



NISCO

南钢耐磨钢和高强钢产品手册

Introduction of abrasion resistant plates and high strength structural plates

售后服务

- 1、国内外重点工程，公司将派遣专业技术人员到现场进行跟踪并提供技术支持。
For important domestic and overseas projects, NISCO will arrange technicians to sites to instruct and support clients during following supplied materials.
- 2、您在加工使用中存在的任何问题可向我们的技术部门寻求支持。
Quick responses to you on any questions and help in need.
- 3、用户提出书面质量异议后，公司承诺 24 小时内给予回复，72 小时内到达现场。
NISCO promises to response in 24 hours and arrive at sites in 72 hours when claiming.

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中国优秀耐磨钢和高强钢生产企业

Excellent enterprise in making abrasion resistant plates and high strength structural plates in China

SARS
WEAR PLATE

NISCO 南京钢铁股份有限公司
NANJING IRON & STEEL CO.,LTD.



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◎ 南钢简介

Brief introduction of NISCO

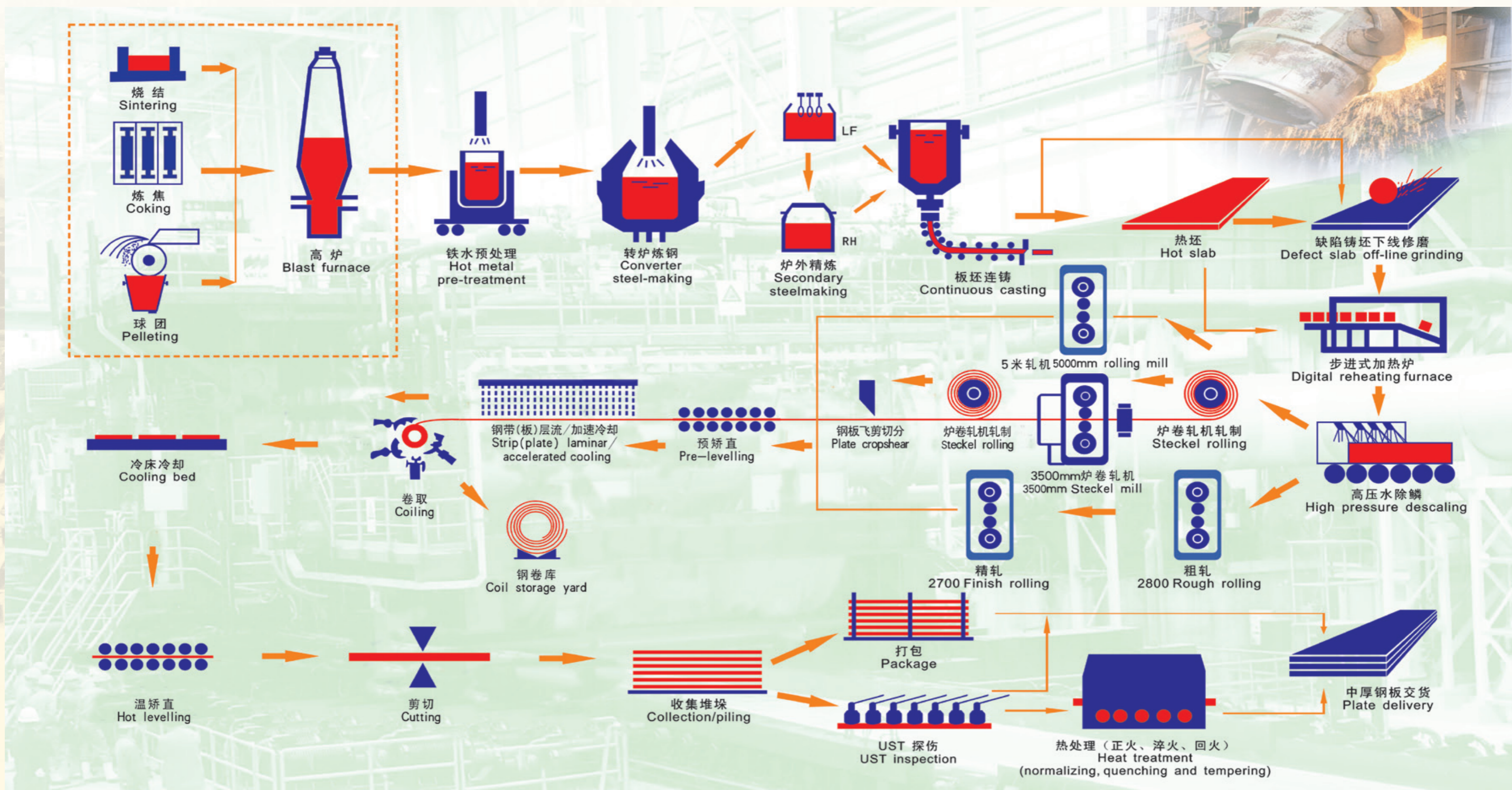
南京钢铁股份有限公司（以下简称“南钢”），位于南京市江北沿江工业开发区，传承于南钢集团有限公司，始建于1958年。南京钢铁股份有限公司作为南钢集团核心企业，经过50余年的艰苦创业和创新发展，现已发展成为以精品板材、优特钢长材为支撑的特大型钢铁联合企业。现在具备年产1000万吨钢的综合生产能力，生产板材、棒材、线材、带钢、球扁钢等产品。

