



中信泰富特钢集团
CITIC PACIFIC SPECIAL STEEL HOLDINGS



Special Seamless Tube
Product Manual



大冶特殊钢股份有限公司
DAYE SPECIAL STEEL CO.,LTD.



Daye Special Steel Co., Ltd. (hereinafter referred to as "Daye Steel ") is the oldest iron and steel enterprise in China, known as "the Cradle of Iron and Steel Industry".

Daye Steel located in Huangshi city, Hubei province, belongs to the biggest Chinese special steel group-- CITIC Pacific Special Steel Group, holding Daye Special Steel Co., Ltd. (hereinafter referred to as "Daye Special Steel " whose stock code is 000708).

Daye Steel is one of the companies in China who produces special steels with the most complete varieties and specifications. It is bases for high alloy medium & thick wall seamless steel tubes, alloy steel bars and high alloy steel forgings in China, products are exported to more than 50 countries and regions in America, Europe and Southeast Asia, such as the United States, Brazil, Germany, South Korea, Japan etc., having made great contributions to national economic construction and national defense industry.

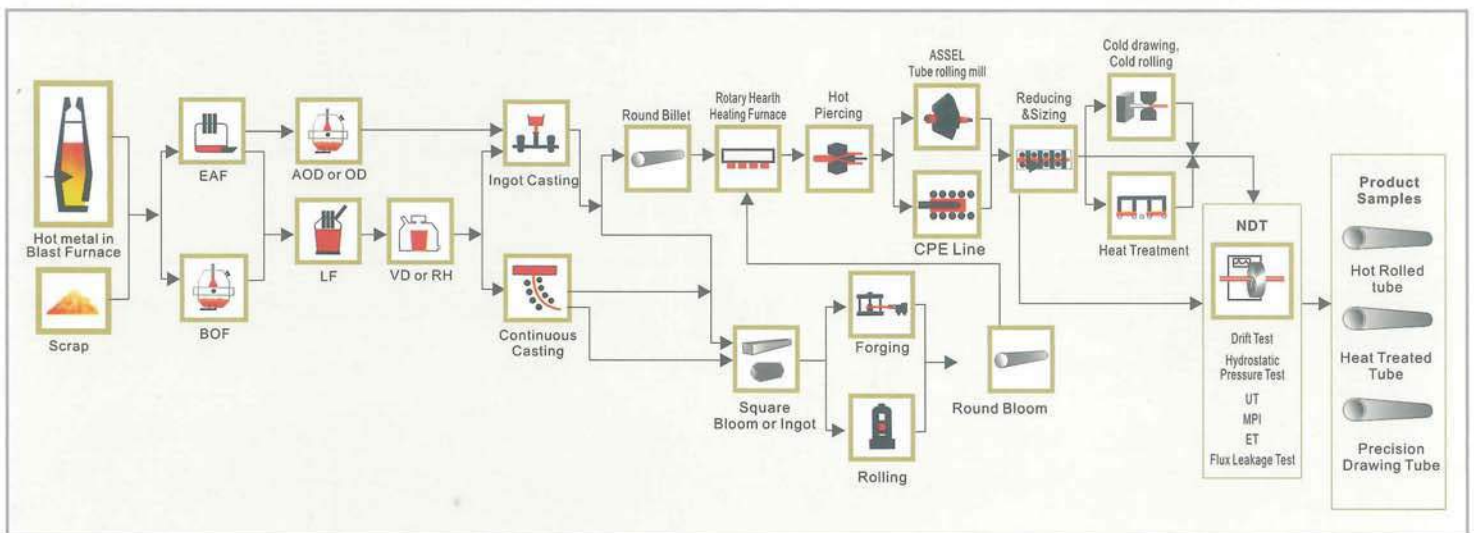
Century Long Historic Brand

Main Certifications



Around the goal of "leading products are approved and accepted by the international famous companies", company develop second and third party certification. Dage Special Steel got the ISO9001:2008, IATF16949:2016 quality management system certification; GB/T24001-2004/ISO14001:2004 environmental management system certification; GB/T28001-2001 health and safety management system certification; AS9100D air quality system certification; ISO10012:2003 measurement management system certification, the thick wall seamless steel pipe won the national inspection-free products, national metallurgical products quality gold award, European PED, CE, AD-WO certification, tubing and casing got the API certification, pressure pipe use seamless steel tube got national manufacturing license, Steel tube for engineering machinery has been approved by USA Caterpillar, Japan Komatsu. Oil&gas tube has been approved by Halliburton, Baker Hughes, FMC, Schlumberger, High pressure boiler tube has been certified by Haerbing, Dongfang, Shanghai Boilers, and BHEL, ALSTOM, etc which promote products entering the international advanced level.

