/Q345D	8~150	AR/CR/N
	Q345E	8~100	AR/CR/N
	Q390A/Q420A/Q460A	12~100	CR
	Q390B/Q420B/Q460B	12~100	CR/N
	Q390C/Q420C Q390D/Q420D	12~100	CR/N
	Q390E/Q420E	50~100	N
	Q460C/Q460D/Q460E	10~100	CR/N
GB/T714-2000	Q235qC/Q345qC/Q370qC	8~150	AR/CR/N
	Q235qD/Q345qD/Q370qD	8~150	AR/CR/N
	Q345qE/Q370qE 14MnNbq	8~100	AR/CR/N
	Q420qC/Q420qD/Q420qE	20~70	TMCP/TMCP+T
GB/T 19879-2005	Q235GJB/Q235GJC Q235GJD/Q235GJE	8~150	AR/CR/N
	Q345GJB/Q345GJC/Q345GJD	8~150	AR/CR/N/TMCP
	Q345GJE	8~100	AR/CR/N/TMCP
	Q390GJC/D/E	8~100	AR/CR/N/TMCP
	Q420GJC/D/E/(-W)	20~70	TMCP/TMCP+T
	Q460GJC/D/E	20~70	TMCP/TMCP+T
YB/T4137-2005	Q460CFC/D/E Q500CFC/D/E Q550CFC/D/E Q620CFC/D/E	12~80	TMCP/TMCP+T
	Q690CFC/D/E Q800CFC/D/E	12~50	TMCP/TMCP+T
Q/BQB 610 JIS G3101	SS330 SS400 SS490 SS540	8~150	AR
Q/BQB 611 JIS G3106	SM400A/SM490A	8~150	AR
	SM400B/SM400C SM490B/SM490C	8~150	AR/CR/N
	SM490YA	8~100	AR/CR
	SM490YB	8~100	AR/CR/N
	SM520B/SM520C	8~100	CR/N
	SM570	16~70	QT

产品标准 Product standard	牌 号 Grade	厚度范围(mm) Thickness	交货状态 Delivery condition
Q/BQB 612 JIS G3136	SN400A	8~100	AR
	SN400B/ SN400C SN490B/ SN490C	8~100	AR/CR/N/TMCP
Q/BQB 613 JIS G3128	SHY 685 SHY 685N SHY 685NS	16~100	QT
EN10025-2	S235JR/S235J0/ S235J2	8~150	AR/CR/N
	S275JR/S275J0/S275J2	8~150	AR/CR/N
	S355JR/S355J0 S355J2/S355K2	8~150	AR/CR/N
EN10025-3	S275N/S275NL	12~120	CR/N
	S355N/ S355NL	12~120	N
EN 10025-6	S500Q/S500QL/S500QL1	12~100	QT
	S550Q/S550QL/S550QL1		
	S620Q/S620QL/S620QL1		
	S690Q/S690QL/S690QL1	12~50	
ASTM A36	A36	8~150	AR
ASTM A283	A283 Gr.C	8~150	AR
ASTM A514	A514 Gr.F	16-50	QT
ASTM A572 ASTM A709	A572 Gr.50/A709 Gr.50	8~100	AR/CR/N
	A572 Gr.60/A572 Gr.65	12~40	CR
ASTM A588	A588 Gr.A/A588 Gr.B	12~80	CR
ASTM A633	A633 Gr.A A633 Gr.C A633 Gr.D	8~150	N
	A633 Gr.E	8~100	
协议 Agreement	BHARDY360 BHARDY400 BHARDY400CF BHARDY450 BHARDY500	12~50	QT
	BWELDY460CFM BWELDY500CFM BWELDY550CFM	12~80	TMCP
	BWELDY620CFM BWELDY690CFM	12~50	
	BWELDY700Q	12~80	QT
	BWELDY700CFQ BWELDY900Q BWELDY960Q BWELDY1100Q	12~50	

备注：1、Q420GJC/D/EW 为具有耐候性能的高强建筑用钢；

2、可以按照产品标准或产品标准＋用户附加的技术协议供货；

3、增加 Z 向性能时，按照 GB/T5313 或按照用户技术协议执行。

Remarks: 1.Q420GJC/D/EW is high strength construction structural steels with weathering properties.

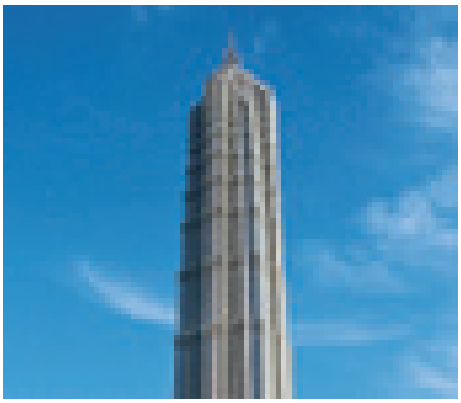
2.Delivery comply with production standards or plus additional requirements by technical agreement.

3.The requirements of through thickness characteristics comply with GB/T 5315 or technical agreement.

2、典型结构用钢板介绍
Typical structural plates

（1）建筑结构用钢板
Steel plate for building structure

(1.1)、Q460C/D/E-Z15/25/35



宝钢Q460E-Z25/35是国内最高强度等级的建筑结构用钢，主要用于受力最大的主体钢结构，成功应用于中央电视台新台址等工程，其优良的综合性能与焊接性能受到用户赞赏。

Q460E-Z25/35 is the highest grade structural steel plates for high-rise building. Owing to the excellent comprehensive properties and weldability, the plates have been successfully used as the major components of CCTV new site building which are acted by the maximum stress, as results, is appreciated by customers.

产品性能要求 / Requirements of product property

化学成分 / Chemical composition（wt %）

牌 号 Grade	C	Si	Mn	P	S	Alt	Cr	Ni	Nb	V	Ti	Pcm	Ceq
Q460C	≤0.2	≤0.55	1.0 ~ 1.7	≤0.035	≤0.035	≥0.015	≤0.7	≤0.7	0.015 ~ 0.06	0.02 ~ 0.15	0.008 ~ 0.20	≤0.29	≤0.50
Q460D				≤0.030	≤0.030								
Q460E				≤0.025	≤0.025								

备注 / Remarks: Ceq=C+Mn/6+(Cr+V+Mo)/5+(Ni+Cu)/15

Pcm=C+Si/30+(Mn+Cu+Cr)/20+Ni/60+Mo/15+V/10+5B

力学性能 / Mechanical property

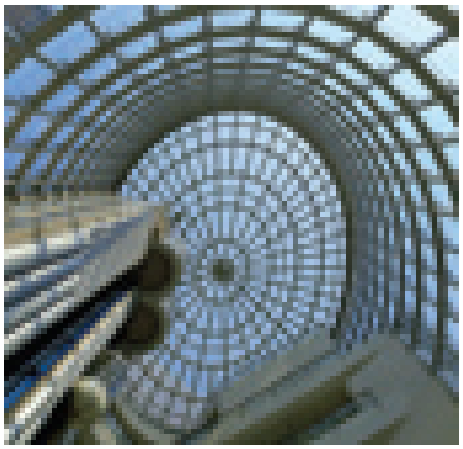
牌 号 Grade	厚度范围 Thickness (mm)	拉伸试验（横向）Tensile test (transverse)				冲击试验（纵向）Impact test (longitudinal)			厚度方向性能 Through-thickness characteristics		弯曲试验(横向) Bend test (transverse)	
		下屈服强度 Lower yield stength ReL, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率 Elongation A，%,	屈强比 Yield ratio YR, %	质量等级 Quality class	温度 Temperature ˚C	冲击值 Impact energy J	断面收缩率，% Contraction 均值 Average value	断面收缩率，% Contraction 单值 Individual value	弯曲角度 Angle	弯曲直径 Diameter
Q460C	＞16~35	≥440	550-720	≥20	≤83	C	0	≥34	/	/	180°	d=3a
Q460D	＞35~50	≥420				D	-20		/	/		
Q460E	＞50~110	≥400				E	-40		/	/		
Q460-Z15		同上 Ditto							15	10		
Q460-Z25									25	15		
Q460-Z35									35	25		

备注：屈服现象不明显时，采用 $R_{p0.2}$。

Remarks: The yield strength value applies to the Rp0.2, if the yield strength is not pronounced.

(1.2)、**Q420C/D-Z15/25/35**

宝钢高等级建筑结构钢Q420D-Z25，综合性能及焊接性优良，成功用于中央电视台新台址等工程。



The Q420D-Z25 is the high grade structural steel for high-rise building. Owing to the excellent comprehensive properties and weldability, the plate has been successfully used as the major components of the CCTV new site building.

