

PUBLIC RECORD

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LAIGANG PRODUCTS

ENTERPRISE PROFILE

Initiated in January 1970 and experienced over forty years' evolution and development, Laigang Group has become a large-scale iron and steel enterprise group with annual production capacity of 18 million tons of steel. In March 2008 Shandong Iron & Steel Group carried out integrative combination, and Laigang Group was affiliated to Shandong Iron & Steel Group. Currently, Laigang Group boasts a total asset of 92 billions, 39000 employees among which 24000 employees from its iron and steel business, 14 subsidiary companies and holds shares of 11 transformed units. Its iron and steel products mainly consists of four series namely fashioned iron, plate and strip, extra improved and special iron and bar material. The products have won the titles of "Metallurgical Product Quality Golden Cup Prize", "Metallurgical Industry Quality Excellent Product" and "Famous Brand of Shandong Province"; in which hot rolled H Shape steel once won the title of "China Famous Product" and deformed steel bar the title of "National Free-inspection Product". The relevant industry has formed several industries including mining and selection of iron ore, engineering design and product general contracting, financial securities, steel structure processing, construction installation, real estate development, powder metallurgy and products, cement and micro powder clinker, metallurgical auxiliary material, transportation and logistics, chemical products and so on.

Laigang Group was among the first batch of Chinese metallurgical enterprises which have passed ISO9001 Quality Management System, ISO14001 Environment Management System and OHSAS18001 Occupational Health and Safety Management System; in 2006 it passed QES Three-system Authentication and 2013 passed ISO5001 Energy Management System Authentication. It was successively conferred the honor titles of national users satisfactory enterprise, national quality management advanced enterprise, national re-employment advanced enterprise, national technical talents cultivation outstanding contribution prize, national AAA credibility enterprise, national harmonious labor relationship creation model enterprise and so on. In the

year of 2005, Laigang Group was confirmed as the State's first batch of recycling economy experiment unit, and won national quality prize in 2008, national resources comprehensive utilization top ten enterprise in 2009, China enterprise cultural construction top ten creative unit and Shandong Province governor quality prize in 2010, and national after-sale service industry top ten unit in 2011.

PRODUCT PROFILE

FASHIONED STEEL SERIES

Laigang Group possesses large, medium and small-sized three hot rolled fashioned steel production lines, with the main products involving in H-beam steel, joist steel, channel steel series as well as door frame steel, caterpillar band steel, magnetic suspension rail used F-beam steel, electric power tower used angle steel, mining used steel and so on; with 100×100mm - 1000×300mm H shape steel, 16#-63# joist steel , 14#-25# C-beam door frame steel and J-beam door frame steel totally eight series and 220 specifications; The annual production capacity of high-quality fashioned steel is 2.6 million tons. The product standards covers international standard, Japan standard, South Korea standard, European standard, American standard, Australian standard; Laigang Group is currently the H shape steel production base in China with large scale of production scale, most complete of category and specifications and strong competitiveness. Its products have successively passed CE and FPC authentication of U.K. Lloyd's Register Quality Assurance Limited, JIS authentication of Japanese Standards Association and KS product authentication of Korean Standards Association. The products have been utilized to Beijing Olympic Games “Bird’s Nest” Project, the biggest railway station in Asia-Beijing South Station, ocean petroleum 981 deepwater semi-submersible drilling platform and other important national engineering construction projects. In the year of 2003, Laigang Group began to be dedicated to the development and production of door frame steel, and gradually realized the imported product replacement. It has been equipped with the production capacity of door frame steel with several specifications like C140a, C160a, C160b, C180b, C220b, C250b, J160a, J160b, J180b, H140 and etc. Systematic pushing research, development and manufacturing of HRB335, 20MnSiV, Q420C, Q440C high strength steel products, whose yield strength reaches 440MPa and above, strength of extension 590MPa and above, satisfying the demand of customers on continuously upgrading of product quality. Laigang Group also successively developed caterpillar band steel, iron tower used angle steel, mining used

steel as well as a series of fashioned steel products utilized to different areas, and therefore it has equipped with comprehensive ability of manufacturing a great variety of deformed fashioned steel.

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H-beam Steel

Type	Mark	Executive Standard	Specification
Plain carbon steel	Q235A, Q235B Q235C, Q235D Q275D, SS400, KS SS400, S235JR S235J0, S235J2 S275JR, S275J0 S275J2	GB/T 11263-2010 GB/T 4171-2008 JIS G3106-2008 KS D 3503-2014 EN 10025-2-2004 AS/NZS 3679.1-1996 ASTM A36/A36M-2012 ASTM A572/A572M-2013a	HW100×100 HW125×125 HW150×150 HW175×175 HW200×200 HW250×250 HW350×350 HW400×400 HN150×75 HN175×90 HN200×100 HN250×125 HN300×150 HN350×175 HN400×200 HN450×200 HN500×200 HN550×200 HN600×200 HN500×300 HN650×300 HN700×300 HN750×300 HN800×300 HN850×300 HN900×300 HN1000×300 HM150×100 HM200×150 HM250×175 HM300×200 HM350×250 HM400×300 HM500×300 HM550×300
			HE100 HE120 HE140 HE180 HE200 HE220 HE240 HE260 HE280 HE300 HE320 HE340 HE360 HE400 HE450 HE500 IPE180 IPE200 IPE240 IPE270
Low alloy steel	Q345B, Q345C Q345D, Q345E Q390B, Q390E Q355NHD		