南钢以战略为指引，创新、改革、发展为导向，倡导“以人为本，同心共进”的企业价值观，不断谋求企业由优秀向卓越迈进，追求多方共赢。企业先后获得“中国优秀企业形象单位”、“全国质量效益型企业”、“全国实施用户满意工程（用户满意产品）先进单位”、“全国优秀诚信企业”等荣誉称号。在2009年获得“全国质量奖”。

Nanjing Iron & Steel Co. Ltd. (hereinafter referred as NISCO) is located in Yanjiang Industrial Development Zone, Nanjing, and is restored from Nanjing Iron & Steel Group Company built in 1958. As the core of Nanjing Iron & Steel Group, NISCO has been developed into an extra large iron and steel complex which takes the high value added plates and high quality special long products as its strong support with 50 years' development through hardworking and innovation. Now the capacity is 10 million tons of steel covering steel products of plates, round bars, wire rods, narrow strips and flat bulbs.

NISCO takes the strategy as its guidance, applying innovation, reformation and development as its direction, advocating the enterprise value of taking people as the orientation and developing with the same objective. NISCO seeks for continuous improvement for excellent performance and pursues multi-win approach. NISCO has been entitled as the Image as China Excellent Enterprise, National Quality & Benefit Enterprise, Advanced Enterprise for National Implementation of User Satisfactory Project, and National Excellent Creditable Enterprise. NISCO was awarded "China Quality Award" in Sep. 2009.

◎ 生产流程 Process flow



◎ 主要装备 Main equipments



1 × 2500m³、2 × 2000m³ 高炉 Blast furnace



焦化炉 Coking furnace



球团竖炉 Pelletizing shaft furnace



180、220m² 烧结机
Sintering machine



360m² 烧结机
Sintering machine

◎ 主要装备 Main equipments



3 × 150 吨转炉
3 × 150 ton Converter



2800mm 轧机
2800mm medium plate mill



3500mm 炉卷轧机
3500mm Steckel mill



5000mm 宽厚板轧机 5000mm Wide/thick plate mill



3 × 150 吨 LF 精炼炉
3 × 150 ton LF refinery furnace



2 × 150 吨 RH 炉
2 × 150 ton RH degas station



3 台板坯连铸机
3 sets of Continuous casting machines

◎ 主要装备 Main equipments



淬火机 Quenching device



辊底式热处理炉（正火、淬火、回火）
 Roller type heat treatment furnace (for normalizing, quenching and tempering)



预矫直机 Pre-leveling machine



温矫直机 Warm leveling machine



强力冷矫直机 High force leveling machine

◎ 耐磨钢板产品介绍 Introduction of abrasion resistant plates

产品概述 Brief Introduction

南钢生产低合金高强度耐磨钢板 NM360、NM400、NM450、NM500、NM550 和 NM600 在具有高的强度和硬度的同时，还具有较好的低温冲击韧性、焊接性能、机加工性能和成形性能。南钢耐磨钢板已在不同气候类型、地形和工作环境下经过反复考验，并表现出十分优异的性能。主要应用挖掘机、前轮装载机、各类自卸车车厢、输送机、溜槽、容器、破碎机、切碎机、搅拌机、筛选设备 etc。南钢耐磨钢板可极大地提高产品和设备的耐磨性能，降低故障停机风险，并有助于制定极为精确的设备保养计划，针对不同场合耐磨钢可使您的产品使用寿命延长至两到三倍，有时甚至是五倍以上；同时，可以减轻产品的自重，耐磨钢板的硬度、韧性和结构强度的独特组合使得在降低钢板厚度的同时又提高使用寿命。使用厚度更薄的钢板有助您制造出载重量更大的运输设备，减少 CO₂ 的排放量。