产品性能要求 / Requirements of product property

化学成分 / Chemical composition（wt %）

牌 号 Grade	C	Si	Mn	P	S	Alt	Cr	Ni	Nb	V	Ti	Pcm	Ceq
Q420C	≤0.2	≤0.55	1.0 ~ 1.7	≤0.035	≤0.035	≥0.015	≤0.4	≤0.7	≤0.06	≤0.20	≤0.2	≤0.29	≤0.47
Q420D				≤0.030	≤0.030								

备注 / Remarks: Ceq=C+Mn/6+(Cr+V+Mo)/5+(Ni+Cu)/15

Pcm=C+Si/30+(Mn+Cu+Cr)/20+Ni/60+Mo/15+V/10+5B

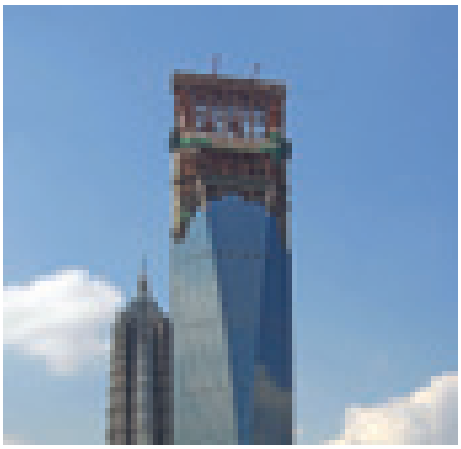
力学性能 / Mechanical property

牌 号 Grade	厚度范围 Thickness (mm)	拉伸试验（横向）Tensile test (transverse)				冲击试验（纵向）Impact test (longitudinal)				厚度方向性能 Through-thickness characteristics		弯曲试验（横向）Bend test (transverse)	
		下屈服强度 Lower yield stength ReL, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率 Elongation A，%,	屈强比 Yield ratio YR, %	厚度 Thickness (mm)	质量等级 Quality class	温度 Temperature ℃	冲击值 Impact energy J	断面收缩率，% Contraction 均值 Average value	断面收缩率，% Contraction 单值 Individual value	弯曲角度 Angle	弯曲直径 Diameter
Q420C	>16~35	≥400	550~720	≥20	≤83	>16	C	0	≥34	/	/	180°	d=3a
	>35~50	≥380								/	/		
	>50~100	≥360								/	/		
Q420D	>16~35	≥400					D	-20	≥34	/	/		
	>35~50	≥380								/	/		
	>50~100	≥360								/	/		
Q420-Z15	16~100	同上 Ditto				同上 Ditto				≥15	≥10		
Q420-Z25										≥25	≥15		
Q420-Z35										≥35	≥25		

备注：屈服现象不明显时，采用 $R_{p0.2}$。

Remarks: The yield strength value applies to the Rp0.2, if the yield strength is not pronounced.

(1.3)、SN490B/C



SN490B/C是一种高性能建筑结构用钢，宝钢生产的SN490B/C以其优良的力学性能和焊接性成功应用于上海环球金融中心、日经大厦等国内外重大工程。

SN490B/C is a high grade structural steel plates for building, owing to the excellent comprehensive properties and weldability. The plates manufactured by Baosteel have been successfully used in major oversea and domestic projects such as Shanghai World Financial Center, Nippon Nikkei Building and Caterpillar Building.

产品性能要求 / Requirements of product property

化学成分 / Chemical composition（wt %）

牌 号 Grade	C	Si	Mn	P	S	Als	Nb	V	Ti	N	Ceq	Pcm
SN490B/C	0.10 ~ 0.18	≤0.50	1.2 ~ 1.6	≤0.02	≤0.005	≥0.015	0.015 ~ 0.035	≤0.08	≤0.02	≤0.018	≤0.425	≤0.29

备注 / Remarks: Ceq=C+Mn/6+Si/24+Ni/40+Cr/5+Mo/4+V/14

Pcm=C+Si/30+(Mn+Cu+Cr)/20+Ni/60+Mo/15+V/10+5B

力学性能 / Mechanical property

牌 号 Grade	厚度范围 Thickness (mm)	拉伸试验（横向） Tensile test (transverse)				冲击试验（纵向） Impact test (longitudinal)		厚度方向性能 Through-thickness characteristics	
		上屈服强度 Upper yield stength Reh, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率 Elongation A_{200}/A_{50}, %	屈强比 Yield ratio YR, %	温度 Temperature ℃	冲击值 Impact energy J	断面收缩率, % Contraction	
								均值 Average value	单值 Individual value
SN490B/C	＜10	≥325	490~610	≥18	/	0	≥100	≥25	≥15
	≥12~16	325~445			≤80				
	≥16~40	325~445		≥21					
	≥40~60	295~445		≥23					

备注： 1. 屈服现象不明显时，采用 $R_{p0.2}$。

2. 其中SN490C的Z向断面收缩率符合以上要求，板厚≤50mm，延伸率用 A_{200}，板厚＞50mm，延伸率用 A_{50}。

Remarks: 1.The yield strength value applies to the Rp0.2, if the yield strength is not pronounced.

2.Through thickness contraction of SN490C meets the above requirements. The elongation of A_{200} are applied for the thickness ≤ 50mm, and A_{50} are applied for the thickness ＞ 50mm.

（2）桥梁结构用钢板
Steel plate for bridge structure

(2.1)、**14MnNbq**

14MnNbq是一种高等级桥梁结构用钢，以其优良的力学性能和焊接性成功应用于国内大型桥梁工程，例如：武汉天兴洲大桥、上海闵浦大桥等工程。

14MnNbq is the high grade structural steel plate for bridge building. Owing to the excellent comprehensive properties and weldability. The plates have been successfully used in Wuhan Tianxingzhou Bridge, Shanghai Minpu Bridge etc.

产品性能要求 / Requirements of product property

化学成分 / Chemical composition（wt %）

牌 号 Grade	C	Si	Mn	P	S	Als	Cu	Ni	Nb	V	Ti	Ceq
14MnNbq	0.11 ~ 0.17	⩽0.50	1.2 ~ 1.6	⩽0.020	⩽0.01	⩾0.015	⩽0.3	⩽0.3	0.015 ~ 0.035	⩽0.08	⩽0.02	⩽0.425

备注 / Remarks: Ceq=C+Mn/6+Si/24+Ni/40+Cr/5+Mo/4+V/14

力学性能 / Mechanical property

牌 号 Grade	厚度范围 Thickness (mm)	拉伸试验（横向） Tensile test (transverse)			冲击试验（纵向） Impact test (longitudinal)		常温时效冲击 Aging impact
		下屈服强度 Lower yield stength ReL, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率 Elongation A，%,	温度 Temperature ℃	冲击值 Impact energy J	均值 Average value
14MnNbq	⩽16	⩾370	530~685	⩾20	-40	⩾100	⩾100
	>16~25	⩾355	510~665	⩾19			
	>25~36	⩾350	500~645			⩾120	⩾120
	>36~60	⩾345	490~625				

备注：屈服现象不明显时，采用 $R_{p0.2}$。

Remarks: The yield strength value applies to the Rp0.2, if the yield strength is not pronounced.

(2.2)、**Q420qD/E**

Q420qD/E是目前国内最高等级桥梁结构用钢，宝钢开发的Q420qD/E以其优良力学性能，焊接性，低屈强比获得国内市场认可。

Q420qD/E is the highest grade structured steel plates for bridge building in China at present, owing to excellent comprehensive properties, weldability and low yield ratio, the product has been acknowledged as one of the best products in domestic market.

产品性能要求 / Requirements of product property

化学成分 / Chemical composition（wt %）

C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cu (%)	Mo (%)	Nb (%)	B (ppm)	Ceq (%)	Pcm (%)
≤0.06	0.10 ~ 0.50	1.20 ~ 1.65	≤0.020	≤0.010	0.15 ~ 0.50	0.10 ~ 0.30	0.015 ~ 0.050	≤30	≤0.435	≤0.20

备注 / Remarks: Ceq=C+Mn/6+(Cr+V+Mo)/5+(Ni+Cu)/15
Pcm=C+Si/30+(Mn+Cu+Cr)/20+Ni/60+Mo/15+V/10+5B

力学性能 / Mechanical property

牌 号 Grade	拉伸试验（横向） Tensile test (transverse)				冲击试验（纵向） Impact test (longitudinal)		厚度方向性能 Through-thickness characteristics		弯曲试验（横向） Bend test (transverse)	
	下屈服强度 Lower yield stength ReL, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率 Elongation A, %,	屈强比 Yield ratio YR, %	温度 Temperature ℃	冲击值 Impact energy J	断面收缩率, % Contraction 均值 Average value	断面收缩率, % Contraction 单值 Individual value	弯曲角度 Angle	弯曲直径 Diameter
Q420qE	≥420	570-720	≥18	≤0.89	-40 (常规/Normal) 20 (时效/Aging)	≥120	/	/	180°	d=3a
Q420qE-Z15							15	10		
Q420qE-Z25							25	15		
Q420qE-Z35							35	25		

备注：屈服现象不明显时，采用 $R_{p0.2}$。

Remarks: The yield strength value applies to the Rp0.2, if the yield strength is not pronounced.

（3）耐候钢板
Atmospheric corrosion resisting steel for welded structure

(3.1)、ASTM A588

ASTM A588 为耐大气腐蚀钢板，产品钢质纯净，表面和外观质量优，具有良好的耐大气腐蚀性能，耐蚀性是普通结构钢的两倍以上，同时该产品具有良好的低温韧性，良好的折弯、焊接加工性能，屈服强度级别包括345MPa、420MPa等，适用于室外应用的焊接结构，包括工程机械、建筑、桥梁等等。

ASTM A588 is atmospheric resistant steel plates. Owing to high purity of steel and advanced rolling technology, the high performance of the plates can be achieved, for example, excellent low temperature toughness, good ductility and weldability, as well as high surface quality and dimensional accuracy of the plates. Also this product possesses excellent atmospheric resistance. Its atmospheric resistant index is two times more than that of general structural steels. The yield strength includes 345MPa and 420MPa. This grade plates have been mainly used in outdoor welding structures including engineering machinery, buildings and bridges.

产品性能要求 / Requirements of product property

化学成分 / Chemical composition（wt %）

牌 号 Grade	C	Si	Mn	P	S	Cr	Cu	Ni	V
ASTM A588 Gr.A	≤0.19	0.30 ~ 0.65	0.80 ~ 1.25	≤0.04	≤0.05	0. 40 ~ 0.65	0.25 ~ 0.40	≤0.40	0.02 ~ 0.10
ASTM A588 Gr.B	≤0.20	0.15 ~ 0.50	0.75 ~ 1.35	≤0.04	≤0.05	0. 40 ~ 0.70	0.20 ~ 0.40	≤0.50	0.01 ~ 0.10

力学性能 / Mechanical property

牌 号 Grade	厚度范围 Thickness (mm)	拉伸试验（横向） Tensile test (transverse)			冲击试验（纵向） Impact test (longitudinal)	
		屈服强度 Yield stength ReH/$R_{p0.2}$，MPa	抗拉强度 Tensile stength Rm，MPa	伸长率 Elongation A_{200}, %	温度 Temperature ℃	冲击值 Impact energy J
ASTM A588 Gr.A /Gr.B	12~80	≥345	≥485	≥21	0	≥27

备注：屈服现象不明显时，采用 $R_{p0.2}$。

Remarks: The yield strength value applies to the Rp0.2, if the yield strength is not pronounced.