Process Flow



Main Users



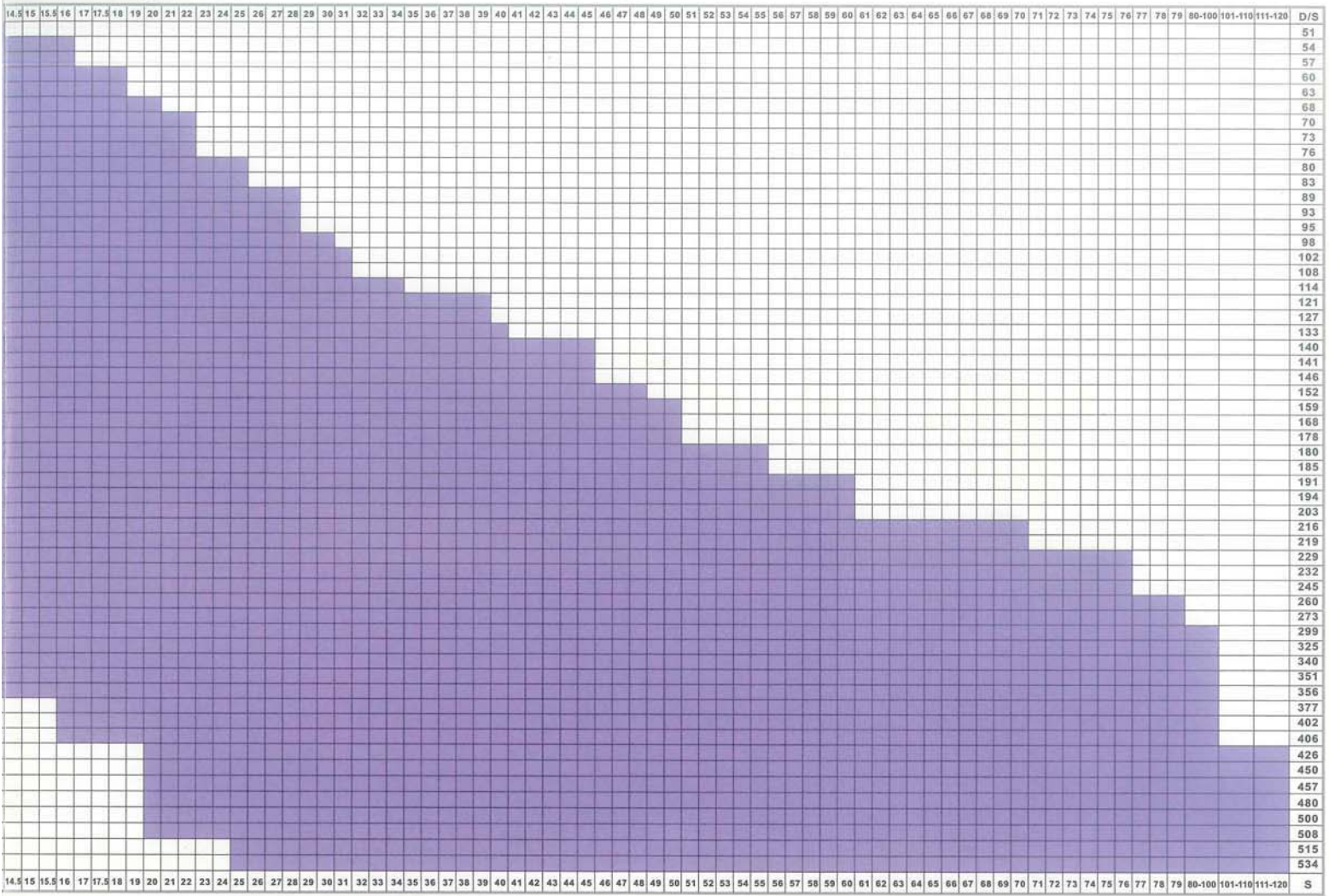
Hot Rolled Tube Dimension

D/S	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	11	12	13	14
51																
54																
57																
60																
63																
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457																
480																
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515																
534																
S	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	11	12	13	14

