Rare earth alloy wear-resistant pipe

The wear and tear of rare earth alloy is a phenomenon of material loss caused by relative motion between objects. Rare earth wear-resistant alloy steel tube wear-resistant materials can resist wear and prolong the life of the product.

- Main Material: ZG40CrNiMoMnSiRe
- Heat treatment hardness: HRC≥40
- Impact toughness: ≥14J/cm2
- Tensile strength: ≥700MPa

What is ZG40Cr8MnMoNiSiRe?

ZG40Cr8MnMoNiSiRe is the latest rare earth alloy wear-resistant material developed by our factory on the basis of the original rare earth alloy. By increasing the content of Cr in the rare earth alloy, the wear resistance of the rare earth alloy is greatly increased. ZG40Cr8MnMoNiSiRe now is instead of ZG40CrMnMoNiSiRe to produce rare earth metal wear resistant pipe and fittings.

Chemical composition (%)

Grade	C	Cr	Mn	Mo	Ni	Si	S	P	Re
ZG40CrMnMONiRe (JM6a)	0.35-0.42	1-1.14	1-1.14	0.3-0.6	0.5-0.8	0.8-1.2	≤0.04	≤0.04	≤0.02

Mechanical properties

Grade	Tensile strength σb MPa	Impact ak j/cm2	Hardness HRC
ZG40CrMnMoNiRe (JM6a)	≥860	30	≥40

The mechanical properties adopt perfect testing methods to ensure the stability of material properties.

Horizontal centrifugal casting process of rare earth alloy wear-resistant pipe

Rare earth alloy wear-resistant pipe is produced by horizontal centrifugal casting, in which the smelted liquid metal is passed through the pouring riser and diverted into the rotating mold barrel (the speed of the mold barrel is generally 800-1000 rpm), under the action of centrifugal force A casting method for filling and solidifying into a casting. The horizontal centrifugal casting machine is used for casting various tubular castings and various carbon steel, alloy steel pipes and double-layer steel rolls that require different compositions of inner and outer layers.

Characteristics

Liquid metal can form a hollow cylindrical free surface in a mold without a core. In the production process, the casting process is greatly simplified, with high productivity and low cost.

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

SCAN WHATSAPP

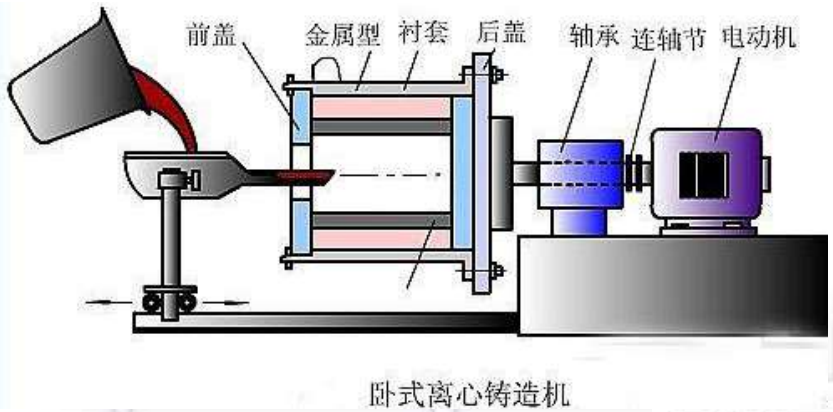
Under the action of centrifugal force, the metal liquid improves the ability of metal to fill the mold, so some alloys and thin-walled castings with poor fluidity can be produced by centrifugal casting.

Due to the centrifugal force, casting defects are improved, shrinkage holes (shrinkage porosity), pores, inclusions and other defects are reduced, and the mechanical properties are improved.

Because centrifugal casting has no riser runway, etc., the utilization rate of metal is improved.

How To Improve the Wear Resistance of Rare Earth Alloy Wear-Resistant Pipes?

Rare earth wear-resistant alloy pipe material has strong anti-wear performance, so when choosing rare earth alloy wear-resistant pipe, higher wear resistance is required, how to improve it?



卧式离心铸造机

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

Material

After years of production, research and development in our factory, rare earth alloy wear-resistant pipes have a series of formulas, and different material series can be selected according to the requirements of wear resistance. In addition, when some elements such as fev, fenb, and cu are properly added, the metallographic structure of the material will change, the grains will be finer, the strength will be higher, the plasticity will be stronger, and the metal matrix will be further passivated, so that the original material is resistant to resistance. The abrasiveness is improved again, thereby increasing the service life of the rare earth alloy wear-resistant pipe.

Structurally

The thickness of the scouring surface of the pipeline can be increased or the guide block can be increased, so that the increased thickness or guide block can be worn first when the medium flows through, thereby improving the overall service life of the rare earth alloy wear-resistant pipeline.

Craftsmanship

in the casting process, heat treatment mainly changes the hardness of rare earth alloy wear-resistant pipes. Appropriate heat treatment can effectively improve the performance of pipe fittings, change the hardness of pipe fittings, and make them more wear-resistant.

PMI test:

Positive material identification (PMI) is used to analyses and identify material grade and alloy composition for quality and safety control. A rapid, non-destructive method, positive material identification is performed on a wide range of components and assets, and provides a semi-quantitative chemical analysis.