（4）焊接结构用钢板
Steel plate for welded structure

(4.1)、S355NL+Z15/25/35

S355NL+Z15/25/35是高等级结构用钢，宝钢开发的S355NL-Z25以其优良的力学性能、焊接性成功应用于GE的风塔结构等工程。

S355NL+Z15/25/35 is the high toughness steel plate for welded structure. Owing to the excellent comprehensive properties and weldability, the plates manufactured by Baosteel have been successfully used as the major structural components of GE's wind tower.

产品性能要求 / Requirements of product property

化学成分 / Chemical composition（wt %）

牌 号 Grade	厚度范围 Thickness	C	Si	Mn	P	S	Alt	Cr	Ni	Nb	V	Ti	Cu	Ceq
S355NL	≤63	≤0.18	≤0.50	0.9 ~ 1.65	≤0.025	≤0.02	≥0.02	≤0.3	≤0.5	≤0.05	≤0.12	≤0.05	≤0.55	≤0.43
	>63													≤0.45

备注 / Remarks: Ceq=C+Mn/6+(Cr+V+Mo)/5+(Ni+Cu)/15

力学性能 / Mechanical property

牌 号 Grade	拉伸试验（横向） Tensile test (transverse)				冲击试验（纵向） Impact test (longitudinal)			厚度方向性能 Through-thickness characteristics	
	厚度范围 Thickness (mm)	下屈服强度 Lower yield stength ReL, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率 Elongation A, %	厚度 Thickness (mm)	温度 Temperature ˚C	冲击值 Impact energy J	断面收缩率, % Contraction 均值 Average value	断面收缩率, % Contraction 单值 Individual value
S355NL	> 16~40	≥345	470~630	≥22	> 16	-10	≥30	/	/
	> 40~63	≥335				-20	≥30	/	/
	> 63~80	≥325		≥21		-30	≥30	/	/
	> 80~100	≥315				-40	≥30	/	/
	>100~120	≥295	450~600			-50	≥30	/	/
S355NL+Z15	16~120	同上 Ditto						≥15	≥10
S355NL+Z25								≥25	≥15
S355NL+Z35								≥35	≥25

备注：屈服现象不明显时，采用 $R_{p0.2}$。

Remarks: The yield strength value applies to the Rp0.2, if the yield strength is not pronounced.

（5）机械用钢板
Steel plate for machincal structure

(5.1)、BWELDY460CFM, BWELDY500CFM BWELDY550CFM, BWELDY620CFM BWELDY690CFM

BWELDY460CFM、BWELDY500CFM、BWELDY550CFM、BWELDY620CFM、BWELDY690CFM 为低焊接裂纹敏感性高强度 TMCP 钢板，产品钢质纯净，表面和外观质量优，强度高、低温韧性好，焊接性优良，综合力学性能稳定。目前主要用于煤矿机械行业的高强度结构件。

BWELDY460CFM, BWELDY500CFM, BWELDY550CFM, BWELDY620CFM, and BWELDY690CFM are high strength TMCP steels with low sensitive welding cracking. Owing to high purity of steel and advanced rolling technology, the high performance of the plates can be achieved, for example, high strength, excellent low temperature toughness and weldability, as well as high surface quality and dimensional accuracy of the plates. This grade plates can be used as high strength structural components in mine machinery.

力学性能及 Pcm/ Mechanical property and Pcm

牌 号 Grade	Pcm (%)	厚度范围 Thickness mm	拉伸试验（横向） Tensile test (transverse)			冲击试验（纵向） Impact test (longitudinal)	
			屈服强度 Yield stength $Rp_{0.2}$, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率 Elongation A_5, %	L2（-20℃） Akv，J	L4（-40℃） Akv，J
BWELDY460CFM	≤0.20	≥12-50	≥460	550-710	≥17	≥47	≥47
		>50-80	≥440				
BWELDY500CFM	≤0.20	≥12-50	≥500	610-770	≥17	≥47	≥47
		>50-80	≥480				
BWELDY550CFM	≤0.20	≥12-50	≥550	670-830	≥16	≥47	≥47
		>50-80	≥530				
BWELDY620CFM	≤0.25	≥12-50	≥620	710-880	≥15	≥47	≥47
		>50-80	≥600				
BWELDY690CFM	≤0.25	≥12-50	≥690	770-940	≥14	≥47	≥47

备注 / Remarks: Pcm=C+Si/30+(Mn+Cu+Cr)/20+Ni/60+Mo/15+V/10+5B

(5.2)、BWELDY700CFQ, BWELDY700Q BWELDY900Q, BWELDY960Q BWELDY1100Q

BWELDY700CFQ、BWELDY700Q、BWELDY900Q、BWELDY960Q、BWELDY1100Q 为焊接结构用高强度调质钢板，产品钢质纯净，表面和外观质量优。强度高，并具有很好的塑性和低温韧性，以及良好的焊接性能，综合性能优异。可适用于要求有良好焊接性能的挖掘机、铲车、混凝土泵车、汽车起重机等工程机械，以及采煤机液压支架、大型吊机等矿山、港口机械结构。

BWELDY700CFQ, BWELDY700Q, BWELDY900Q, BWELDY960Q and BWELDY1100Q are high strength Q&T steel plates for welded structure. Owing to high purity of steel and advanced rolling technology, the high performance of the plates can be achieved, for example, high strength, excellent ductility, low temperature toughness and weldability, as well as high surface quality and dimensional accuracy of the plates. This grade plates can be used as structural components of excavators, forklifts, concrete pump trucks and truck cranes, or mine and port equipment such as hydraulic support of coal feeders and large-scale cranes.

力学性能 / Mechanical Property

牌 号 Grade	厚度范围 Thickness mm	拉伸试验（横向） Tensile test (transverse)			冲击试验（纵向） Impact test (longitudinal)	
		屈服强度 Yield stength $Rp_{0.2}$, MPa	抗拉强度 Tensile stength Rm, MPa	伸长率 Elongation A_5, %	L2（-20℃） Akv，J	L4（-40℃） Akv，J
BWELDY700CFQ*	12-50	⩾700	780-940	⩾14	⩾47	⩾47
BWELDY700Q	12-50	⩾700	780-940	⩾14	⩾30	⩾30
	＞50-80	⩾670	760-940	⩾14	⩾30	⩾30
BWELDY900Q	12-50	⩾900	940-1100	⩾12	⩾30	⩾30
BWELDY960Q	12-50	⩾960	980-1150	⩾12	⩾30	⩾30
BWELDY1100Q	15-30	⩾1100	1250-1600	⩾10	⩾30	⩾30

*: Pcm=C+Si/30+(Mn+Cu+Cr)/20+Ni/60+Mo/15+V/10+5B ⩽ 0.20

(5.3)、BHARDY360, BHARDY400 BHARDY400CF, BHARDY450 BHARDY500

BHARDY360、BHARDY400、BHARDY400CF、BHARDY450、BHARDY500为高硬度耐磨钢板，产品钢质纯净，表面和外观质量优，强度高、低温韧性好，综合力学性能稳定。目前主要用于煤矿工程机械、载重车辆等。

BHARDY360, BHARDY400, BHARDY400CF, BHARDY450, BHARDY500 are high hardness wear resistant steel plates. The product can be processed through continuous casting or mould casting, slab reheating, rolling, hot leveling, slow cooling, ultrasonic test, shot blasting, quenching and tempering. Owing to high purity of steel, the excellent mechanical properties can be achieved, for example, high strength and low temperature toughness, as well as high surface quality and dimensional accuracy of the plates. Currently this product is mainly used in mine engineering machinery and loading vehicles.

力学性能 / Mechanical property

牌 号 Grade	厚度范围 Thickness mm	硬度 HB Hardness	弯曲试验（横向） Bend test (transverse)	
			弯曲角度 Angle	弯曲直径 Diameter
BHARDY360	12-50	340-400	90°	d=3a
BHARDY400	12-50	380-440		
BHARDY400CF	12-20	380-440		
BHARDY450	12-50	420-480		
BHARDY500	12-50	450-540		

备注：根据需方要求，经供需双方协商，并在合同中注明，可提供拉伸、冲击性能。

Remarks: Tensile propenty and impact propenty are provided when requirced. They should be indicated in the contract after consulting.