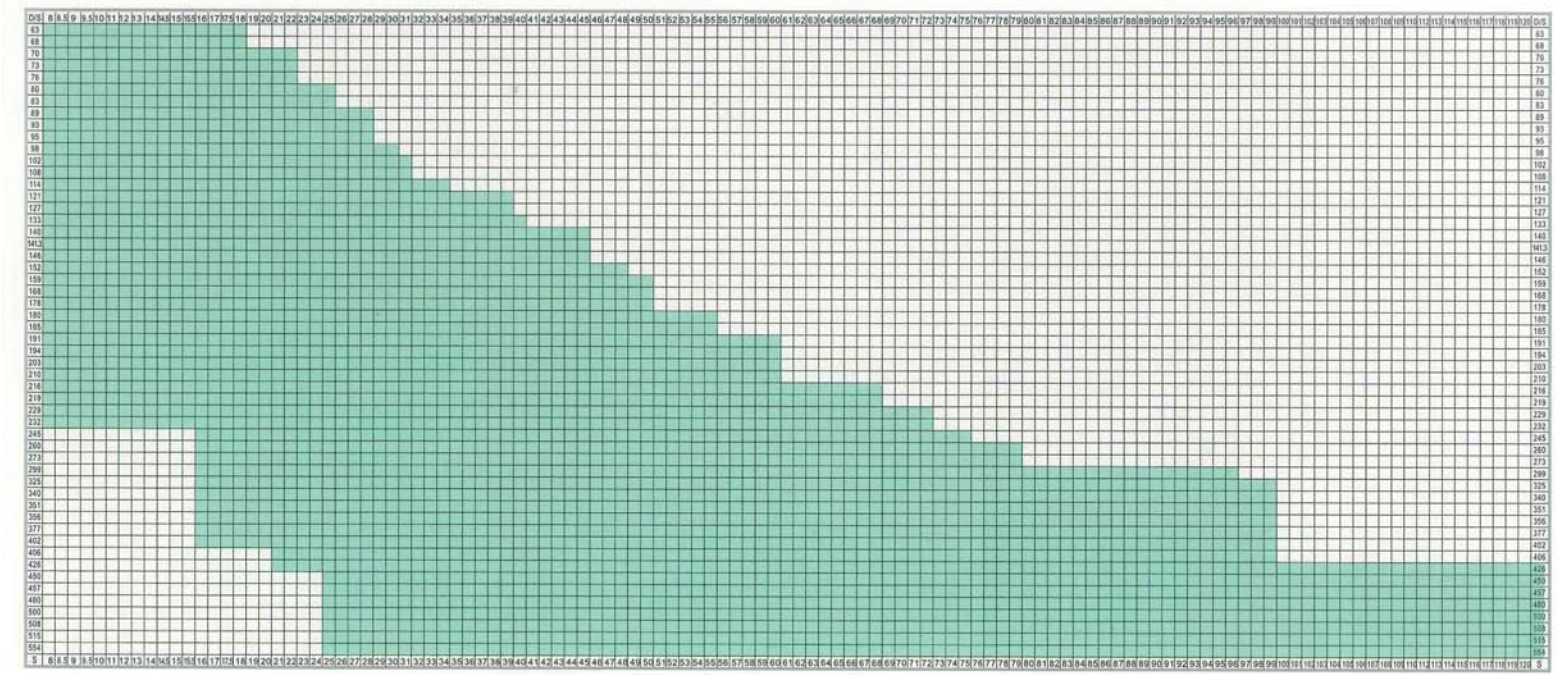
Product Outline

Steel Varieties	Representative Steel Grade
Machinery Engineering Use Mechanical Tube	20、45、Q345B、S40CBM、S355J2H、S460QLH、15-42CrMo、SNCM439
Automotive Steel tube	SAE1527、SAE5130H、SAE1030、E355、E430、E620、SCr420K、SCM415、SCM420、20CrMnTiH、20-45Mn2、16-20MnCr5
Hydraulic prop Steep pipe support	20MnTiB、27SiMn、30CrMnSiA、20MnV6、E470、S690、S770、S890
Tube oil industry	37CrMnMo、42CrMo4、37Mn5、4145H、4137H、1340、4145Mod、4330VM、4130、4340、J55、K55、N80-1、E75、X95、G105、X42-X100、S135、13Cr、S13Cr、9Cr、L80、T95、C110、Q125、4140、42CrMo、4330、35CrMo、4130M7
High pressure boiler tube Pressure pipe	20G、15CrMoG、12Cr1MoVG、10Cr9Mo1VNbN、T/P11、T/P12、T/P22、T/P23、T/P5、T/P9、T/P91、T/P92、10MoWVNb、P265GH、P355N、13CrMo4-5、10CrMo9-10、37Mn、34Mn2V、30CrMo
Bearing tube	GCr15、100Cr6、52100、SUJ2、GCr15SiMn、100CrMnSi6-4、GCr18Mo、100CrMo7、G20CrNi2Mo、8620H、A485-1
Aerospace, aviation tube for special use	30CrMnSiA、38CrMoAl、PCrNi1Mo、30Cr3SiNiMoVA、GH1131、D60
Applicable Standards:	GB/T8162、GB/T8163、GB5310、GB3087、GB/T17396、JISG3445、ASTMA106、ASTMA335、ASTMA179、ASTMA210、ASTMA519、EN10297、EN10210-1、EN10210-2、EN10025、EN10216、DIN1629、DIN17121、API5CT、API5DP、API5L

Division Range



Treated Tube Pass Group Specification



Products Application Fields

Aviation, aerospace, marine, wind power, petroleum, chemical industry, power station equipment, railway, coal, automobile, machinery etc.

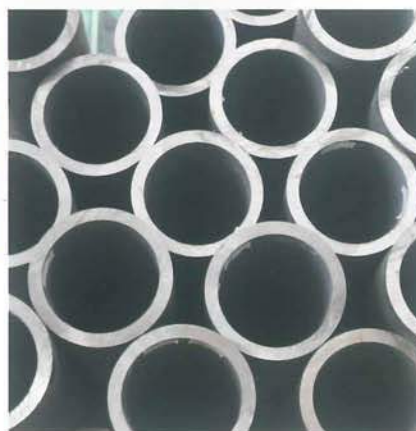
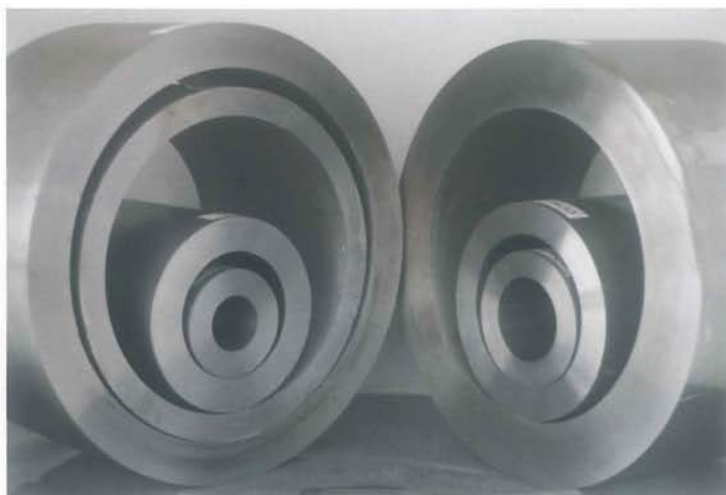
Daye Steel has developed special seamless steel tube with various specifications, widely used in the field of national defense, aerospace, machinery manufacturing, automobile manufacturing, railway transportation, nuclear power, petroleum chemical and high pressure boiler etc.