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	SM490A, SM490B SM490YA SM490YB SN490B, Grade 300, KS SM490A KS SM490B KS SM490YA KS SM490YB, KS SN490B, S355JR S355J0 S355 S355J2, S450J0 A36, GR40, GR60		IPE300 IPE400 IPE450 IPE500 UC203×203 UC254×254 UC305×305 UB305×102 UB457×191 UB533×210 W12×16 W12×19 W12×22 W10×49 W10×54 W10×60 W10×68 W10×77 W10×88 W10×100 W10×11 W18×50 W18×55 W18×60 W18×65 W18×71 W21×55 W21×62 W21×68 W21×73 W21×83 W21×93
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I-groove Steel

Type	Mark	Executive Standard	Specification
Plain carbon steel	Q235B, Q275D	GB/T 706-2008	I16 I18 I20 I22 I25 I28 I30 I30T I32 I36 I40
Low alloy steel	Q345B, Q345CQ345D		I45 I56 I63 C16 C18 C20 C25 C28 C30 C32 C36 C40

Fashioned Steel for Special Purposes

Type	Mark	Executive Standard	Specification
Low and medium speed magnetic suspension rail used F-beam steel	Q235B, Q345B LGWR345B	Q/370000SGT 114-2013	LGF372×94.5 LGF372×96.5 LGF375×96 LGF375×98
Low and medium speed magnetic suspension sleeper used F-beam steel	Q235B, Q345B LGWR345B	Q/370000SGT 115-2013	LGH230×200
Forklift truck portal used fashioned steel	HRB335, 20MnSiV, Q440C, Q420C, 25MnV, V1027M	YB/T 4237-2010 or technical agreement	C140A C160a C160b C180b C220b C250b J160a J160b
Mining used hot rolled fashioned steel	20MnK, 25MnK	YB/T 5047-200	11# 12#
Track shoe used fashioned steel	23MnB, 25MnB, 25MnBM	Technical agreement	LW190×8.5 W190×10 ST190×10
Iron tower used hot rolled angle steel	Q345B, Q420B	YB/T 4163-2007	A220×220×16 A220×220×18 A250×250×24 A250×250×26 A250×250×28 A250×250×30

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Automobile frame used hot rolled H-beam steel	Q345B, LG510L, LG510LH, LG610C	Q/3700LYS 324-2012	H196×149 H446×150 H630×200
Electrified railway overhead lines pillar used hot rolled H-beam steel	Q235B, Q345B	YB/T 4238-2010 or technical agreement	IPB260 IPB280 IPB300 IPBV240 (T) IPBV260 (T) IPBV280 (T) IPBV230 (T)
Ocean engineering used fashioned steel	SM490YB, B, D, D36, DH36, E36,EH36	YB/T 4274-2012 or technical agreement	HW300×300 HN600×300 HM450×300 HW400×400 HN900×300

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Plate-strip Product Series

Laigang Group currently has three plate-strip production lines consisting of 620mm hot rolled ribbon steel, 1500mm hot rolled wide flat steel and 1500 cold rolled thin plate; with the annual productive capacity of 1,000,000 tons ribbon steel, 2,000,000 tons of wide flat steel and 400,000 tons of cold rolled thin plate.

The major products involves in hot rolled ribbon steel, wide flat steel and cold rolled thin plate three series, including carbon constructional steel belt, high-quality carbon constructional steel belt, low alloy constructional steel belt, steel pipes used hot rolled carbon constructional steel belt, automobile frame steel, automobile wheel used steel, hot rolled checkered plate, pipeline steel, petroleum casing pipe, weathering resistant steel, cold rolled base stock, bridge used steel, hot rolled pickled coil, chill roll, fire extinct roll, welded tube exclusively used steel, high strength automobile structural used steel.

Laigang Group successively developed and is capable of manufacturing carbon constructional steel, low alloy high strength constructional steel, high-quality carbon constructional steel, cold rolled 08AI steel, pipeline steel S360 steel, automobile frame LG610L, SS400, SPHT2, S23JR, SAE1010, B-level steel, 08F, CQ, DQ, DDQ and so on which comply with the Japan Standard, American Standard and European Standard; the products cover more than thousands of specifications with thickness ranging from 0.2 to 20.0 mm and width ranging from 183 to 1350mm. The products have been sold to the South Korea, Southeast Asia, Thailand, South America, Europe and other counties and regions with strong domestic and international market competitiveness.