应用案例
Application Cases

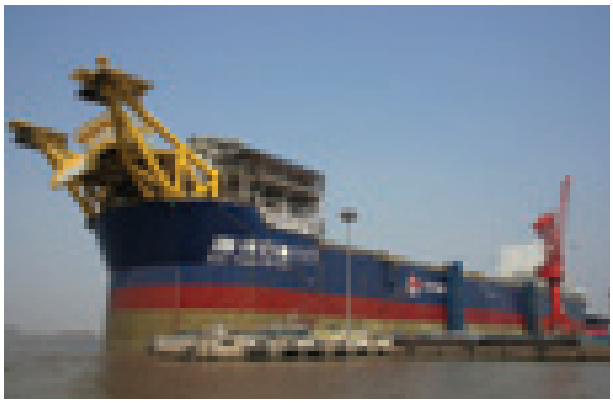
船用钢板
Hull structural steel plate 45

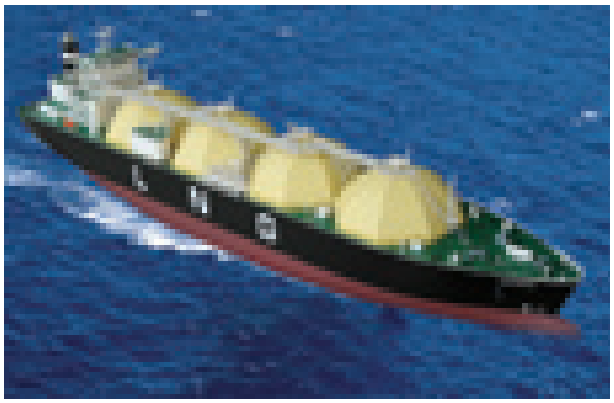
管线用钢板
Steel plate for pipeline 47

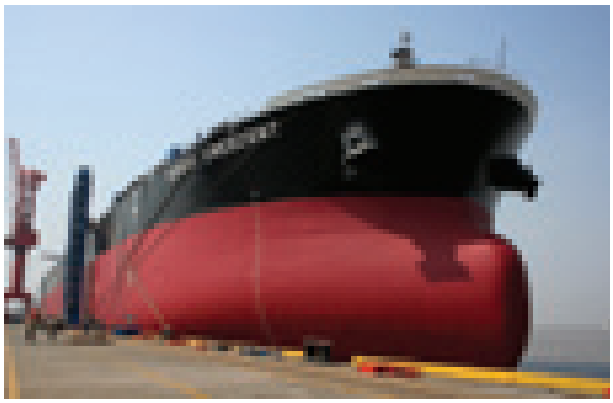
能源用钢板
Steel plate for energy engineering 49

结构用钢板
Structural steel plate 53

应用案例 | Application Cases
船用钢板 Hull Structural Steel Plate





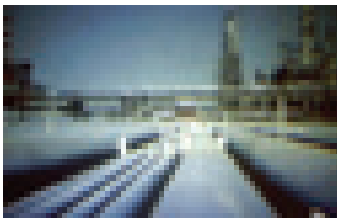


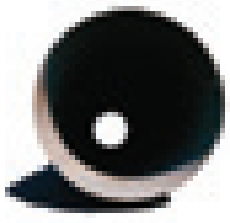
LNG 船
LNG vessel

- 30 万吨浮式储油轮(FPSO)
  300,000 tons Floating Production Storage and Offloading (FPSO)
- 17.6 万吨散货轮
  176,000 tons bulk carrier
- 8530 箱集装箱轮
  Vessel with 8530 containers

船型 Vessel type	钢种 Steel grade	规格范围 Specification
30万吨FPSO 300,000 tons FPSO	A	8～35*1500～4000*6001～20800
	A32	10～40*1600～4000*6000～18500
	B	16～31*2000～4000*7000～19000
	D	14～35*2001～4000*5500～11000
	D32	12～40*1600～4000*5000～18000
	D32 Z25	25*3000*10000
	D36	8.0～30*1650～3450*4500～12000
	E32	24～40*1500～3450*7200～17700
	E32 Z25	24*3500*15000
	E36	20～60*1400～3800*4500～12000
	E36 Z25	28*3000～3800*8000～10000
LNG船 LNG vessel	A	7～60*1500～3000*6000～17500
		7～60*1300～3000*6000～17500
	A36	11*3000*12000
	B	22.5～50*1500～3000*6000～17000
		22.5～24*3000*7000～17000
	D	12～40*1800～3000*8000～17000
		12～50*1600～3200*6000～17000
	D-Z25	16～24*1800～3000*8000～16900
	E	10～74*1800～3100*7000～17000
		10～74*1600～3100*4500～17000
	E-Z25	16*2000～2850*13190～16900
30万吨VLCC 300,000 tons VLCC	A	11～38*1500～4500*6000～22500
	AH32	12～38*1500～4500*6000～22500
文昌海洋平台 Wen Chang offshore platform	DH32 NV D36	20*2100～2470*10840～15120

管线用钢板 Steel Plate for Pipeline

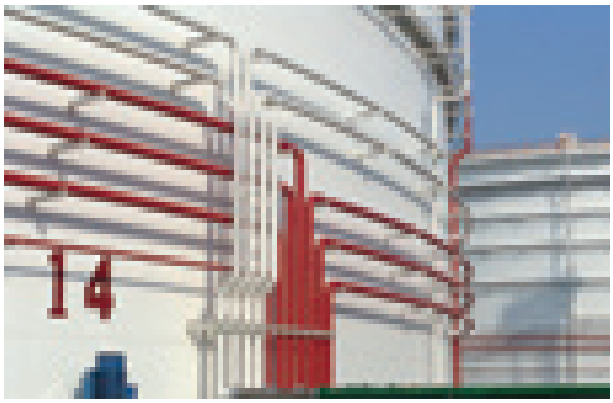


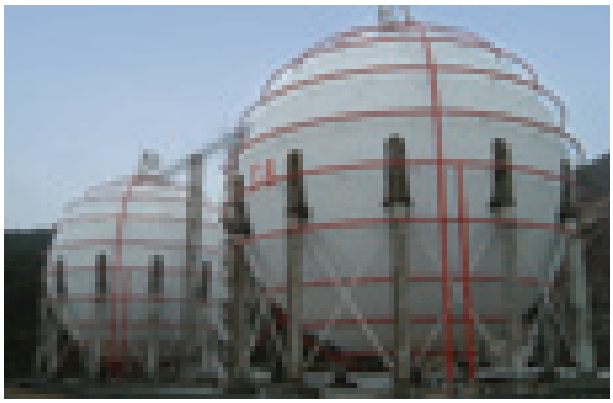


项目名称 Project	材质 Grade	厚度范围（mm） Thickness	管径（mm） Pipe diameter
印度海底管线 Submarine pipeline, India	X52	20~24	1219
川气出川管线 Pipeline for transmitting Sichuan's natural gas	X70、X70-W	21、26.2	1016
福建炼化海底管线 Submarine pipeline, Fujian Refinery	X60	17.5	711
俄罗斯远东输油管线(中俄原油管线) Far east oil pipeline, Russia （Sino-Russian crude oil pipeline）	K60-2、K70	19~24	1219
西气东输二线 Second phrase, pipeline for transmitting gas from west to east	X80	22	1219

应用案例 | Application Cases

能源用钢板 Steel Plate for Energy Engineering





水电 Hydropower station

- 原油储罐 Crude oil storage tank
- 球罐 Spherical vessel
- 核电站 Nuclear power plant
- 火电厂 Thermal power plant

1．原油储罐
Crude oil storage tank

项目名称 Project	用途 Purpose	钢种及规格 Steel Grade and Specification
中石化白沙湾原油商业储备基地 Baishawan Crude Oil Commercial Reserve Base, China Petroleum & Chemical Corp (SINOPEC)	15万立方米原油储罐 Crude oil storage tank with volume of 150000 m^3	12～40mm B610E（08MnNiVR）
镇海国家战略石油储备基地 Zhenhai National Oil Reserve Limited Company	10万立方米原油储罐 Crude oil storage tank with volume of 100000 m^3	12～34mm B610E（08MnNiVR）
黄岛国家战略石油储备基地 Huangdao National Oil Reserve Limited Company		
中石油兰州石化新改扩建原油储备工程 Crude oil reserve project in Lanzhou Chemical Company, China National Petroleum Corporation (CNPC)		
中海油惠州炼化项目 Huizhou refinery project, China National Offshore Oil Corporation (CNOOC)		
大连港新港南海原油罐区(二期)工程 Nanhai crude oil reserve (second stage) in the new harbor zone of dalian port limited company		
中石化白沙湾原油商业储备基地 Baishawan Crude Oil Commercial Reserve Base of SINOPEC		
中石化镇海岚山原油商业储备基地工程 SINOPEC Nanshan Oil Commercial Reserve Base in Zhenhai, Zhejiang		
营口港仙人岛原油一期工程 Xianren Island crude oil reserve first-stage project		
中海油广西钦州炼化工程储罐项目 Qinzhou refinery project in Guanxi Zhuang, China National Offshore Oil Corporation (CNOOC)		

2．球罐
Spherical vessel

项目名称 Project	用途 Purpose	钢种及规格 Steel grade and specification
重庆天然气改造项目 Chongqing natural gas reconstruction project	5000立方米天然气球罐 5000m^{3}spherical vessel for natural gas	10、36mm B610CF （07MnCrMoVR）
南阳汉冶钢厂球罐项目 Spherical vessel project in Nanyang Hanye Steel Works	1000立方米氧气球罐 1000m^3 spherical vessel for oxygen gas	50mm B610CF （07MnCrMoVR）
鞍钢新轧钢球罐项目 Spherical vessel project in Ansteel Company Limited	650立方米氮气球罐 650m^3 spherical vessel for nitrogen gas	44mm B610CF （07MnCrMoVR）
宝钢股份不锈钢分公司球罐项目 Spherical vessel project , Stainless Steel Branch, Baoshan Iron & Steel Co., Ltd, 吉林通化钢铁厂球罐项目 Spherical vessel project in Tonghua Iron & Steel Group Company Limited	-40℃低温球罐 Low temperature spherical vessel at -40℃	36、38mm B610CF-L1 （07MnNiMoVDR）
中海油惠州炼化项目 Huizhou refinery project, China National Offshore Oil Corporation (CNOOC) 天津石化百万吨乙烯工程 Million tons ethylene project in SINOPEC Tianjin Company 镇海炼化工程 SINOPEC Zhenhai Refining & Chemical Co. (ZRCC)	-50℃低温乙烯、丙烯球罐 -50℃Low temperature spherical vessel at for ethylene, propylene	10~50mm B610CF-L2 （07MnNiMoVDR）
东莞九丰能源项目 Project in The Energy Word of Jovo, Dongguan	球罐 Spherical vessel	12~55mm 15MnNbR
中石化青岛大炼油项目 SINOPEC Qingdao Refining Corp. Ltd.	球罐 Spherical vessel	14~48mm 15MnNbR
邯郸钢铁厂球罐项目 Spherical vessel project in Handan Iron & Steel Company	1000立方米氧气球罐 1000m^3 spherical vessel for oxygen gas	44~50mm 15MnNbR
珠海恒基达鑫项目 Project in Zhuhai Winbase International Chemical Tank Terminal Co., Ltd.	球罐 Spherical vessel	8~60mm 15MnNbR