Special Seamless Tube

Leading Products

ASME standard T / P series of high-pressure boiler tubes, pipes especially for oil industry, bearing tubes, mechanical working tubes, steel tubes for engineering structures, tools, vehicles, ships and national defense equipments, etc.



Special Seamless Tube

Superior Manufacturing Equipment



460 tube rolling Line

Daye Steel has four professional special seamless steel pipe production lines, the main equipment is composed of annular heating furnace, piercing machine, ASSEL three roller tube mill, CPE pipe unit, reducing and sizing machine, straightening machine, heat treatment furnaces and various types of NDT equipments.



Rotary Hearth Heating Furnace



219 CPE line



RD testing



Heat treatment Line



Hydrostatic Test Machine



170 tube Line

Special Seamless Tube

Technology Development Capability

The lab of Daye Steel quality inspection center has approvals from China National Accreditation Service for Conformity Assessment (CNAS). It has an expert group focusing on metallurgical, processing technology and material subjects but also integrating various disciplines and a multi-level talent structure, is fully equipped with complete testing, production and quality inspection instruments, including Field Emission Scanning Electron Microscope, MAX200 X-ray diffractometer, Quanta-R300 electronic universal material testing machine, automatic metallographic sample preparation device, KC-200 large particle inclusion ultrasonic detection system and ICP etc. more than 40 sets of international advanced equipments, having formed a complete R&D base for new special steel materials.



Automatic Analysis System-DSC0011



Full Spectrum Direct Reading Inductively Coupled Plasma Emission Spectrometer



FEI Quanta400F Field Emission Scanning Electron Microscope



Full Automatic Brinell Hardness Tester



Ring Flattening Test Instrument

Special Seamless Tube

AISI/SAE 4330VMOD Q&T tube

Main applications

Oil industry rotary shaft, drilling jars, stabilizer, perforating gun and motor shaft, intermediate shaft and a variety of high strength parts.



Jar



Rotary shaft



Stabilizer



Motor shaft



perforating gun



Intermediate shaft

AISI/SAE 4330VMOD Q&T tube

Main characteristics

4330VMOD is a new material optimized and improved on the basis of 4330. It is mainly used in oil well equipment with super high strength and high toughness. The material has the following characteristics:

- (1) High strength: Currently, yield strength more than 155KSI at quenched and tempered status is available.
- (2) High toughness and plasticity: After quenched and tempered, steel can maintain both high strength and toughness and plasticity.
- (3) High hardenability: Currently, tubes with wall thickness up to 3 inches(76mm) can be quenched and tempered, and the section structure is uniform with complete sorbite, section hardness difference ≤ 3 HRC.
- (4) Small cold processing deformation: Due to high tempering stability and long tempering time, the residual stress during heat treatment can be effectively eliminated.

Melting process: EAF/BOF+LF+VD/RH

Chemical composition

Element	C	Mn	Si	P	S	Cr	Ni	Mo	V	Ti	Ai	Cu
Content (%)	0.28 0.33	0.75 1.00	0.10 0.30	\leq 0.015	\leq 0.005	0.80 1.10	1.85 3.00	0.35 0.60	0.05 0.12	\leq 0.12	\leq 0.04	\leq 0.35

Mechanical properties at Q&T condition

Rp0.2(KSI)	Rm(KSI)	A(%)	Z(%)	Hardness (HRC)	Longitudinal impact at room temperature (J)
≥ 155	160-190	≥ 15	≥ 35	30-40	≥ 54
≥ 170	≥ 175	≥ 12	≥ 30	≥ 35	≥ 34

Cleanness Test method: ASTM E45,method A

Rp0.2(Ksi) Non-metallic inclusion	A		B		C		D	
	Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick
Qualified level	≤ 1.5	≤ 1.0	≤ 1.5	≤ 1.0	≤ 0.5	≤ 0.5	≤ 1.0	≤ 1.0

NDT: ultrasonic testing [standard ASTM E213、level L2 (5%S)], magnetic particle inspection (standard ASTM E709、level CX-430)

Delivery condition : Quenched and tempered

Size range: OD: 76-508mm WT: 8-70mm L: 4.5-11.5m

ASTM A519 4140 heat treatment seamless tube

Main applications

Wellhead components, fishing tools, short tools,
drilling jars, screw drill, packer, hanger.



Screw drill



Drilling jars



Wellhead components



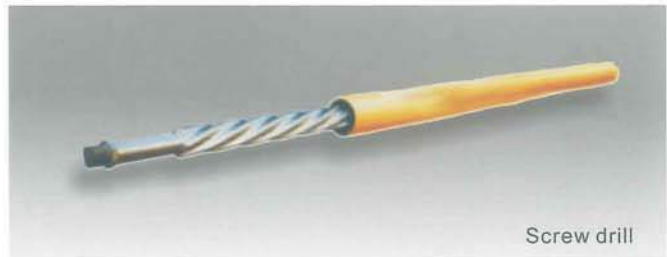
Drilling jars



Short tools



Finishing tool



Screw drill

ASTM A519 4140 heat treatment seamless tube

Main characteristics

4140 is a common grade for completion tools . The steel has good processability, small processing deformation, good fatigue resistance and moderate hardenability.