NISCO produces high strength low alloy abrasion resistant steel plates of grade NM360, NM400, NM450, NM500, NM550 and NM600 which not only have high strength and hardness, but also have excellent properties of low temperature toughness, weldability, machining properties and formability. NISCO's abrasion resistant steel plates have been proved excellent performances when used in different types of climates, terrains and work environments. These products are used for making excavators, wheel loaders, dump trucks, conveyors, chutes, containers, crushing machines, cutting machines, mixers, screening equipments, etc. NISCO's plates can increase the wear resistance properties of equipments greatly and reduce the risk of breakdown and stoppage, which is contributed to develop the precise equipment maintenance plan for clients. The working life of facilities made by NISCO's abrasion resistant steel plates can be extended to two times longer than other grades, sometimes can achieve 5 times. The unique combination of excellent hardness, good toughness and high strength can reduce self weight and extend the service life. The use of thinner plate is helpful to create a conveyer with greater load capacity and lower CO₂ emission.

代表钢种 typical grades: NM360、NM400、NM450、NM500、NM550、NM600

交货状态 delivery condition: Q+T

交货规格 supplying size range:

表示可交货范围 Supply range 单位 Unit: mm

	1600	1800	2000	2200	2400	2600	2800	3000	3200
5 ≤ t < 8									
8 ≤ t < 10									
10 ≤ t < 12									
12 ≤ t ≤ 30									
30 < t ≤ 60									

执行标准：技术协议、GB/T 24186 或 NISCO 企标。

Applying standard: technical agreement, GB/T 24186 or NISCO standard.

尺寸公差：可满足 GB、EN、ASTM 或用户特殊需求等各类公差要求。

Dimension tolerance: meet requirements Chinese standard, EN standard, ASTM standard or client's standard.

探伤标准：按 GB/T 2970 II 级或 EN 10160 S1E1 逐块探伤，特殊要求钢板进一步加严探伤。

Ultrasonic test: apply GB/T 2970 II level, EN 10160 S1E1 or client's requirements on each plate.

成分及典型机械性能 Composition and typical mechanical properties

表 1 不同级别耐磨钢的成分含量范围 (wt%)

Table 1 The elements content of abrasion resistant steels (wt%)

钢级 Grade	C	Si	Mn	Al	Cr	B	Ti	Mo	Ni
NM360	≤ 0.18	≤ 0.40	≤ 1.45	≤ 0.060	≤ 0.50	≤ 0.0020	≤ 0.035	≤ 0.40	--
NM400	≤ 0.22	≤ 0.40	≤ 1.50	≤ 0.060	≤ 0.60	≤ 0.0020	≤ 0.035	≤ 0.40	≤ 0.50
NM450	≤ 0.25	≤ 0.60	≤ 1.50	≤ 0.060	≤ 1.00	≤ 0.0020	≤ 0.035	≤ 0.50	≤ 0.50
NM500	≤ 0.32	≤ 0.60	≤ 1.50	≤ 0.060	≤ 1.10	≤ 0.0023	≤ 0.035	≤ 0.60	≤ 0.50
NM550	≤ 0.37	≤ 0.60	≤ 1.60	≤ 0.060	≤ 1.30	≤ 0.0025	≤ 0.035	≤ 0.70	≤ 0.80
NM600	≤ 0.47	≤ 0.40	≤ 1.00	≤ 0.060	≤ 1.30	≤ 0.0025	≤ 0.035	≤ 0.50	≤ 2.50

P ≤ 0.010%、S ≤ 0.0015%、H ≤ 1.5ppm、N ≤ 45ppm、O ≤ 15ppm

残余元素含量低 Low level of residual elements:

Pb ≤ 0.003%、Sb ≤ 0.002%、Sn ≤ 0.004%、As ≤ 0.006%

表 2 不同级别耐磨钢的碳当量水平 (wt%)

Table 2 Carbon equivalent of abrasion resistant steels with different grades (wt%)