1500mm Hot Rolled Wide Flat Steel

Type	Mark	Specification	Executive Standard
Carbon constructional steel	Q235A, Q235B, S235JR, S235J0, S235J2, S235BJR, S275JR, S275J0, S275J2, S275BJR, S275BJ0	2.5-20×950- 1350	GB912-2008 GB/T 3274-2007 BS EN 10025-2-2004
Steel tube used hot rolled carbon constructional steel belt	SPHT1, SPHT2	2.5-20×950- 1350	JIS G3132-2011
Low alloy high strength	Q345B, Q345C, Q345D, Q390D Q420B, S355JR, S355J0	3.5-20×950- 1350	GB 912-2008 GB/T 3274-2007 EN 10025-2-2004
High-quality carbon constructional steel	40Mn, 45Mn, 45, S45C, S45CB, 65Mn, 60	3.0-12×950- 1350	GB/T 710-2008 GB/T 711-2008 JIS G4051-2009

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Automobile frame steel	LG510L, LG610L, LG700L	3.0-14×950- 1350	Q/370000SGT 125-2013
Automobile wheel used steel	LG330CL, LG380CL, LG420CL, LG540CL, LG590CL	3.0-14×950- 1350	Q/3700LYS 270-2011
Hot rolled checkered plate	HQ235B HSS400 HA36B HSS400B HS235BJR	2.3-14×950- 1250	Q/370000SGT 126-2013
Pipeline steel	B, BM, S245, L245, L245M, L245MB, X42, X42M, S290, L290, L290M, L290MB, X46, X46M, S320, L320, L320M, L320MB, X52, X52M, S360, L360, L360M, L360MB, X56, X56M, S390, L390, L390M, L390MB, X60, X60M, S415, L415, L415M, L415M, L415MB, L415MC	4.0-14×950- 1350	API SPEC 5L 45TH EDITION-2012 GB/T 9711-2011 GB/T 14164-2013
Petroleum casing pipe	J55	4.0-14×950- 1350	Technical agreement
Weathering resistant steel	SPA-H, Q355NHD	4.0-14×950- 1350	GB/T 4171-2008 JIS G3125-2010
Cold rolled base stock	SPHC, SPHD, SPHD, SAE1008, SAE1006, DC01, DC03, DC04, CS(A), CS(B)	2.5-14×950- 1270	JIS G3131-2010 SAE J403-1994 GB/T 5213-2008 BS EN 10130-2006 ASTMA1008/A 1008M-2013
Bridge used steel	Q345qD	4.0-14×950- 1350	GB/T 714-2008

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620mm Hot Rolled Ribbon Steel

Type	Mark	Specification	Executive Standard
Common carbon steel	Q195, Q215A, Q235A, Q235B, Q195L, S275JR	1.8-8.0×183- 350 2.0-8.0×350- 390 2.3-7.0×390- 420 2.5-6.5×420- 445	GB/T 3524-2005 EN 10025-2-2004 Or technical agreement
Low alloy high strength steel	Q345B, Q345BL, Q400W, STK500, 20MnSi	1.8-6.5×183- 340 2.0-6.0×340-370 2.3-6.0×370-400 3.0-5.5×400-445	GB/T 3524-2005 or technical agreement
High-quality carbon constructional steel	25	1.8-6.5×183- 340 2.0-6.0×340-370 2.3-6.0×370-400 3.0-5.5×400-445	GB/T 8749-2008 or technical agreement
High-quality carbon constructional steel	45, 50, T50, J50, 50H, 40Mn, 50Mn	2.0-6.5×183-340 2.3-6.0×340-370 2.5-6.0×370-400 3.0-5.5×400-445	GB/T 8749-2008 or technical agreement
High-quality carbon constructional steel	65Mn, T65Mn, J65Mn, J50Mn, ST57, 70Mn	2.3-6.0×183-340 2.5-5.5×340-370 2.75-5.0×370-400 3.0-5.5×400-445	GB/T 8749-2008 or technical agreement

1500mm Cold Rolled Thin Plate

Type	Mark	Specification	Executive Standard
Hot rolled pickled coil	SPHC, SPHD, SPHE	2.0-4.5×900-1350	JIS G 3131-2010
Chill roll	SPCC, SPCD, SPCE	0.2-2.5×900-1350	JIS G 3141-2011
Fire extinct roll	SPHC, SPHD, SPHE, DC01, DC03, DC04, Q235, CS(A), CS(B)	0.2-2.5×900-1350	JIS G 3141-2011 GB/T 5213-2008 BS EN 10130-2006 GB/T 11253-2007 STMA1008/1008M-2013
Welded tube exclusively used steel	LHG1, LHG2	0.4-1.0×1000-1350	Technical agreement
Welded wire exclusively used steel	LGHS	0.4-1.0×1000-1350	Technical agreement
High strength automobile frame used steel	LG900, LG600HC, LG700HC	1.0-2.5×900-1350	Technical agreement
High-quality carbon steel	40Mn, 45Mn, 65Mn	0.5-2.5×900-1350	GB/T 13237-1991

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Wide and Heavy Plate Product Series

Laigang Group owns a 4300mm wide and heavy plate production line, with annual designed productive capacity of 1.8 million tons and 380,000 tons of heat treatment capability. The key equipment and techniques of rolling mill, controlling system and the supporting continuous casting system in the whole production line are introduced from Siemens VoestAlpine; the main equipment include top-bottom combined blowing converter, LF refining furnace, RH refining furnace, single machine continuous casting machine, walking-beam-type reheating furnace, double-stand four rolling machine, Mulpic on-line rapid cooling system, cold/hot rectification machine, on-line diagnostic machine; the configuration of equipment is complete with the whole set of equipment and technique reach the international leading level. The production lines have three heat treatment production lines with the most complete supporting facilities in China, in which quenching and tempering heat treatment are introduced from German LOI Company, and normalizing furnace is designed by Beijing Sainengjie Company. heat treatment furnace apply mathematical model to control the temperature, realizing full automatic production, with the characteristics of high precision of temperature control, capable of producing steel plate hardening, normalizing and tempering.