After quenching and tempering, this steel has good strength and comprehensive mechanical properties, high strength, high hardenability, good toughness, high temperature anti-creep strength and long-lasting strength.

4140 Q+T grade covers 80KSI-140KSI, the fluctuation of single piece performance does not exceed 30Mpa, and the hardness variation of full section does not exceed 3HRC.

The domestic and foreign steel grade comparison table below

Chinese Standard	American Standard	European standard	Japanese standard
GB/T8162 42CrMo,40CrMnM ^o	ASTMA519 4140	EN 10297-1 42CrMo4	JIS G 4105 SCM440

Melting process: EAF+LF+VD/RH

Chemical composition

Element	C	Si	Mn	P	S	Cu	Ni	Cu	Cr	Mo	Ni	O	Sn
Content (%)	0.38 0.43	0.15 0.35	0.75 1.00	≤ 0.025	≤ 0.025	≤ 0.25	≤ 0.25	≤ 0.30	0.80 1.10	0.15 0.25	≤ 0.25	≤ 0.0025	≤ 0.020

Comprehensive Performance

Steel grade	Rp0.2 (KSI)	Rm (KSI)	A (%)	Z (%)	Transverse impact value at 0°C(J)	Hardness (HRC)
80KSI	80-110	≥100	≥20	≥40	≥80	18-22
95KSI	95-125	≥105	≥15	≥40	≥75	≤25.5
110KSI	110-140	≥125	≥15	≥40	≥70	28-34
125KSI	125-150	≥135	≥13.5	≥35	≥65	30-35
130KSI	130-150	≥135	≥13	≥35	≥34	30-36
140KSI	140-170	≥150	≥12	≥40	≥27	32-38

Cleanness Test method: ASTM E45 Method A

Non-metallic inclusion type	A		B		C		D	
	Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick
Qualified level	≤1.5	≤1.0	≤1.0	≤1.0	≤0.5	≤0.5	≤1.0	≤1.0

NDT: ultrasonic testing 【 standard ASTM E213, level L2 (5%S) 】, magnetic particle inspection (standard ASTM E709, level CX-430)

Delivery condition: Quenched and tempered, cold drawn+ heat treated

Size range: OD: 76-508mm WT: 8-80mm L: 5000-11500mm

Special Seamless Tube

95SS,110SS,125HS High strength,H2S corrosion resistance seamless tube

Main applications

The sleeve, collar, wellhead parts, screw drilling tools, fishing tools, hanger



sleeve



screw drilling tools



hanger



cementing head



wellhead parts



fishing tools



coupling

95SS,110SS,125HS High strength,H2S corrosion resistance seamless tube

Main characteristics

A low-alloy steel of Cr-Mo-Nb type was developed, which use microalloying elements to achieve grain refinement and solid solution strengthening. At the same time, it was formed by inclusion deformation technology, segregation improvement technology and sectional reduction technology. A multi-level of corrosion-resistant seamless steel pipe material with a maximum wall thickness of 60 mm can be made.

Melting process: EAF/BOF+LF+VD/RH

Chemical composition

Element	C	Mn	P	S	Cr	Mo	Ni
Content	≤ 0.35	≤ 1.20	≤ 0.010	≤ 0.005	0.40 1.50	0.25 1.00	≤ 0.99

Comprehensive Performance

Steel grade	Rp0.2(KSI)	Rm(KSI)	HRC(max)	NACE TM0177method A SMYS(%)	Test temperature
95SS/T95	95-110	≥105	25	90	21 ± 3°C
110SS/C110	110-120	≥115	29	85	21 ± 3°C
125SS	125-140	≥135	34	80	79 ± 3°C

Through a special heat treatment process, after quenching and tempering, each pipe section hardness deviation is not higher than 3HRC and intensity deviation is not higher than 40MPa. Based on the above control, 90%Ys pre-stressed H2S corrosion test has passed the 720 hour test without fracture.

Cleanness testing method: Method A of ASTM E45

Non-metallic inclusion							
A		B		C		D	
Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick
≤1.0	≤1.0	≤1.0	≤1.0	≤0.5	≤0.5	≤1.0	≤1.0

NDT : UT: ASTM E213、L2 (5%)、MPI: ASTM E709

Delivery condition: quenched and tempered

Size range: 110SS/C110: OD: 76-508mm WT: 8-50mm L: 4500-11500mm

95SS/T95、125SS: OD:76-508mm WT: 8-65mm L: 4500-11500mm

Precision cold drawn tube introduction

Chemical composition

Steel grade	C	Si	Mn	P	S	Cr	Ni	Cu	Mo	Al
1026	0.22~0.28	0.15~0.30	1.10~1.40	≤0.025	≤0.025	—	—	≤0.30	—	≤0.050
27SiMn	0.24~0.32	1.10~1.40	1.10~1.40	≤0.030	≤0.030	≤0.30	≤0.30	≤0.20	—	
Q345B	≤0.20	≤0.50	≤1.70	≤0.035	≤0.035	≤0.30	≤0.50	≤0.30	—	
E355	≤0.22	≤0.55	≤1.60	≤0.025	≤0.025	—	—	≤0.20	—	
4140	0.38~0.43	0.15~0.35	0.75~1.00	≤0.025	≤0.025	0.80~1.10	≤0.30	≤0.20	0.15~0.25	