钢级 Grade	NM360	NM400			NM450			NM500	NM550/600
厚度 t(mm)	t ≤ 60	t < 20	20 ≤ t < 40	t ≥ 40	t ≤ 12	12 < t ≤ 20	t > 20	t ≤ 60	t ≤ 60
Ceq	≤ 0.46	≤ 0.45	≤ 0.50	≤ 0.52	≤ 0.47	≤ 0.52	≤ 0.60	≤ 0.63	≤ 0.75

碳当量计算公式: $Ceq=C+Mn/6+(Cr+Mo+V)/5+(Cu+Ni)/15$

表 3 不同级别耐磨钢的力学性能典型范围

Table 3 Typical mechanical properties of abrasion resistant steels with different grades

钢级 Grade	HBW 10/3000	$R_{p0.2}$ (MPa)	R_m (MPa)	A_{50} (%)	-20°C, Longitudinal KV ₂ (J)
NM360	370~390	≥ 950	1200~1250	≥ 12	≥ 40
NM400	390~410	≥ 1050	1250~1300	≥ 10	≥ 40
NM450	440~460	≥ 1100	1450~1500	≥ 9	≥ 24
NM500	470~510	≥ 1250	1650~1700	≥ 9	≥ 24
NM550	530~560	≥ 1350	1700~1800	≥ 7	≥ 20
NM600	580~620	/	/	/	/

◎ 高强钢板产品介绍 Introduction of high strength structural plates

产品概述 Brief Introduction

自 2006 年以来, 南钢先后研制开发了系列高强度结构钢板 Q550、Q690、Q890、Q960、Q1100, 并通过 CE 认证。钢板性能稳定, 板形、成型性及可焊性优异, 广泛应用于煤矿机械、工程机械和港口机械。2007 年 Q690E 开始替代进口, 应用于 8000 吨浮吊项目。2008 年 Q690D、Q690E、S690QL 开始批量出口到欧洲、南非, Q890、Q960、Q1100 已成功应用于工程起重机和混凝土泵车, 尤其是 5~10mm 薄规格钢板得到了国内用户的广泛认可。

Since 2006, NISCO has developed a series of high-strength structural plates covering from Q550, Q690, Q890, and Q960 to Q1100 and also holds CE certificate. Plates are widely used in mining machinery, engineering machinery and port machinery because of stable performance, good flatness, formability and weldability. In 2007, Q690E started to substitute importing materials used in 8000t floating crane. In 2008, Q690D, Q690E and S690QL started to be imported to Europe and South Africa. Q890 and Q960 have been successfully used in construction cranes and concrete pumps, especially Q890, Q960 and Q1100 from 5mm to 10 mm thickness have been widely applied by domestic users.

高强度结构板执行标准和供货规格 Applied standards and supply sizes

牌号 Grade	执行标准 Applied standards	可供货的产品规格 Supply sizes		
		t (mm)	W(mm)	L(m)
Q550D-QT Q550E-QT	Q/3201	5~11	1000~2500	≤ 15
	NG212-2012	12~50	1000~2800	≤ 15
		51~80	1000~2800	≤ 10
Q690D-QT Q690E-QT	Q/3201	5~11	1000~2500	≤ 15
	NG212-2012	12~50	1000~2800	≤ 15
		51~80	1000~2800	≤ 10
Q890D Q890E	Q/3201	5~11	1000~2500	≤ 15
	NG212-2012	12~60	1000~2800	≤ 15
Q960D Q960E	Q/3201	5~11	1000~2500	≤ 15
	NG212-2012	12~60	1000~2800	≤ 15
Q1100D Q1100E	Q/3201	5~11	1000~2500	≤ 15
	NG212-2012	12~30	1000~2800	≤ 15
S550Q S550QL	EN 10025-6:2004	5~11	1000~2500	≤ 15
		12~50	1000~2800	≤ 15
		51~80	1000~2800	≤ 10
S690Q S690QL	EN 10025-6:2004	5~11	1000~2500	≤ 15
		12~50	1000~2800	≤ 15
		51~80	1000~2800	≤ 10
S890Q S890QL	EN 10025-6:2004	5~11	1000~2500	≤ 13
		12~60	1000~2800	≤ 15
S960Q S960QL	EN 10025-6:2004	5~11	1000~2500	≤ 13
		12~50	1000~2800	≤ 15