3．大型水电站金属构件
Metallic components in large hydropower station

项目名称 Project	用途 Purpose	钢种及规格 Steel plate and specification
三峡右岸地下电站 Underground hydropower station in China Three Gorge Project Corporation	压力钢管 Penstock 蜗壳 Spiral case 水轮机 Turbine	42~60mm B610CFHL2 (B610CF)
锦屏一级水电站 Jinping Hydropower Station	压力钢管 Penstock	12~76mm B610CFHL2 (B610CF)
向家坝水电站 Xiangjiaba Hydropower Station	压力钢管 Penstock	
龙滩水电站 Longtan Hydropower Station	蜗壳 Spiral case	
通用亚洲水电设备有限公司 GE Hydroasia Co. Ltd.	蜗壳 Spiral case	12~60mm P460NL1
哈尔滨电机厂有限公司 Haerbin Electric Machinery Co, Ltd. 阿尔斯通水电 ALSTOM Hydropower	蜗壳 Spiral case 水轮机 Turbine	12~100mm B610CFHL2 (B610CF)

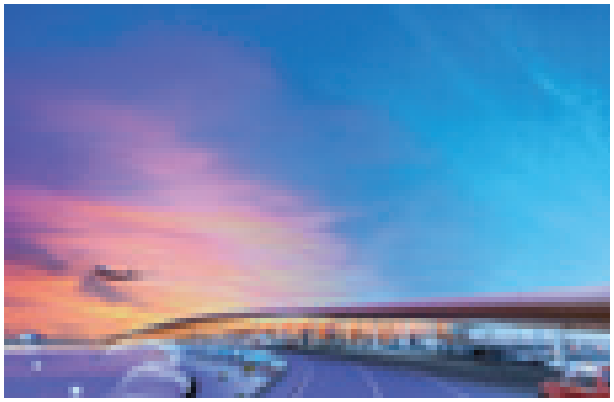
4．核电
Nuclear engineering

项目名称 Project	用途 Purpose	钢种及规格 Steel grade and specification
山东核电设备制造有限公司 Shandong Nuclear Power Equipment Manufacture Co. Ltd.	AP-1000 安全壳 AP-1000 Containment Vessel	19-96mm SA738Gr.B
岭澳核电站二期项目 Second stage project in Lingao Nuclear Power Station	MSR壳体，封头 MSR Shell and head	30~64mm SA516Gr.70
	ASD罐箱 ASD tank	8~118mm 20HR
秦山核电站二期扩建 Second stage enlarged project in Qinshan Nuclear Power Station	蒸气发生器 Steam Generator	10~100mm SA516Gr.70
巴基斯坦恰希玛核电站二期 CHASHMA Nuclear Power Plant In Pakistan	蒸气发生器 Steam Generator	10~115mm 20g

5．锅炉、电力、石化
Boiler、Power、Petrochemical engineering

项目名称 Project	用途 Purpose	钢种及规格 Steel grade and specification
上锅，东锅，哈锅电站项目 Electric power engineerings by Shanghail Boiler Company Limited; Easten Boiler Factory And Harbin Boiler Company Limited	电站耐热结构件 Components for resisting heat in power station	10~100mm SA387Gr.11, SA387Gr.12, SA387Gr.22, 15CrMoR, 12Cr1MoV等
新疆独山子炼化项目 Dushanzi Refinery Project in Xinjiang	乙烯项目换热器 Thermal exchange equipment for ethylene project	10~120mm SA516Gr.70
福建炼化项目 Refinery Project in Fujian	炼化设备 Refinery equipment	10~100mm 16MnR
上海外高桥／国华宁海／浙江玉环等电厂 Power stations in Waigaoqiao Shanghai, Ninghai, Yuhuan, Zhejiang	100万超超临界机组 Ultra super critical unit	10~120mm SM490B

应用案例 | Application Cases
结构用钢板 Structural Steel Plate



首都国际机场
二期航站楼
Terminal 2 of
capital airport

环球金融中心
Shanghai world financial center

央视新台址
New site of CCTV

西喉门大桥
Xihoumen bridge

工程项目／产品 Construction project / product	钢种 Steel grade	规格（mm） Specification
央视新台址 New site of CCTV	A572Gr50/Z15/Z25/Z35	8~100
	Q235C	12~150
	Q345B/Z15/Z25	16~70
	Q345C/Z15/Z25/Z35	8~100
	Q345D/Z25	18~120
	Q345GJC/Z15/Z25/Z35	60~100
	Q390C	14~120
	Q390D/Z15/Z25/Z35	10~120
	Q420D/Z15/Z25/Z35	30~100
	Q460E/Z25/Z35	50~110
环球金融中心 Shanghai world financial center	A572Gr50/Z25/35	40~105
	SN490B	10~55
	SN490C	16~60
日本森大厦平河町大楼 Hirakawacho mori tower	SN490B、SN490C	10~60
国家图书馆 National library	Q345C/Z15/Z25	40~80
国家体育场 National stadium	Q345GJC/Z15/Z25	14~60
	Q345GJD/Z15/Z25/Z35	＞60~135
上海长江隧桥工程 Shanghai yangtse river tunnel project	Q345qC/D	10~85
武汉天兴洲大桥 Wuhan tianxingzhou bridge 上海闵浦大桥 Shanghai minpu bridge	14MnNbq/Q370qE	14~50×2100~4200
舟山西喉门大桥 Zhoushan xihoumen bridge	Q345qC/D/Z25	8~80
神华集团煤矿项目 Colliery project of shenhua group	Q690CFD, Q550CFD, BHT80D (BWELDY690CFM,BWELDY550CFM, BWELDY700Q)	16~80
广州新电视塔 Guangzhou new televison tower	Q345GJC/Z15/Z25 Q345C/Z15/Z25 Q390GJC/Z15/Z25 Q420GJCW	20~80
首都国际机场二期航站楼 Terminal 2 of capital airport	Q345GJC	80~120
GE公司风塔结构 Wind tower strutruce of GE company	S355NL/Z25	50~120

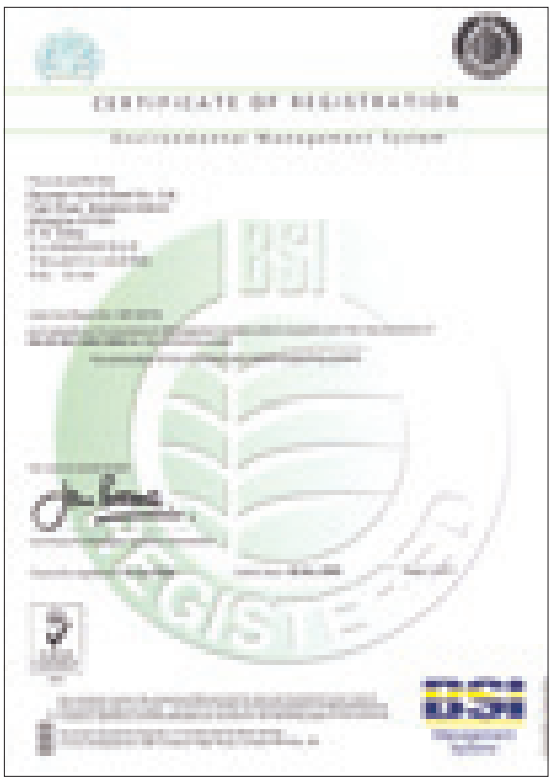
质量保证体系
Quality Assurance System

宝钢5m厚板厂05年3月投产以来，通过全体员工的不懈努力，建立和完善各项管理机制，05年11月获得了ISO9001、ISO14001、OHSAS18001等体系的认证。

Since its being put into production in March, 2005, the 5-meter heavy plate plant has established and improved different kinds of management mechanism. Certificates of system registration such as ISO9001, ISO14001 and OHSAS18001 have been gained in November 2005.