Comprehensive performance

Steel grade	Level	Rp0.2 (Mpa)	Rm (Mpa)	A (%)	Surface roughness	OD(ID)tolerance	Typical delivery status
1026		≥482	≥550	≥10	Ra0.4-3.2	±0.3%	BKS
27SiMn		≥700	≥800	≥15	Ra0.4-3.2	±0.3%	QBK
Q345B		≥450	≥580	≥14	Ra0.4-3.2	±0.3%	BKS
E355		≥355	≥515	≥15	Ra0.4-3.2	±0.3%	BKS
4140 series	80 KSI	552-655	≥655	≥20	Ra6.3-12.5	±0.5%	QBK
	110KSI	759-965	862-1034	≥15	Ra6.3-12.5	±0.5%	QBK
	125KSI	862-1034	931	≥14	Ra6.3-12.5	±0.5%	QBK
	130KSI	≥896	965-1138	≥13	Ra6.3-12.5	±0.5%	QBK

Cleanness (GB/T10561-2005 /ASTM E45 Method A)

Non-metallic inclusion type	A		B		C		D	
	Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick
Qualified level	≤1.5	≤1.0	≤1.0	≤1.0	≤0.5	≤0.5	≤1.0	≤1.0



Screw drilling



Gas cylinder



Oil cylinder



Cylinder support (Derricking cylinder)



Oil cylinder

NDT

UT ASTM E213/GB-T5777、
L2(5%S)

Delivery status

BKS、QBK

Size

OD: 10-402mm
WT: 1-40mm
L: 5000-12000mm

Special Seamless Tube

Precision cold drawn tube introduction

Melting process: EAF/BOF+LF+VD/RH

Main Characteristic

1026、27SiMn、Q345B、42CrMo、ST52、E355、4140 Such precision cold drawn tubes through cold drawing, cold-rolled and cold machining process optimization, and improving the pipe size and performance, high size precision, good surface quality, free of internal and external defects and has good performance.

Precision cold drawn tube standard:

China	Germany	Europe	America
GB/T3639	DIN2391	EN10305-1	ASTM A519

Main application

Oil drilling, hydraulic prop, cylinder, plug column, drilling tools, gas cylinder, engineering machinery.

Cold drawn products size range

D/S	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
10	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
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139	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
146	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
152	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
159	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
166	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
172	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
178	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
186	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
194	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
203	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
216	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
219	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
224	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
232	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
245	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	36	38	40
252	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22														



Introduction of High Pressure Boiler Tube

Main Supplied Steel Grades

ASME series	SA106B/C、P1、P5、P9、T/P12、T/P22 T/P 91、etc
Gb5310 series	20G、15CrMoG、12Cr1MoVG、12Cr2MoG、15Ni1MnMoNbCu(WB36)、10Cr9Mo1VNbN,etc
EN10216-2 series	P195GH、P235GH、P265GH、20MnNb6、16Mo3、13CrMo4-5、10CrMo9-10、15NiCuMoNb5-6-4(WB36)、X10CrMoVNb9-1,etc

Delivery status: Normalized, Normalized + Tempered, or customer required special status.

Available size range: OD(Φ) 51 ~ 508mm,WT(S): 4 ~ 100mm,length(L): 5000 ~ 12000 mm

Introduction:

Company produced high-pressure boiler tube has been made from integrated controlled process covering steelmaking, forging, tube rolling, and heat treatment. Therefore, the harmful elements content in steel is low and low level of gas such as N,H,O. Flexible availability of steel billets which can meet demands of mass production and various production with small volume. High size precision:OD size tolerance $\pm 1\%$, can be $\pm 0.5\%$ at best, wall thick tolerance $\pm 8\%$, can be $\pm 5\%$ at best.

Representative steel grade: ASME SA-335M P22

Applicable size range (OD×WT×L mm):73~508×10~100×5000~12000 mm

Delivery status: Normalized+ Tempered

Product Features:

Grade P22 is 2 Cr-1Mo low alloy pearlite structure steel, this steel has good processing performance and better welding performance. It is not so sensitive to heat treatment, but it can obtain uniform property on a big section, with good plasticity and high temperature performance, it is mainly used for manufacturing of superheater header and pipeline, as well as reheater header and steam pipeline whose working temperature below 565 °C.

Representative steel grade	Comparative Standard	Similar Steel Grade	Heat Treatment Process	
SA-335M P22	GB 5310	12Cr2MoG	Normalizing at 900~960°C	Tempering at 700~750°C
	ISO	10CrMo9-10		
	EN	10CrMo9-10		
	ASME/ASTM	T22/P22		
	JIS	STBA 24		

Main Technical Index

Steel grade	Chemical Composition %									
	C	Mn	Si	P	S	Cr	Mo	V	Nb	N
SA-335M P22	0.08 0.13	0.40 0.60	0.20 0.40	≤ 0.015	≤ 0.010	2.10 2.40	0.95 1.05	≤ 0.08	≤ 0.03	≤ 0.012

[O] ≤20 ppm, [H] ≤2ppm;As ≤0.015%,Sn≤0.015%,Pb≤0.010%,Sb≤0.010%,Bi≤0.010%;

Σ = As + Sn + Pb + Sb + Bi ≤ 0.035%.