注意：交货状态：Q+T

Note: delivery condition: Q+T

化学成份 chemical composition (Wt%)

牌号 Grade	C ≤	Mn ≤	P ≤	S ≤	Si ≤	Nb ≤	Mo ≤	Cr ≤	Ni ≤	B ≤	Ceq ≤
Q550D-QT Q550E-QT	0.16	1.60	0.015	0.005	0.40	0.060	0.50	0.50	0.50	0.0030	0.50
Q690D-QT Q690E-QT	0.16	1.60	0.015	0.005	0.40	0.060	0.50	0.50	0.50	0.0030	0.54
Q890D Q890E	0.19	1.60	0.015	0.005	0.40	0.060	0.80	0.80	1.00	0.0030	0.62
Q960D Q960E	0.20	1.60	0.015	0.005	0.40	0.060	0.80	0.80	1.00	0.0030	0.65
Q1100D Q1100E	0.22	1.60	0.015	0.005	0.40	0.060	0.80	0.80	1.50	0.0030	0.72

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

力学性能 mechanical properties

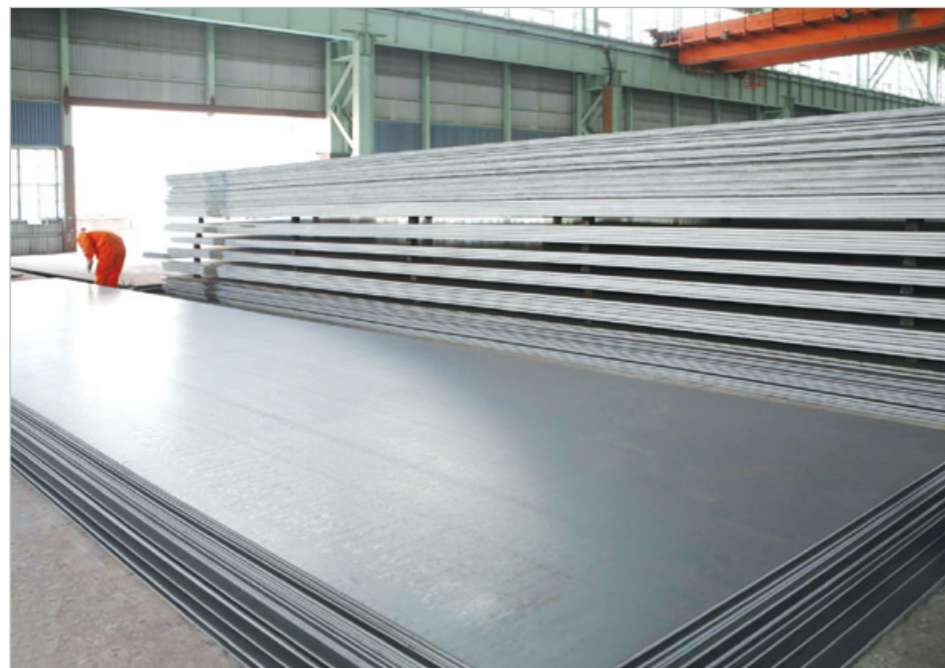
牌号 Grade	厚度 Thickness (mm)	屈服强度 Yield strength (MPa)	抗拉强度 Tensile strength (MPa)	延伸率 Elongation (A%)	冲击功 KV ₂ (J)
Q550D-QT Q550E-QT	5 ~ 80	≥ 550	670 ~ 830	≥ 16	≥ 34
Q690D-QT Q690E-QT	5 ~ 80	≥ 690	770 ~ 940	≥ 14	≥ 34
Q890D Q890E	5 ~ 60	≥ 890	940 ~ 1100	≥ 12	≥ 27
Q960D Q960E	5 ~ 50	≥ 960	980 ~ 1150	≥ 11	≥ 27
Q1100D Q1100E	5 ~ 30	≥ 1100	1200 ~ 1500	≥ 9	≥ 27

冲击温度 Impact temperature: D—— -20℃; E—— -40℃; Q—— -20℃; QL—— -40℃

高强度结构板不同标准的钢号对照 (供参考)
Comparison of high-strength structural plates grades in different standards (for reference)

南钢企标 NISCO standard Q/3201 NG212-2012	欧标 EN 10025-6	美标 ASTM A709	SSAB 企标 SSAB standard	JFE 企标 JFE standard
Q550D Q550E	S550Q S550QL			JFE-HITEN690S
Q690D Q690E	S690Q S690QL	Grade 100	Weldox 700	JFE-HITEN780S
Q890D Q890E	S890Q S890QL		Weldox 900	
Q960D Q960E	S960Q S960QL		Weldox 960	JFE-HITEN980S
Q1100D Q1100E			Weldox 1100	

S550Q, S550QL, S690Q, S690QL, S890Q, S890QL, S960Q and S960QL hold CE certificate.