CQC
质量管理体系认证证书
中国质量认证中心


环境管理体系认证证书


CERTIFICATE OF REGISTRATION
Environmental Management System
BSI
REGISTERED
BSI


CERTIFICATE OF REGISTRATION
Environmental Management System
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质量保证体系
Quality Assurance System


Certificate of Registration


Certificate of Registration


Certificate of Registration


Certificate of Registration

产品认证
Approved Product Certificate

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通过认证的产品
Approved Products

一、通过认证的产品
Approved Products

1. 通过船级社认证的钢级及规格
The steel grades and specifications approved by classification of society

船级社 Classification of Society	品种 Steel type	钢级 Steel Grade	厚度范围 Thickness mm	交货状态 Delivery Condition	厚度方向性能 Through-thickness Characteristics
ABS BV CCS DNV LR KR NK GL RINA	普通强度船板 Ordinary-strength hull structural steel plates	NVA/NVB	≤50	NR	Z25/Z35
		NVD	≤35	NR	
		A/B	≤50	AR	
			≤80	N	
		D	≤35	AR	
			≤80	N	
		E	≤80	N	
	高强度船板 High-strength hull structural steel plates	AH27S*/DH27S* AH32/DH32 AH36/DH36	≤20	AR	Z25/Z35
			≤40	CR（NR）	
			≤80	TM（TMCP）	
			≤80	N	
		EH27S*/EH32/EH36	≤80	TM（TMCP）	
			≤80	N	
DNV	船用锅炉压力容器钢板 Boiler and pressure vessel steel plates for shipbuilding	NV360-0F,1F,2F NV410-0F,1F	≤50	AR	-
			≤80	N	
		NV460-0F,1F NV490-0F,1F	≤20	AR	
			≤40	CR（NR）	
			≤80	N	
		NV510-0F,1F	≤40	CR（NR）	
			≤80	N	
LR	船用锅炉压力容器钢板 Boiler and pressure vessel steel plates for shipbuilding	360FG/410FG/ 460FG/490FG/ 510FG	≤40	CR（NR）	-
			≤80	N	
CCS	压力容器用高强度厚钢板 High strength heavy steel plates for pressure vessels	B610CF（07MNMoVDR） B610CF-L1（07MnNiMoVDR） B610CF-L2（07MnNIMoVDR）	≤50	QT	-

注：1. AR-轧态，CR（NR）-控轧（正火轧制），N-正火，TM(TMCP)-热机械轧制
2. 如用户有要求，也可按照 GB/T712 供货；
3. * AH27S、DH27S 和 EH27S 为 DNV 和 LR 船级社规范中钢级
4. B610CF，B610CF-L1，B610CF-L2 为宝钢企业标准 Q/BQB660-2006 中牌号。
5. 宝钢分公司分别通过了 ABS 船级社的 QA（Quality Assurance）认证，BV 船级社的 Model I 认证，CCS 船级社的 QA 认证、LR 船级社的 MQS（Material quality Scheme）认证、NK 船级社的 QA 认证、KR 船级社的 QA 和 DNV 船级社的 MSA 认证。
6. NVA, NVB, NVD 为通过 DNV 船级的钢级

Remarks: 1. AR-as rolled, CR-control rolling, N-normalizing, TM-Thermomechanical control process
2. GB712 is also available if the customer requires.
3. AH27S and DH27S are included exclusively in DNV and LR classification of society.
4. B610CF, B610CF-L1 and B610CF-L2 are the steel grades exclusively included in Baosteel enterprise standard Q/BQB660-2006.
5. Baoshan Iron and Steel branch company has obtained the approval certificate of QA (Quality Assurance) of ABS,CCS, NK and KR, MQS (Material quality Scheme) of LR and MSA of DNV respectively.
6. NVA, NVB, NVD has been approved by DNV

2. 通过国家特征设备制造许可认证钢级及规格

The steel grades and specifications which are approved or authorized manufacture license for special equipment by national related administrative or institutes

产品名称 Product Name	牌号 Steel Grade	规格(mm) Specification	标准 Standard	备注 Remark
锅炉和压力容器用钢板 Steel plates for boilers and pressure vessels	Q245R, Q345R, Q370R, 18MnMoNbR，13MnNiMoR，15CrMoR，12Cr1MoVR 14Cr1MoR，12Cr2Mo1R	6.0-150×900-4800×L	GB713-2008	注1 Remark 1
低温压力容器用低合金钢钢板 Low alloy steel plates for low temperature pressure vessels	16MnDR，09Mn2VDR，15MnNiDR，09MnNiDR	6.0-100×900-4800×L	GB3531	
压力容器用调质高强度钢板 High strength Q&T steel plates for pressure vessels	07MnCrMoVR,07MnNiMoVDR	12-60×900-4800×L	GB19189	

注 1：新发布的 GB 713-2008 替代 GB 713-1997 和 GB6654-1996，于 2008 年 9 月 1 日起实施。

Remark 1: The newly-issued GB 713-2008 has replaced GB 713-1997 and GB6654-1996, and has been implemented from September 1, 2008.

3. 通过全国锅炉压力容器委员会技术评审钢级及规格

The steel grades and specifications approved by the China Standardization Committee on Boilers and Pressure Vessels(CSCBPV)

产品名称 Product Name	牌号 Steel Grade	厚度范围（mm） Thickness	服役温度 Service Temperature	标准 Standard
压力容器用高强度厚钢板 High strength thick steel plates for pressure vessels	08MnNiVR(B610E)	12-45	-20℃-100℃	Q/BQB660-2006
	B610CF	12-50	-20℃-100℃	
	B610CF-L1	12-50	-40℃-100℃	
	B610CF-L2	12-50	-50℃-100℃	
锅炉压力容器用钢板 Steel plates for boilers and pressure vessels	12CrMo1R	≤100	-	GB/T713-2008, GB150
	14Cr1MoR	≤100	-	

注：95mm 厚 12Cr2Mo1R（H）钢板可用于制造相应设计参数的临氢设备。

Remark: 12Cr2Mo1R（H）with the thickness of 95mm can be used to manufacture the equipment for critical hydrogen with corresponding design parameters .

通过认证的产品
Approved Products

4. 通过 JIS 标志认证钢级及规格

The steel grades and specifications approved by JIS

产品名称 Product Name	牌号 Steel Grade	规格 Specification	标准 Standard	备注 Remark
建筑结构用厚钢板 Heavy steel plates for construction	SN400A、SN400B、SN400C、SN490B、SN490C	SN400A、SN400 B、SN490B， 厚度/Thickness：6.0-100mm， SN400C、SN490C， 厚度/Thickness：16.0-100mm， 宽度/Width：900-4800mm， 长度/Length：3000-25000mm；	JIS G3136	-
一般结构用轧制钢材 Rolled steel plates for general structure	SS330,SS400, SS490,SS540	-	JIS G3101	-

5. 通过欧盟 CE 认证钢级及规格

The steel grades and specifications approved by EU CE

认证规范 Authentication Specification	证书号 Certificate Number	标准 Standard	牌号 Steel Grade	厚度范围 Thickness（mm）	交货轧态 Delivery Condition
AD 2000-W0/ TRD-100	01202CHI/A-060200	EN10028-2	P235GH, P265GH, P295GH, P355GH	10-150	AR、N
		EN10028-3	P355N, P355NH, P355NL1, P355NL2;		
PED 97/23/EC	01202 CHI/Q-06 0200	EN10025-1993	S235JRG1, S235JRG2, S235J2G3 S275JR, S275J2G3, S355J2G3, S355K2G3,		
		EN10025-2-2004	S235JR, S235J0, S235J2, S275JR, S275J0, S275J2, S355JR, S355J0, S355J2, S355K2		
CPD 89/106/EEC	0035-CPD-A201	EN10025-1/2-2004	S235JR, S235J0, S235J2,S275JR, S275J0, S275J2, S355JR, S355J0, S355J2, S355K2	10-150	AR、N

产品证书 | Product Certificates

船级社证书 Certificate of Classification of Society

产品证书 | Product Certificates

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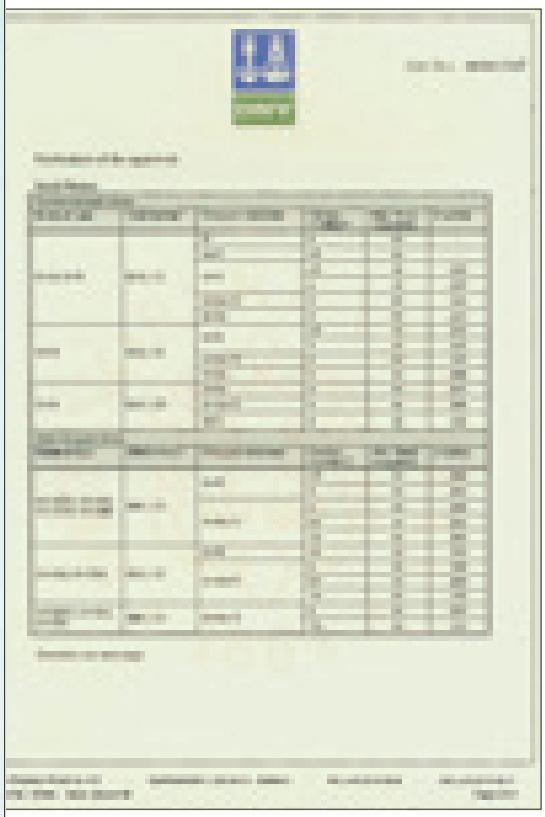
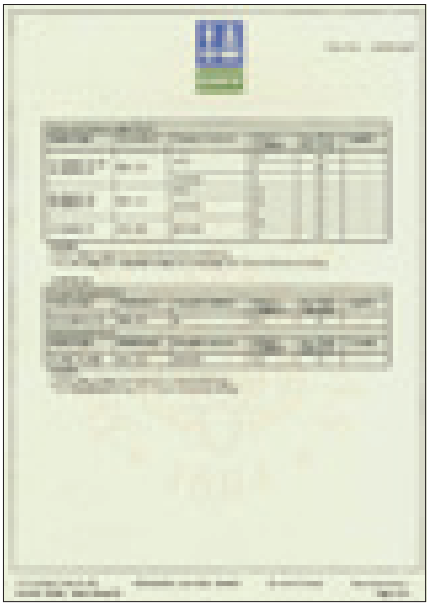
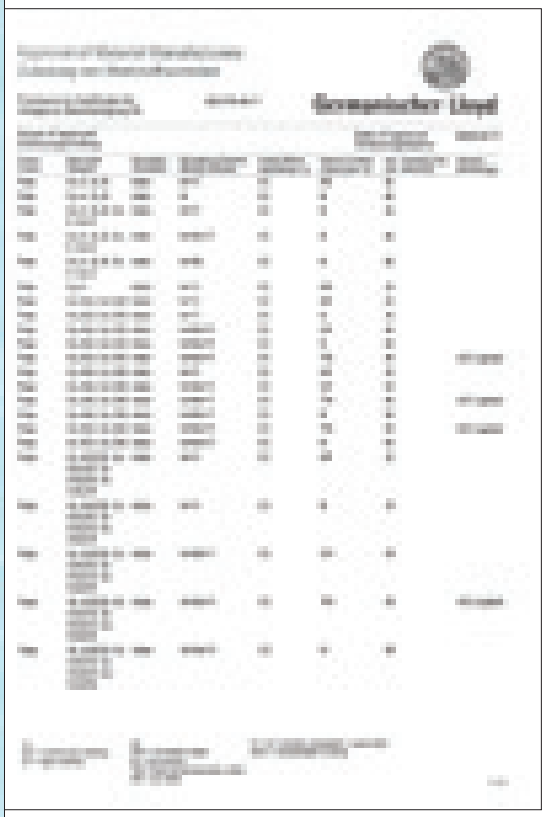
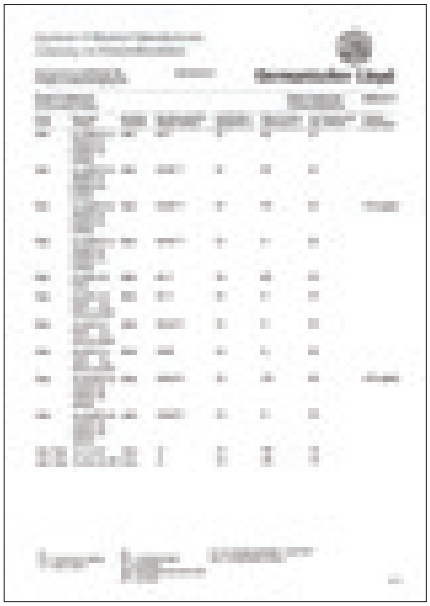
APPROVAL OF MANUFACTURER