Introduction of High Pressure Boiler Tube

steel grade	SA-335M P22						
Testing items	Tensile property				Impact absorbed energy KV ₂ (J)		Hardness HB
	R _m (MPa)	R _{p0.2} (MPa)	A(%)		longitudinal	transverse	
			longitudinal	transverse			
Performance	≥415	≥205	≥22	≥14	≥40	≥27	130-179
Non-metallic inclusion	A type	B type	C type	D type	A+B+C+D	B+C+D	Ds type
Thin	≤2.0	≤2.0	≤1.0	≤2.0	≤4.5	≤4.0	≤2.0
Thick	≤1.5	≤1.5	≤1.0	≤1.5	≤4.5	≤4.0	

Representative steel grade: ASME SA-335M P91

Applicable size range (OD×WT×L mm):73~508 × 10~90 × 5000~12000 (mm)

Delivery status: Normalized+ Tempered

Product Features:

Steel grade P91 is an improved grade based on 9Cr-1Mo, which has been integrated with V, Nb, N to perform solid solution of Cr and Mo. P91 has a high elevated temperature strength and resistance to corrosion, subcritical, supercritical units, can be used as a temperature ≤ 625 °C high temperature superheater and reheater header pipe and wall temperature ≤ 600 °C high temperature header and steam pipes, and so on.

Representative steel grade	Comparative Standard	Similar Steel Grade	Heat Treatment Process	
SA-335M P91	GB 5310	10Cr9Mo1VNbN	Normalizing at 1040~1080°C	Tempering at 730~800°C
	ISO	X10CrMoVNb9-1		
	EN	X10CrMoVNb9-1		
	ASME/ASTM	P91/T91		
	JIS	STBA 26		

Main Technical Index

steel grade	Chemical Composition													
	C	Si	Mn	Cr	Mo	V	Nb	N	P	S	Ni	Al	Ti	Zr
SA-335M P91	0.08 0.12	0.20 0.50	0.35 0.55	8.40 9.50	0.90 1.00	0.19 0.24	0.07 0.09	0.030 0.070	≤0.015	≤0.010	≤0.20	≤0.018	≤0.01	≤0.01

[O] ≤20 ppm, [H] ≤2ppm; As ≤0.015%, Sn ≤0.015%, Pb ≤0.010%, Sb ≤0.010%, Bi ≤0.010%;
 $\Sigma = \text{As} + \text{Sn} + \text{Pb} + \text{Sb} + \text{Bi} \leq 0.035\%$

Steel grade	SA-335M P91						
Testing item	Tensile strength				Impact absorbed energy KV ₂ (J)		Hardness HB HBw
	R _m (MPa)	R _{p0.2} (MPa)	A(%)		longitudinal	transverse	
			longitudinal	transverse			
Performance	≥585	≥415	≥22	≥14	≥40	≥27	200-240
Non-metallic inclusion	A type	B type	C type	D type	A+B+C+D	B+C+D	Ds type
Thin	≤2.0	≤2.0	≤1.0	≤2.0	≤4.5	≤4.0	≤2.0
Thick	≤1.5	≤1.5	≤1.0	≤1.5	≤4.5	≤4.0	

Gas cylinder tube

Main Supplied Steel Grades

GB 18248 series	37Mn、34Mn2V、30CrMo、35CrMo,etc
JIS 3429 series	STH11、STH12、STH21、STH22,etc

Delivery status: hot rolled

Available size range: OD(Φ) 51 ~ 530mm,WT(S): 4 ~ 90mm,length(L): 5000~12000mm

Product Features:

Company produced gas cylinder tube has low level of harmful element and high cleanness and good size accuracy. OD size tolerance $\pm 1\%D$, can be $\pm 0.5\%D$ at best, wall thick tolerance $\pm 10\%S$, can be $\pm 5\%S$ at best. With good internal and external quality, it has been widely used in manufacturing of oxygen cylinder and hydrogen cylinder and accumulator.



Gas cylinder tube

Representative steel grade: 37Mn

Applicable size range (OD×WT×L mm): 51~530×4~90×5000~12000 (mm)

Delivery status: hot rolled

Product Features:

Grade 37Mn has very good mechanical property and process performance. Common gas cylinder can be made from normal normalizing, and high requirement gas cylinder can be made from quenched and tempered process. Company produced gas cylinder tube has good size accuracy. (OD size tolerance $\pm 0.8\%D$, wall thick tolerance $\pm 8\%.S$) With good internal and external quality, it has been widely used in manufacturing of oxygen cylinder and hydrogen cylinder and accumulator.