This production line mainly operates the high-end products based on “high, precision, excellence, professionalism”. Product’s specification scale: (6-150)mm ×(1500-4100)mm ×(3000-24000)mm, providing various excellent wide heavy plate according to international, American Standard, European Standard, Japan Standard or customized based on special requirements of users. The major products include: common and high-quality carbon constructional steel plate, low alloy high strength constructional steel plate, shipbuilding and ocean engineering used steel plate, engineering machinery used high strength steel plate, pressure container steel plate, wind electricity used steel plate, pipeline used steel plate, architectural construction used steel plate, bridge used steel plate and so on, extensively utilized in shipbuilding, engineering machinery, petroleum chemical engineering, wind electricity, bridge construction, model and other domains. The products have successfully been applied to ZMJ, Sany Heavy Industries Holding, Sinopec, China Shipbuilding Industry Corporation and other domestic well-known enterprises, and also sold to Europe, America, Japan, South Korea, Middle East, Southeast Asia, Hong Kong and other countries and regions.

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Wide heavy plate products obtained furnace pressure container used special equipment manufacturing permit and pressure pipe component special equipment manufacturing permit issued by State Quality Inspection Administration; ship plate steel series products passed the authentication certificate of nine countries including CCS, LR, DNV; the steel plate with European Standard passed CE certificate and FPC certificate issued by LR; in addition, the products have passed JIS authentication; bridge used steel plate passed the transportation product authentication issued by CCS.

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Wide and Heavy Plate Product

Type	Grade of steel	Executive Standard	Specification (mm)
Shipbuilding and ocean engineering used steel plate	A,B,D,E,AH32,AH36,AH40, DH32,DH36,DH40,EH32, EH36,EH40,FH32,FH36, FH40	CCS,ABS,LR,BV, DNV,NK,KR,GL RINA Standard GB 712-2011	6-80×1500-4100
Engineering machinery used high strength steel plate	Q460(C/D/E),Q500(C/D/E), Q550(C/D/E), Q620(C/D/E), Q690(C/D/E), Q800(C/D/E), Q890(C/D/E), Q960(C/D/E), Q1030(C/D/E),	GB/T 1591-2008 GB/T 16270-2009 or technical agreement	8-100×1500-4100
Wear-resistant steel plate	NM360,NM400,NM450, NM500, 27MnTiBM	GB/T 24186-2009 or technical agreement	6-60×1500-4100
Boiler and pressure container steel plate	Q245R,Q345R,Q370R, 15CrMoR 14Cr1MoR, 12Cr1MoVR and foreign standard container plate of corresponding level	GB713-2008 and corresponding foreign mark standard	8-80×1800-4100
	16MnDR and foreign standard container plate of corresponding level	GB3531-2008 and corresponding foreign mark standard	8-80×1800-4100
	(S)A285Gr.A-C	ASME SA285/SA 285M, ASTM A285/A285M- 2012	6-80×1500-4100
	(S)A516Gr.55-70	ASME SA516/SA516M, ASTM A516/A516M-2010	6-80×1500-4100
	12MnNiVR, 07MnCrMoVR, 07MnNiMoVDR	GB19189-2011	10-45×1500-4100
	06Ni9DR	GB 150-2011	5-40×1500-4100
Wind electricity used steel plate	Q345C, Q345D, Q345E	GB/T 1591-2008	8-140×1500-4100
	Q390A, Q390B, Q390C, Q390D, Q390E		8-100×1500-4100
	Q345FTC,Q345FTD, Q345FTE, Q345FTF	GB/T 28410-2012	8-130×1500-4100
	Q420FTC, Q420FTDQ, 420FTE, Q420FTF		8-100×1500-4100
Architectural structure used steel plate	Q235GJ(B/C/D/E), Q345GJ(B/C/D/E),Q390GJ(C/D/E), Q420GJ(C/D/E),Q460GJ(C/D),	GB/T 19879-2005	8-100×1500-4100
Bridge used steel plate	Q345q(C/D/E), Q370q(C/D/E)	GB/T714-2008	8-100×1500-4100
	Q420q(C/D)		8-80×1500-4100
	14MnNbq	TB10002.2-2005	8-100×1500-4100
Pipeline used steel plate	L245,L290,L320,L360,L415,L450, L485,L555	GB/T 21237-2007 or technical agreement	8-40×1500-4100
	B, X42,X46,X52,X56, X60,X65,X70,X80	APISPEC 5L 45 TH EDITION-2012 or technical agreement	
	P355N	EN10217-3-2002	8-40×1500-4100
Carbon and low alloy constructional steel plate	Q195(A/B),Q215(A/B),Q235(A/B/C/D), Q275(A/B/C/D)	GB/T 3274-2007	6-130×1500-4100
	Q345(A/B/C/D)		6-150×1500-4100
	Q390(A/B/C/D/E), Q420(A/B/C/D/E)		8-100×1500-4100
Foreign standard	SS330,SS400,SS490,SS540	JIS G3101-2010	6-120×1500-4100
	SM400(A/B/C), SM490(A/B/C),SM490 (YA/YB),SM520(B/C),SM570	JIS G3106-2008	8-100×1500-4100
	A36	ASTMA36/A36M- 2012	6-100×1500-4100
	A572 Gr.42-Gr.65	ASTMA572/A572M- 2013a	
	A709 Gr.36- Gr.50	ASTMA709/A709M- 2011	