◎ 耐磨钢板业绩
Application references of abrasion resistant plates

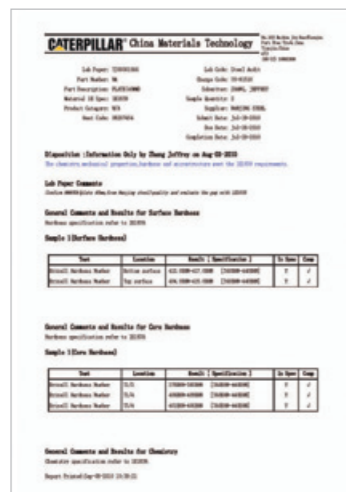
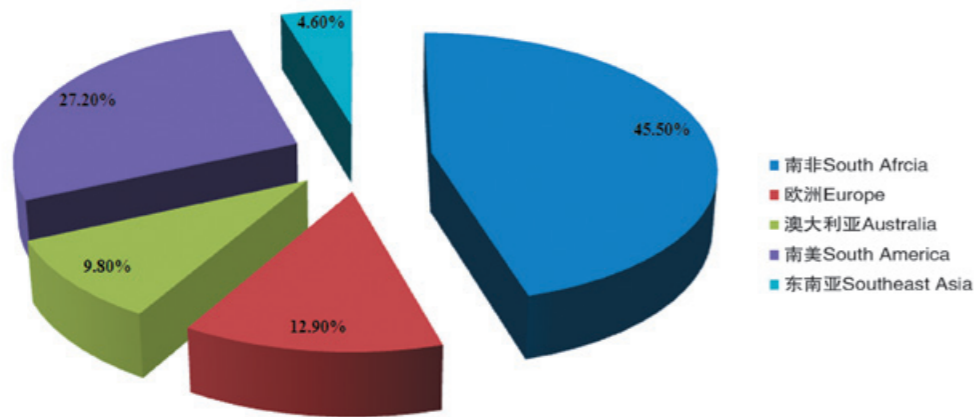
南钢高质量的耐磨钢可用于制造高档次的设备和备件，能够承受长年累月的工矿考核，最大限度的提高设备寿命、降低故障风险，提高设备的作业率。耐磨钢板广泛应用于地下矿井、水泥装备、筑路行业、矿石开采及冶金行业等领域。南钢各级别耐磨钢广泛应用于卡特、张煤机、西北奔牛、新宏昌、美卓等煤矿机械、工程机械、自卸车、冶金及港口行业，累积销售约 80,000 吨。其中出口约 30,000 吨，包括南美、南非、澳大利亚、加拿大、希腊、英国、西班牙等二十余个国家。

NISCO's abrasion resistant steels are widely applied in manufacturing advanced equipments and spare parts which can endure severe working conditions, extend the service life and enhance efficiency of the equipments to a great extent and also decrease the breakdown risk. NISCO's abrasion resistant steels have been widely applied in coal mining machinery, cement equipments, road construction machinery, engineering machinery, dump trucks, metallurgical area and port fields such as Caterpillar, Metso, Zhangjiakou Coal Mining Machinery Co., Ltd, Ningxia Tiandi Benniu Industrial Group., Ltd and Sunhunk Heavy Industries Group. Now the sale amount is about 80,000 tons including 30,000 ton for international market in South American, South Africa, Australia, Canada, Greece, England, Spain, etc, covering more than 20 countries in the world.