Representative steel grade	Standard	Similar Steel Grade	Heat Treatment Process(for samples)
37Mn	GB 18248	37Mn	Quenching at 820~860 °C Cooling method : water cooling Tempering at 550~650 °C Cooling method : Air cooling
	JIS G3429	STH11 STH12	
	EN 10297-1	38Mn6	
	ASTM A372/A372M	Grade C	
	DOT 49CFR § 178.37	Inter-mediate manganese	

Main Technical Index

Steel grade	Chemical Composition							
	C	Mn	Si	P	S	P+S	Ni	Cu
37Mn	0.35-0.39	1.50-1.65	0.20-0.30	≤0.012	≤0.005	≤0.015	≤0.20	≤0.20

$\Sigma = V + Nb + Ti + B + Zr \leq 0.15\%$, [O] ≤ 20 ppm, [H] ≤ 2 ppm; As $\leq 0.015\%$, Sn $\leq 0.015\%$, Pb $\leq 0.010\%$, Sb $\leq 0.010\%$, Bi $\leq 0.010\%$

Steel grade	37Mn				
Testing items	Tensile strength			Impact absorbed energy KV ₂ (J)	
	R _m (MPa)	R _{p0.2} (MPa)	A(%)	Test temperature(°C)	longitudinal
			longitudinal		
Tensile strength	≥750	≥630	≥16	-50	≥40

Non-metallic inclusion	A type	B type	C type	D type	Ds type
Thin	≤2.0	≤2.0	≤1.0	≤2.0	≤2.0
Thick	≤2.0	≤2.0	≤2.0	≤2.0	



The Product Introduction for Line Pipe and Drill Pipe

Seamless Line Pipe

Standard: API 5L 46th

Steel Grade:

Product Specification Level	Steel Grade	Delivery Condition
PSL1	A25, A25P, A, B, X42, X46, X52, X56	Hot rolled
	X60, X65, X70	Q+T
PSL2	BN, X42N, X46N, X52N, X56N, X60N	Normalized
	BQ, X42Q, X46Q, X52Q, X56Q, X60Q, X65Q, X70Q, X80Q, X90Q, X100Q	Q+T
PSL2+Annex H	BNS, X42NS, X46NS, X52NS	Normalized
	BQS, X42QS, X46QS, X52QS, X56QS, X60QS, X65QS, X70QS	Q+T
PSL2+Annex J	BNO, X42NO, X46NO, X52NO	Normalized
	BQO, X42QO, X46QO, X52QO, X56QO, X60QO, X65QO, X70QO, X80QO, X90QO, X100QO	Q+T

Size range: OD 2 inch–20 inch (51–530mm), WT 8/25 inch–4–3/4 inch (8–120mm), including but not limited to API sizes.

Ends type: Beveled or Plain.

Drilling Pipe

Standard: API 5DP 1st

Steel Grade:

Product Specification Level	Steel Grade	Delivery Condition
PSL1	E75, X95, G105, S135	Q+T

Size range: OD 3 inch–9 5/8 inch (89–245mm), WT 9/50 inch–39/50 inch (4.5–20mm)

Ends type: EU (External Upset) 、IU (Internal Upset) 、IEU (Internal & External Upset)



SSC&HIC Lab approved by CNAS



Advanced heat treatment line

The Product Introduction for OCTG

Seamless Tubing & Casing

Standard: API 5CT10th

Steel Grade:

Group	Steel Grade	Product Specification Level	Delivery Condition
Group 1	J55	PSL1, PSL2, PSL3	Normalized
	K55	PSL1, PSL2, PSL3	Normalized
	N80-1	PSL1, PSL2	Normalized
	N80-Q	PSL1, PSL2, PSL3	Q+T
	R95	PSL1, PSL2, PSL3	Q+T
Group 2	M65	PSL1, PSL2, PSL3	Q+T
	L80-1	PSL1, PSL2, PSL3	Q+T
	L80-9Cr	PSL1	Q+T
	L80-13Cr	PSL1, PSL2, PSL3	Q+T
	C90	PSL1, PSL2, PSL3	Q+T
	T95-1	PSL1, PSL2, PSL3	Q+T
	C110	PSL1	Q+T
Group 3	P110	PSL1, PSL2, PSL3	Q+T
Group 4	Q125-1	PSL1, PSL2, PSL3	Q+T

Size range: OD 3 inch-9 5/8 inch (89-245mm) WT 9/50 inch-39/50 inch (4.5-20mm)

Ends type: Plain ends.

Coupling Stock/Coupling Material

Standard: API 5CT10th

Steel Grade:

Group	Steel Grade	Product Specification Level	Delivery Condition
Group 1	J55	PSL1, PSL2, PSL3	Normalized
	K55	PSL1, PSL2, PSL3	Normalized
	N80-1	PSL1, PSL2	Normalized
	N80-Q	PSL1, PSL2, PSL3	Q+T
	R95	PSL1, PSL2, PSL3	Q+T
Group 2	L80-1	PSL1, PSL2, PSL3	Q+T
	L80-9Cr	PSL1	Q+T
	L80-13Cr	PSL1, PSL2, PSL3	Q+T
	C90	PSL1, PSL2, PSL3	Q+T
	T95-1	PSL1, PSL2, PSL3	Q+T
	C110	PSL1	Q+T
Group 3	P110	PSL1, PSL2, PSL3	Q+T
Group 4	Q125-1	PSL1, PSL2, PSL3	Q+T

Size range: OD 2 inch-20 inch (51-530mm), WT 8/25 inch-4-3/4 inch (8-120mm), including but not limited to API sizes

Special Seamless Steel Pipe

Top Level Enterprise



Daye Special Steel Co.,Ltd. in total 4 tube production lines, among which 108 line, 170 line, 460 line are ASSEL three rollers tube mills, and another 219 line called CPE unit. Tube product size range $\Phi 50-530 \times 4.5-130 \text{mm}$, annual capacity 1 million tons, of which 460 line has the most advanced technology and is the largest ASSEL mill in the world. Multi process system provides flexible manufacturing, and the whole tube plant is the special seamless steel tube production base in China who covers most widely used specifications.





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