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	S275(N/NL), S355(N/NL)	EN10025-3-2004	8-110×1500-4100
	S235(JR/J0/J2), S275(JR/J0/J2), S355(JR/J0/J2/K2)	EN10025-2-2004	6-110×1500-4100
	S355MC	EN10149-2-1996	8-20×1500-4100
	S460M	BS EN10025-4-2004	10-60×1500-4100
Weathering resistant steel plate	Q355NH(C/D/E), Q355GNH(C/D/E)	GB/T 4171-2008 or technical agreement	6-60×1500-4100
Mould used steel plate	45,50,55	GB/T 711-2008	10-260×1500-4100
	S45C, S50C, S50C	JIS G4051-2009	
	3Cr2Mo, 35CrMo, P20	GB/T 1299-2000 GB/T 3077-1999 or technical agreement	20-120×1500-4100
Thickness directional properties steel plate	The above has the corresponding mark of thickness directional properties (Z15, Z25, Z35)	Relevant product standard	6-150×1500-4100

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Bar Product Series

Laigang Group is equipped with four bar production lines respectively as small and medium-sized, first steel rolling, the second steel rolling and small-size steel rolling with annual productive capacity of 2.8 million tons; in which the whole set of small and medium-sized rolling steel production line is introduced from Italy DANIELI company; the equipment has reached domestic leading position and advanced international level. Billet is transmitted to steel rolling line hear transmission by transmitting roller or insulated van, the continuous rolling process, full digital linkage alignment; the exterior dimension of steel bar and meter weight controlling precise, surface superior quality, stable mechanical properties, excellent art craft performance.

The major products include hot rolled ribbed steel bar, anchor rod steel bar, prestress concrete used deformed steel bar (finish rolling deformed steel bar), off-line heat treatment anchor rod, hot rolled round steel and so on. The specification of hot rolled ribbed steel bar is Ø10- Ø50mm, except for national standard GB1499.2, it also implements the standards of major countries in the world; obtains the industrial product production permit issued by General Administration of Quality Supervision and Inspection; passed CARES, JQA, KSA, DCL product authentication. The products are exported to Europe, America, Japan, South Korea, Southeast Asia, Australia, Hong Kong and other significant markets, with the stable market share and favorable reputation.

Laigang is the first manufacturer in China which passed Ø50mm large size specification anti-seismic steel bar authentication; HRB500E anti-seismic steel bar enables Laigang to become the several manufacturers capable of manufacturing Ø10-Ø50mm all series specifications. It provides the customers with one-stop procurement platform; also allows the customers to enjoy customized services upon demand such as high-speed rail HRB500JZ left-handed finish rolling deformed steel bar, CRM600 off-line heat treatment anchor rod, constant strength longitudinal all deformed anchor rod, 15-meter cut lengths delivery, etc.

The hot rolled ribbed steel bar manufactured by Laigang has won for several times the honorable titles as “Metallurgical Product Quality Golden Cup Prize”, “Metallurgical Industry Quality Excellent Product” and “Famous Brand of Shandong Province” enjoying good reputation in the industry. The hot rolled ribbed steel bar is the appointed product of many significant projects like Daya Bay Nuclear Power

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Station, Pudong International Airport, Three Gorges Hydro Project, Beijing-Shanghai Express Railway, Qingdao Cross-sea Bridge.

Type	Grade of steel	Executive Standard	Specification
Steel bar concrete used hot rolled ribbed steel bar	HRB335, HRB400, HRB500, HRB335E, HRB400E, HRB500E	GB 1499.2-2007	Ø10- Ø50
Left-handed resin anchor rod used hot rolled steel bar	MG335, MG400, MG500, MG600	Q/3700LYS273-2011 or technical agreement	Ø16 Ø18
Right-handed resin anchor rod used hot rolled steel bar	MG335, MG400, MG500, MG600	Q/3700LYS308-2011 or technical agreement	Ø20 Ø22
Hot treatment anchor rod steel bar	CRM600	Technical agreement	Ø20
Fine rolled twisted bar	PSB785, PSB830, HRB500JZ	GB/T 20065-2006 or technical agreement	Ø20 Ø25 Ø32
British standard twisted bar	460,460B, B500B	BS4449-1988 BS4449-1997 BS4449-2005	Ø10- Ø50
Hong Kong twisted bar	460,500B	CS2:1995 CS2:2012	Ø10- Ø50
American standard twisted bar	GR40,GR60	ASTMA615/A615M-2013	3#-11#
Japan standard twisted bar	SD295A, SD390, SD490	JIS G3112-2010	D10-D41
South Korean standard twisted bar	SD400	KS D3504-2011	D10-D25
Australian standard twisted bar	500N	AS/NZS 4671:2001	Ø12- Ø36
Small dimension round steel	Q235A, Q235B, 20MnSi, 45	GB/T 700-2006 or technical agreement	Ø14- Ø55
Large dimension round steel	Q235A, Q235B, Q345B, 45, 40Cr, 35CrMo, 20CrMnTiH	GB/T 700-2006 GB/T 1591-2008 GB/T 3077-1999 GB/T 5216-2004	Ø120- Ø250