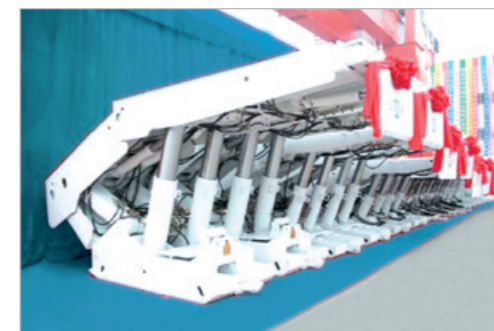
- ◆ 1E1839 及 NM400 实现对卡特彼勒的批量供货
1E1839 and NM400 have been massively supplied for Caterpillar.
- ◆ 成为全球最大的特殊钢材采购商 CVACEROSAG 的合作伙伴
Establish the cooperative partner relationship with CVACEROSAG, the largest special steel purchaser.
- ◆ NM400 供应芬兰美卓公司用于制造矿山设备
NM400 has supplied for Metso (in Finland) mining machinery.
- ◆ NM450 通过湖南湘电大吨位电动轮自卸车焊接工艺评定, 即将对其供货
NM450 has passed the welding processing evaluation of electric dump truck by XEMC and delivery in batch is ongoing.
- ◆ NM450 供应英国 JCB 公司用于制造工程机械设备
NM450 has been supplied for JCB engineering machinery.
- ◆ NM400、NM500 供应韩国 Doosan 公司用于制造工程机械设备
NM400 and NM500 has been supplied for Doosan engineering machinery.

耐磨钢国外市场供货分布 Overseas market distribution



◎ 高强钢板业绩
Application references of high strength structural plates

序号 No.	项目名称 Project name	钢种 Grade	规格 Thickness(mm)	数量 Quantity(t)
1	韩国 8000 吨浮吊 8000t floating crane for Korea project	Q690E	14 ~ 30	4,000
2	新加坡 2000 吨浮吊 2000t floating crane for Singapore project	Q690E	14 ~ 30	3,500
3	煤矿机械用液压支架 For hydraulic support of mining machinery	Q550D、Q690D Q690D-QT	12 ~ 80	350,000
4	调质板出口欧洲、南非 Quenched and tempered plates exported to Europe and South Africa	S690QL	6 ~ 20	1,000
5	高强度结构板供煤矿机械 High-strength structural plates for mining machinery	Q890D	16 ~ 40	1,000
6	起重机工程机械 Crane machinery	Q890D、Q960E	5 ~ 30	5,000
7	混凝土工程机械 Concrete construction machinery	Q890D、Q960E	5 ~ 50	4,000





客户反馈 feedback from clients

应用证明	
项目名称	690-1100MPa 级调质高强度结构钢板的开发与应用
应用单位	三一汽车起重机械有限公司
通讯地址	湖南省长沙市宁乡县金洲开发区金洲大道 168 号
应用成果起止时间	2011 年 3 月至 2012 年 12 月
经济 效益 (万元) (财务部门盖章)	
年 度	/
新增产值 (产量)	/
新增利税 (纯收入)	/
年增收节支总额	/
应用情况及社会效益:	
2011 年前, 屈服强度 940MPa 级高强度结构用钢板主要靠 SS48、BUX1、175 等企业供货。2011-2012 年, 三一汽车起重机械有限公司开发了屈服强度 940MPa 级高强度、成分稳定、性能可靠、板形平整、不平度均在 3mm 米以内、焊接性能优异, 已成功应用于 75 吨、90 吨、120 吨履带起重机臂制造, 通过本项目的创新, 率先实现了 940MPa 级高强度 (15-18mm) 高强度板的国产化, 钢板成形性能优于 SS48 同类产品, 替代进口, 打破了国外长期垄断的局面, 填补了国内空白。	
本项目的推广应用, 提高了我国工程机械行业的竞争力, 该项目实施以来, 三一汽车起重机械共采购 4520 吨, 方便了用户采购程序, 降低了采购成本, 并大大缩短了交货周期, 取得了显著的经济效益和社会效益。	
应用单位 (盖章) 2013 年 12 月 18 日	