CERTIFICATE



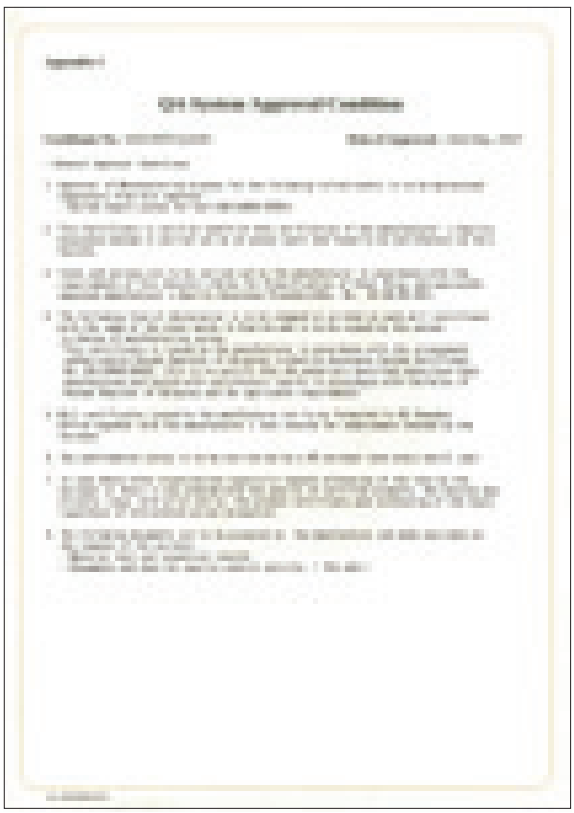


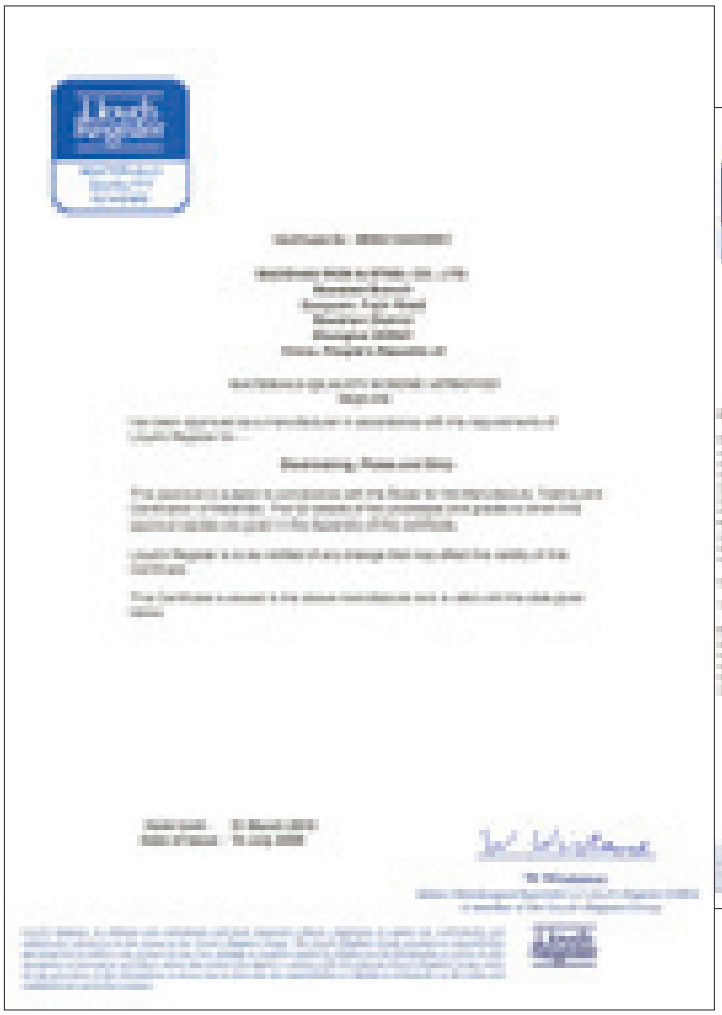


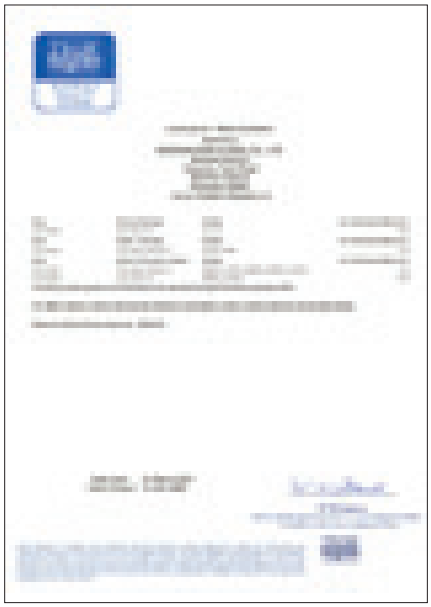


产品证书 | Product Certificates

船级社证书 Certificate of Classification of Society







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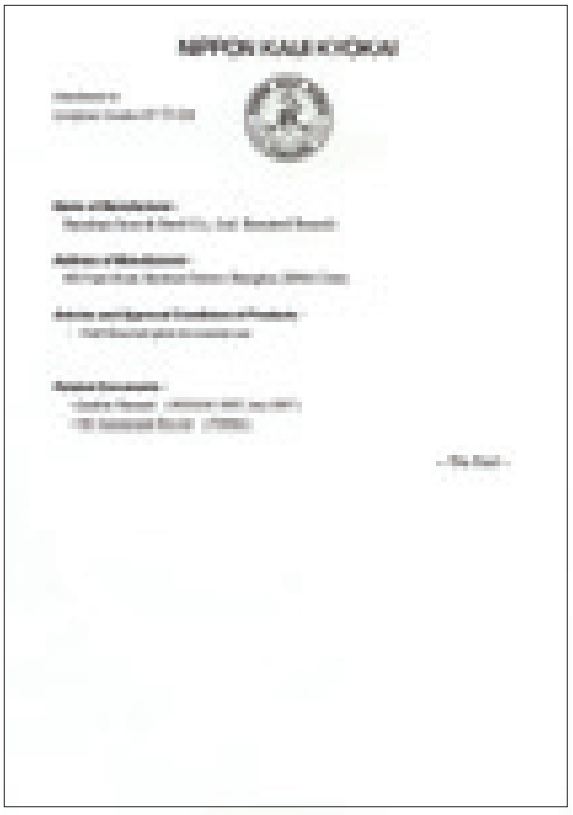
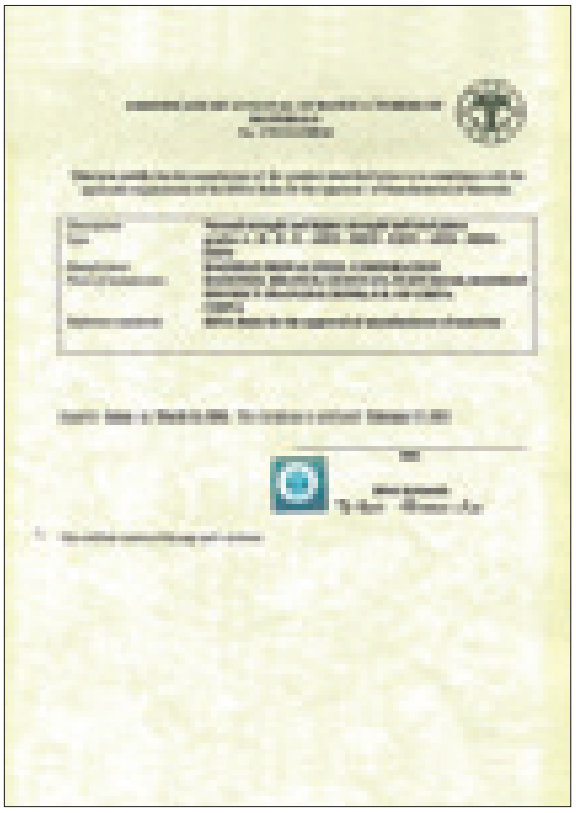
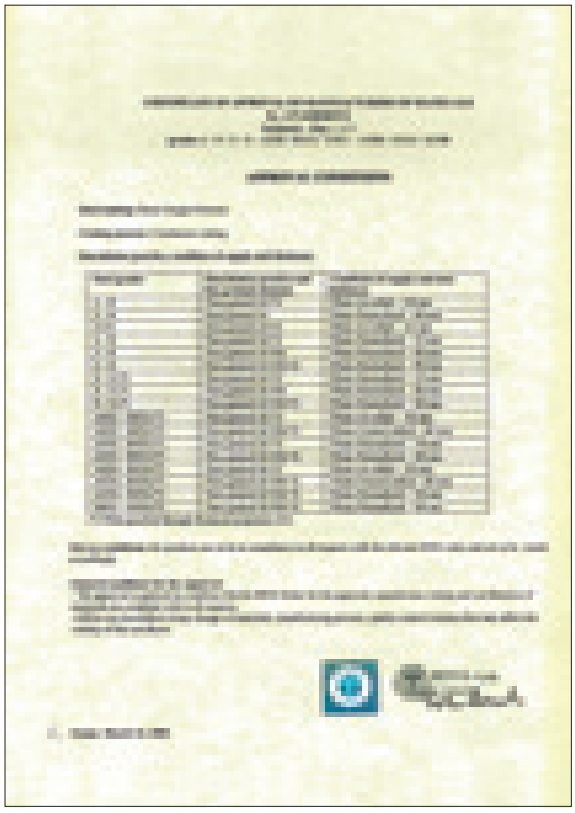
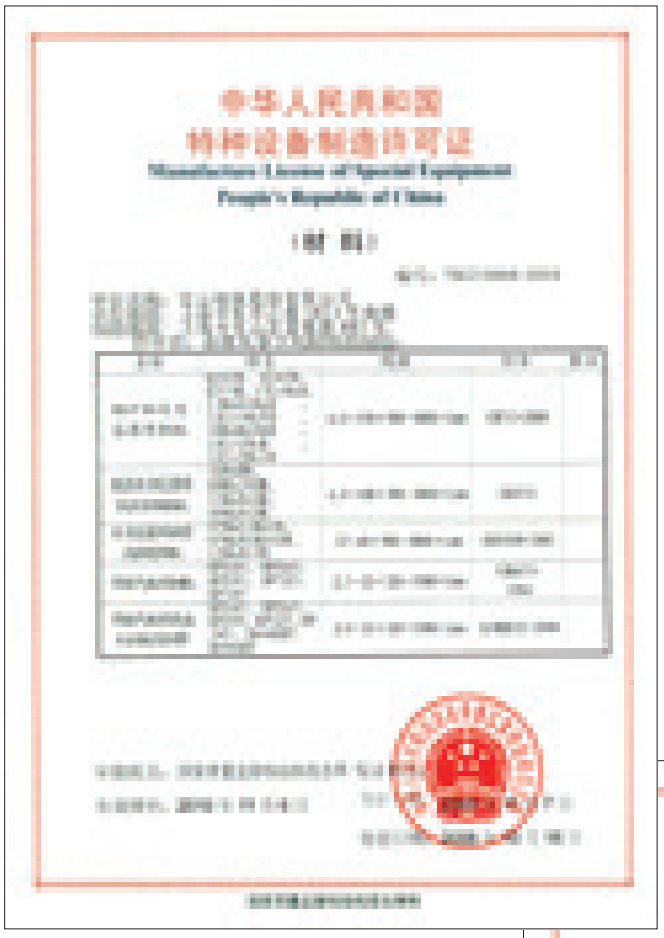






产品证书
特种设备许可证书

Product Certificates
Certificate of Special Equipment by National Related Administrative or Institutes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特种设备制造许可证


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特种设备制造许可证