Heavy Forging Products

Laigang Group owns one forging production line with annual productive capacity of 15000 tons; the principal equipment is 25MN hydraulic press machine, supported 40t forging operator, band sawing machine, car type heating furnace and heat treatment furnace, adopts advanced high-speed pulsing combustion technologies, PLC automatic controlling system is able to control temperature ± 5 degree centigrade, which can realize annealing, normalizing, normalizing+ tempering, balling annealing, solution treatment and so on.

The forged products are classified as long shaft type, crank shaft type, impeller type, cylindrical type and module type; the single weight of forged piece is less than 20 tons; the diameter of cylindrical forged piece can reach 2.5 meters; the maximum

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length of heat treated forged piece is 9 meters; the specification of module products are complete, with 200-900mm thickness and 700-1300mm width.

In recent years, Laigang successively developed 30Cr1Mo1V steam turbine rotors, 34CrMo1A steam turbo generator rotors, FV520B stainless impeller, 35CrMo diaphragm pump bent axle, five, seven whole skid-mounted natural gas compressor bent axle; 1.2738, 1.2311 plastic die steel module; H13 heat die steel module, MC3 cold rolled roller, 25CrNiMo oil field anti-explosion shell, 1000MW boiler lower axle, 1000t straight shank crampons, centrifugal machine main axle, impeller, thermal power, wind power main axle, etc. The forged products have been successively applied to several national key projects such as West-East Natural Gas Transmission Project.

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High-quality and Special Steel Product Series

Laigang owns one production line of 100 tons of electric furnace, one production line of 50 tons of electric furnace and two production lines of 120 tons of converter totally four production lines of special steels. It also boasts four special steel rolling production lines consisting of large-scale complete steel workshop, medium-scale complete steel workshop, small-scale complete steel workshop and new area steel rolling workshop, as well as two special steel finishing flaw detection lines, with the annual productive capacity of 4 million tons of steel and 2.6 million tons of special steel. The major product specifications include $\varnothing 20$ - 280mm hot rolled round steel and $\varnothing 350$ mm- 800mm continuous casting commodity billet. Laigang is China's extra large special steel enterprise and the largest special steel production base, research and development base in Shandong Province.

The main equipment of 100-ton electric furnace production line and new area steel rolling workshop put into production in September 2013 include: one eccentric bottom ultra-high power electric arc furnace, two 120-ton LF steel refining furnaces, two 120-ton double work position VD vacuum refining furnaces, one unit of R16.5m five-machine five-current alloy steel continuous roller; casting blank slow cooling and finishing coping system, two digital heating furnaces, one set of $\varnothing 1400 \times 1 + \varnothing 950 \times 4 + \varnothing 800 \times 2$ semi- continuous rolling production line as well as other supporting facilities. The annual production of qualified molten steel is 1.1 million tons; the annual production of qualified continuous round billet by continuous casting machine is 1.05 million tons; the specification of continuous casting round billet includes $\varnothing 500$ mm, $\varnothing 600$ mm and $\varnothing 800$ mm, in which 200000 tons being continuous rolling commodity billet. The annual rolling steel production capacity is one million tons of bar steel with specification of $\varnothing 120$ -280mm. The overall processing set-up is compact, high-effective, energy conservative and environmental friendly. The main equipment of electric furnace, refining furnace, continuous casting machine and rolling machine are imported from the foreign countries with the first-rank around the world.

The special steel products of Laigang mainly include pinion steel, bearing steel, alloy constructional steel, high-quality carbon steel, non-quenched and tempered steel, pipe billet steel, spring steel and anchor-chain steel, utilized to the domains of automobile, engineering machinery, railway and mining, power station boiler, petroleum chemical, ocean engineering, wind power project, axle and equipment manufacturing industry. According to the development ideas of "processing

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professionalism, category variety”, centered at automobile used steel and engineering machinery used steel, Laigang is able to provide special steel products national standard, American standard, European standard, Japan standard, industry standard as well as customized based on special demand of customers, and gradually formed six product series respectively automobile used steel, engineering machinery used steel, railway and mining used steel, power station boiler and petroleum chemical used steel, bearing used steel, ocean and ship used anchor chain steel.

The manufacturing of special steel passed international automobile industry ISO/TS 16949 and 2009 quality management system authentication. The bearing steel has acquired the industrial product manufacturing permit issued by General Administration on Quality Supervision and Inspection; ship used anchor chain used round steel acquired CCS, LR, DNV totally certificate from classification society of seven countries. The products have passed test carried out by China Classification Society.