应用证明	
项目名称	690-1100MPa 级调质高强度结构钢板的开发与应用
应用单位	中联重科股份有限公司泉塘工业园
通讯地址	湖南省长沙市远大二路 1636 号
应用成果起止时间	2010 年 3 月至 2012 年 12 月
经济 效益 (万元) (财务部门盖章)	
年 度	/
新增产值 (产量)	/
新增利税 (纯收入)	/
年增收节支总额	/
应用情况及社会效益:	
2011 年前, 屈服强度 940MPa 级高强度一直采用 SS48 进口钢板, 2011-2012 年, 南京钢铁股份有限公司开发的 Q940E 高强度钢板, 已成功用于中联重科起重机械工程, 钢板质量稳定, 焊接性能、成形性良好, 使用安全, 实现了 5-8mm 薄规格 940MPa 级钢板的国产化, 替代进口, 南钢是国内第一家生产 5-8mm Q940E 钢板的企业。	
Q940E 钢板的推广应用, 提高了我公司工程机械核心产品的综合竞争力, 该项目实施以来, Q940E 累计采购 267 吨, 解决了薄规格钢板长期依赖进口的难题, 大大缩短了交货时间, 为产品升级提供了保证, 取得了显著的经济效益和社会效益。	
应用单位 (盖章) 2013 年 12 月 20 日	

◎ 加工配送
Processing and distribution

可根据客户的不同需求进行切割、打坡口、钻孔、焊接、预成型等预处理。

Can pre-process according to different requirements from clients, such as cutting, beveling, drilling, welding, preforming, etc.



加工配送车间
Processing and distribution shop



数控等离子切割机
Plasma cutting machine



全自动数控铣、刨边一体机
CNC milling and edge planing machine



大型数控剪板机
 Large CNC guillotine shear

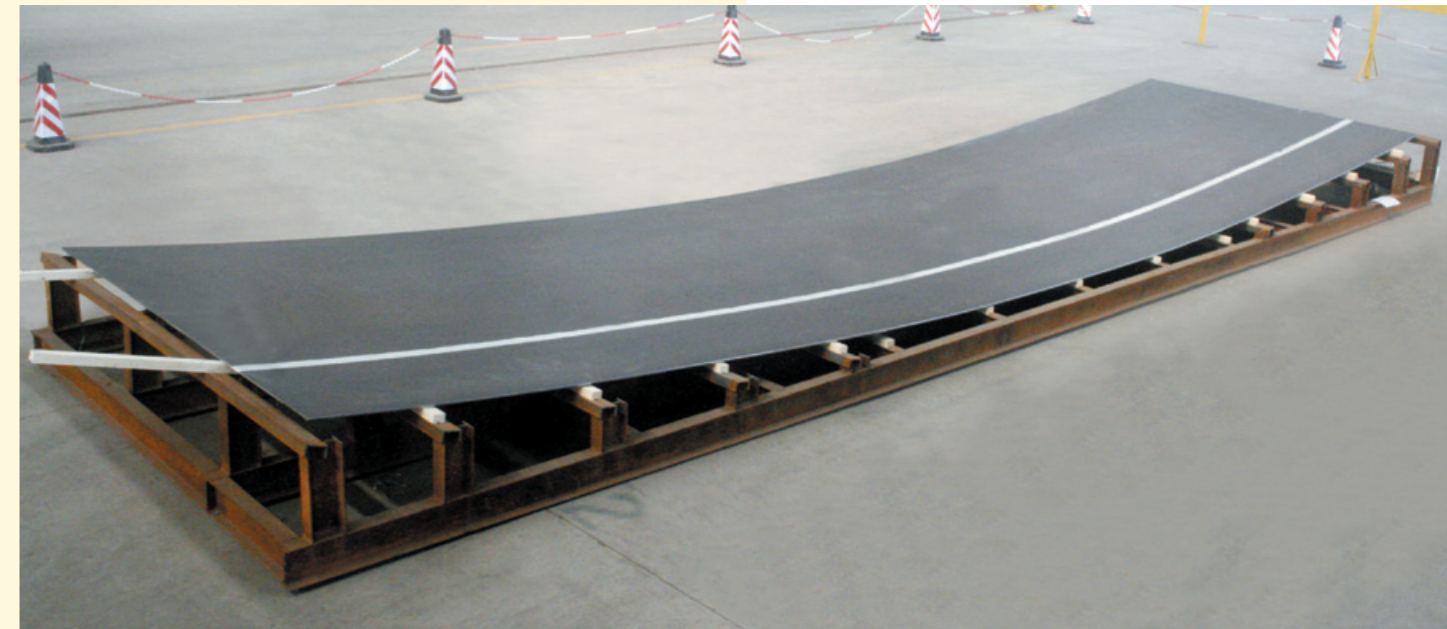


大型直线焊接机
 Large scale long welding machine



预成型焊接机
 Pre-form welding machine

预加工产品样本 Pre-processing products



◎ 体系保证 Management assurances