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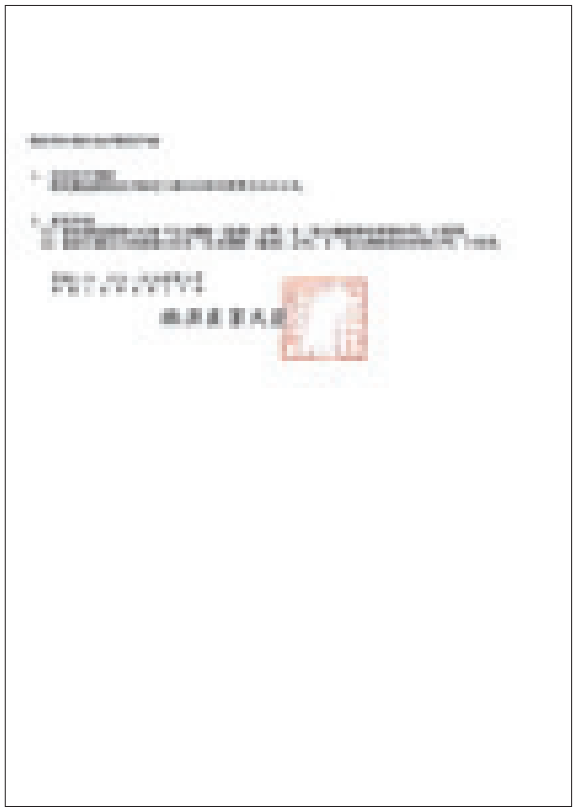
产品证书 | Product Certificates

JIS 证书　JIS certificate

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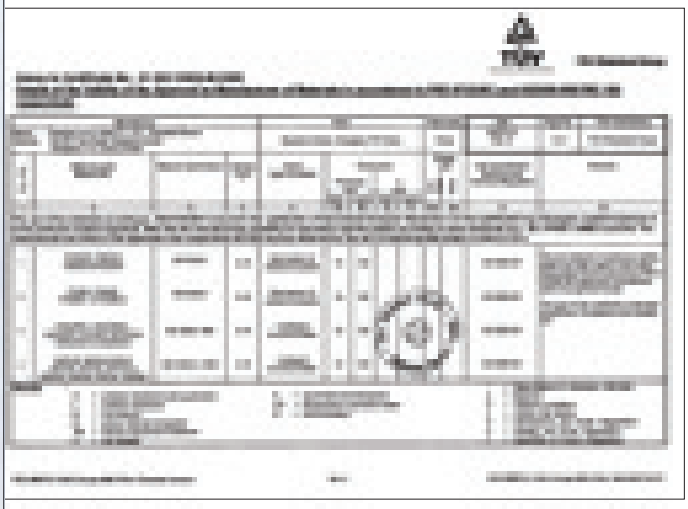


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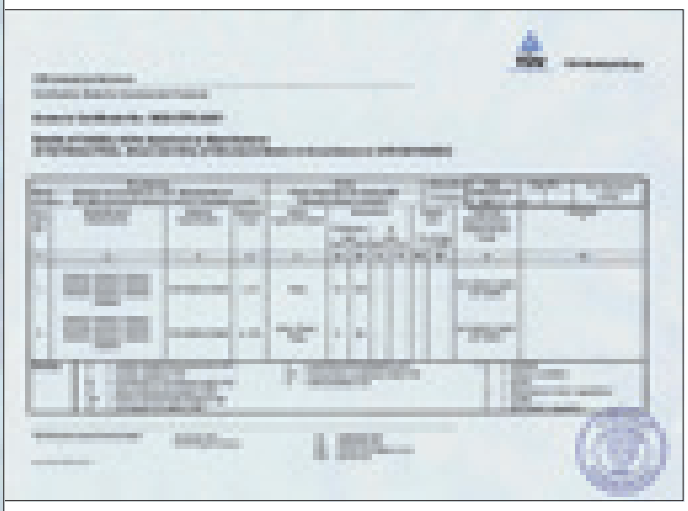

产品证书 | Product Certificates

CE 证书 CE certificate

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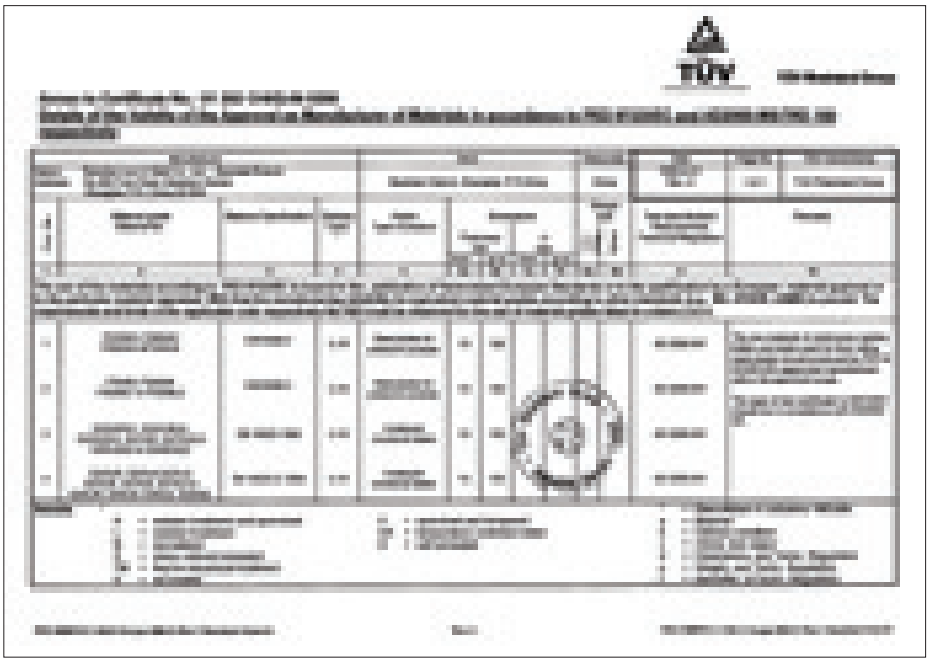

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厚板品种管理部
Heavy Plate Management
地址：上海宝山同济路333号
邮编：200940
电话：021-26642562
传真：021-26642564

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