The annual sales volume of pinion steel keeps 700000 tons, mainly supplied to First Auto Works, Sinotruk, Dongfeng Automobile, Jianghuai Automobile, as well as Tianhai Synchronizer, Zhejiang Wanliyang, Qingzhou Jianfu Wheel Gear, Qijiang Wheel Gear, Zhuzhou Gear and other domestic large and medium-scale gear processing factories. Laigang is the largest domestic gear steel supplier. The chemical component of continuous casting round billet is stable, high degree of cleanliness, low content of residual elements, well-closed formation and stable quality of product. The products have been used to wind power industry to manufacture large scale wind tower flange, yaw gear, wind power bearing as well as mechanical industry used bearing ferrule, valve forged piece, slewing bearing and petroleum industry used oil well pipe; it has been rated as domestic leading large and medium-scale wind power, petroleum industry processing enterprise. Varieties and specifications of hot rolled pipe billet steel are complete; the performance of anti-SSC is excellent, capable of realizing double length delivery and has stepped into the line of domestic large and medium-sized seamless steel pipe processing enterprise.

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Pinion Steel

Name of product	Series of product	Grade of steel	Executive Standard	Specification
Hardenability guaranteed structural steel	Cr-Mn-Ti	20CrMnTiH	GB/T 5216-2004	Ø20- Ø280
		20CrMnTiH1-H6	Q/370000SGT 102-2013	
		20CrMnTiHH, 18CrMnTiH	Q/370000SGT 102-2013	Ø20- Ø280
		16-20CrMnTiSH, 30CrMnTiSH1	Q/370000SGT 102-2013	Ø20- Ø280
		30CrMnTiSH, 30CrMnTiSH1	Technical agreement	Ø20- Ø280
	Cr-Mo	SCM420H(20CrMoH)-SCM440H(SCM440H)	GB/T 5216-2004 JIS G4052-2008	Ø20- Ø280
		SCM822H(22CrMoH)	Q/370000SGT 103-2013	Ø20- Ø280
	Cr-Ni-Mo	SAE8620H(20CrNiMoH), 18NiCrMo5, 17CrNiMo6, SNCM220H, 22CrNiMoH, 39NiCrMo5	GB/T 5216-2004 Q/370000SGT 100-2013 EN 10084-2008	Ø20- Ø280
	Cr-Mn-Mo	20CrNiMoH, 40CrNiMoH	GB/T 5216-2004 Q/370000SGT 101-2013 or technical agreement	Ø20- Ø280
	Cr	SCr420H-SCr440H	JIS G4052-2008 or technical agreement	Ø20- Ø280
		20-40CrH	GB/T 5216-2004	
	Mn-B	40MnBH	GB/T 5216-2004	Ø20- Ø280
Cr-Mn	20CrMnH	GB/T 5216-2004	Ø20- Ø280	

Bearing Steel

Name of product	Series of product	Grade of steel	Executive Standard	Specification
High carbon collaterals bearing steel	Cr	GCr15, GCr15SiMn	GB/T 18254-2002 or technical agreement	Ø20- Ø75
Carburization bearing steel	Si-Mo-V	G55SiMoVA G42CrMoA	Q/370000SGT 110-2013 or technical agreement	Ø20- Ø280
Carbon bearing steel	Carbon steel	G65Mn, G50Mn2, G55	Technical agreement	Ø20- Ø280

Alloy Constructional Steel

Name of product	Series of product	Grade of steel	Executive Standard	Specification
Alloy constructional steel	Cr	20Cr-50Cr, 50CrM	GB/T 3077-1999 or technical agreement	Ø20- Ø280
		LG40Cr, LG40CrS	Q/3700LYS 326-2012 or technical agreement	
		QZ40CrS, QZ40CrSU		
	Cr-Mo	20CrMoA-42CrMoA SCM420-440 34-42CrMo4, 42CrMoS4	GB/T 3077-1999 Q370000SGT 120-2013 DIN EN10083-1-2006 or technical agreement	Ø20- Ø280
	Mn	20-45 Mn2, 40Mn2H-S		Ø20- Ø280
	Mn-B	35MnBM, 35MnBMU, 40MnB, 25MnBM, 15B36Cr	GB/T 3077-1999 Q370000SGT 105-2013 or technical agreement	Ø20- Ø280
	Si-Mn	27SiMn, 35SiMn	GB/T 3077-1999	Ø20- Ø280
	Mn-V	20MnV, F45MnVS,	GB/T 3077-1999 BS EN	Ø20- Ø280

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		F45MnVSU, 38MnSiV5M	10083-3-2006 or technical agreement	
	Cr-V	40CrV, 50CrVA		Ø20- Ø280
	Cr-Mn-Mo	20CrMnMo, 40CrMnMo, AISI4145H	GB/T 3077-1999	Ø20- Ø280
	Cr-Ni-Mo	20CrNiMo, 20CrNiMoA, 40CrNiMoA	Technical agreement or GB/T 3077-1999	Ø20- Ø280
	Cr-Mn-Ti	20CrMnTi, 30CrMnTi	GB/T 3077-1999	Ø20- Ø280
	Other	27MnTiBM, 45BM, SAE15B36M, 40CrBM, 20MnTiB, 35VB	Q/3700LYS 310-2011 or technical agreement	Ø20- Ø280

High-quality Carbon Constructional Steel

Name of product	Grade of steel	Executive Standard	Specification
High-quality carbon constructional steel	20-70	GB/T 699-1999	Ø20- Ø280
	20Mn-70Mn		
	S20C- S55C	JIS G4051-2009	Ø20- Ø280
	C45E, CK45	DIN EN10083-1-2006	
	1020, 1045	ASTM A29/A29M-2012	
	070M20B, 080M40B	BS970-1-1996	
	S355J2, S355J0, S355JR	DIN EN10025-2-2204	Ø20- Ø280
	45-50A, 15B36Cr	Technical agreement	
SAE1020B-35B, A105, 1518, S10CB-S55CB, C60, SAE1018B, SAE1080, SAE1045B,-60B, S35C, P250GH, S355J2B, P245GH, C22.8	Technical agreement	Ø20- Ø280	

Pipe Billet Steel

Name of product	Grade of steel	Executive Standard	Specification
High-quality carbon constructional steel round pipe billet	20#, 45#, 50Mn, S48C, 1040	YB/T 5222-2004 or technical agreement	Ø20- Ø280
			Ø350- Ø800
High pressure seamless steel round pipe billet	20G, 15CrMoG, 12Cr1MoV	YB/T 5137-2007 or technical agreement	Ø20- Ø280
			Ø350- Ø800
Alloy constructional steel pipe billet	27SiMn, 4130, 25CrMoTi, 20-42CrMo	GB/T 3077-1999 or technical agreement	Ø20- Ø280
			Ø350- Ø800
Petroleum used seamless steel round pipe billet	25CrMo, 27CrMoNbTi, 37Mn5, 36Mn2V, 25Mn2V, X52NS, JSL15, MSL-1	America API standard or technical agreement	Ø20- Ø280
High carbon chrome bearing steel round pipe billet	GCr15	GB/T 18254-2002	Ø20- Ø280
Mechanical structural, electricity power, petroleum chemical used continuous casting round billet	20, 45, 40Cr, S355NL, A105Y, 16Mn, P250GH, Q345E, 50Mn, 35CrMo, 42CMoA, 4130, SCM440	Technical agreement	Ø350- Ø800

Spring Steel

Name of product	Grade of steel	Executive Standard	Specification
Spring steel	60Si2MnA, 50CrVA, T65Mn	GB/T 1222-2007 or technical agreement	Ø20- Ø100

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Flaw Detection Steel Material

Name of product	Grade of steel	Executive Standard	Specification
Flaw detection steel material	20CrMoHU, 20CrMoAU	Technical agreement or GB/T 5216-2004	Ø40- Ø100
	42CrMoAU	GB/T 3077-1999	Ø40- Ø100
	35-40MnBMU	Technical agreement	Ø40- Ø100
	45U, S45CU	JIS G4051-2009 or technical agreement	Ø40- Ø100
	YF45MnVU, G55SiMoVAU	Technical agreement	Ø40- Ø100

Exported Steel Material

Name of product	Grade of steel	Executive Standard	Specification
Exported steel material	AISI4140, AISI4150, 34CrMo4, 18NiCrMo5, SCM420-440, 39NiCrMo5	Q37000SGT 119-2013 Q37000SGT 123-2013 Technical agreement	Ø20- Ø280
	42CrMo4, 42CrMoS4, 38MnSiV5	DIN EN10083-1-2006	Ø20- Ø280
	S355J0, S355J0B, S355JR, S355J2B	EN 10025-2-2004	Ø20- Ø280
	B16, 15B36Cr	Technical agreement	Ø20- Ø280

Non-quenched and Tempered Free-Cutting Steel Material

Name of product	Grade of steel	Executive Standard	Specification
Non-quenched and tempered free-cutting steel material	F45MnVS, F30MnVS, F40MnVS, F38MnVS, HF33MnVS, 38MnVS	Q/3700LYS 325-2012 or technical agreement	Ø20- Ø280

Railway and Mining Used Steel

Name of product	Grade of steel	Executive Standard	Specification
Carbon constructional steel	Q235D, Q345D, Q345E, B2	GB/T 700-2006 or technical agreement	Ø20- Ø280
Alloy constructional steel	25MnCrNiMoA, B3, 70Cr2, 65Mn2CrA, 75CeMn, 70Mn2, 55SiMnMo, 35CrMoVA, 40SiMnCrNiMo, LZ50, CL60	Technical agreement	Ø20- Ø280
	27SiMn, 35SiMn, 20-35CrMnSiA	GB/T 3077-1999	

Ship Used Anchor Chain and Ocean Anchor Chain Used Steel

Name of product	Grade of steel	Executive Standard	Specification
Ship used anchor chain and ocean anchor chain used steel	CM490, CM690, 28MnCrMo, R4(22MnCrNiMoA), R30Mn2	GB/T 18669-2012 or technical agreement	Ø20- Ø280