CAUTION RADIATION
Fe_S-6
Cr
Mn
Fe
Ni
Mo


合金
Fe_S-6
Cr
Mn
Fe
Ni
Mo


合金
测试编号412 2022-6-17 13:56
Fe_4340
对比:Fe_4340
Cr 1.41% 0.055% 0.7-0.9%
Mn 1.20% 0.072% 0.6-0.8%
Fe 96.14% 0.484% 95.7-96.85%
Ni 1.27% 0.103% 1.65-2.0%


合金
测试编号412 2022-6-17 13:56
Fe_4340
对比:Fe_4340
Cr 1.41% 0.055% 0.7-0.9%
Mn 1.20% 0.072% 0.6-0.8%
Fe 96.14% 0.484% 95.7-96.85%
Ni 1.27% 0.103% 1.65-2.0%

Application

Rare earth alloy wear-resistant pipe is used for conveying wear-resistant pipes such as power plant powder and ash, mine slag and non-ferrous metal coal extraction and slag discharge, shock resistance and wear resistance.

The application fields of rare earth alloy wear-resistant pipes are as follows:

Coal-fired power plant:

Coal conveying, ash removal, slag discharge pipes, powder feeding, powder returning pipes, desulfurization pipes, etc.;

Mine:

In the coal industry, coal-water slurry, coal washing slime, mine filling material, mine pulverized heavy medium coal washing pipeline, chute, etc.;

Metal Mine:

Conveying wear-resistant pipes for concentrates and tailings;

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

Metallurgy:

Blast furnace coal injection and slag conveying pipes in iron and steel plants; CAO, zinc and sand conveying pipes, iron alloy conveying in steel making, out-of-furnace refining and other preferred wear-resistant pipes;

Cement plant:

Raw slurry transportation, pulverized coal transportation, hoist unloading, finished cement pneumatic transportation loading and unloading, concrete transportation pipeline of rotary kiln wet production line.

Chemical plant:

Coal powder conveying pipeline, silicon powder and other raw material conveying wear-resistant elbows.

The composition design of medium carbon alloy rare earth wear-resistant steel adopts medium carbon multi-alloy system to ensure that the material maintains comprehensive performance indicators. Combining the characteristics of our country's resources, this material adopts a small amount of multi-element alloy body, and adds FeV, FeNb, Cu and other multi-alloy elements on the basis of the original alloy materials FeCr, FeMn, Ni, Re, FeSi, etc., to ensure the performance of the

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

product.

The medium carbon alloy rare earth wear-resistant steel has high wear resistance, and the rare earth wear-resistant alloy steel has strong wear resistance. After adding FeV, FeNb, and Cu, the metallographic structure of the material has changed. The metallographic structure is: Lath Martensite + Bainite. The grains are finer, the strength is higher, the plasticity is stronger, and the metal matrix is further passivated, so that the wear resistance of the original material has been improved.

Medium carbon alloy rare earth wear-resistant steel has high temperature resistance, strong corrosion resistance and improved wear resistance. The content of Ni and Cr elements in the alloy directly determines the temperature resistance of the material. The content of Cr element and Cu element

determines the corrosion resistance of the material. The reasonable combination of these elements makes the new rare earth wear-resistant alloy material have several properties at the same time, such as high wear resistance and high wear resistance. It has excellent corrosion resistance, so it can adapt to the use of various harsh working conditions.

The medium carbon alloy rare earth wear-resistant steel has advanced technology and stable performance. On the basis of centrifugal casting and resin sand molding, our factory has introduced a new EPC lost foam vacuum suction casting process to make molds according to product structure, application, use method, and quantity. High precision, uniform material structure and stable performance, especially for special-shaped parts such as wear-resistant spiral pipes, pulverized coal mixers, fork pipes, import and export hoppers, round and round joints, cone buckets, etc., the wall thickness is uniform.

Rare earth alloy wear-resistant pipe material composition table

No.	Grade	C	Mn	Si	Cr	Ni	Mo	W	V	Nb	Cu	Re	S	P
1	ZGCr20Mo3Ni3Re	2.50/3	1.50/2	0.80/1.2	18.0/23	2.50/3	√				1.20/1.5	√	≤0.06	≤0.06
2	ZGCr28Mo3Ni3Re	2.80/3.3	1.50/2	1.80/1.2	25.0/300	2.80/3.3	√				1.80/2.3	√	≤0.06	≤0.06
3	ZGCr15Mo3Re	2.60/3.2	1.20/1.6	1.0/1.5	12.0/16	√	2.50/3				1080/1.2	√	≤0.04	≤0.05
4	ZGCr25Ni4Si2Re	0.35/0.45	0.80/1.2	1.20/1.6	23.0/26	3.50/4.5			√			√	≤0.035	≤0.045
5	ZGCr15Mo2Re	1.80/2.2	0.80/1.2	1.0/1.5	14.0/18	√	2.0/2.5				0.80/1.2	√	≤0.04	≤0.05
6	ZG40CrMnMoNiSiRe	0.40/0.5	1.20/1.6	1.50/2	1.10/1.6	1.0/1.5	√		√		√	√	≤0.035	≤0.04
7	ZG40Cr5Ni3MoVWRe	0.35/0.45	0.80/1.2	1.20/1.6	23.0/26	2.50/3.5	√	√	√			√	≤0.045	≤0.055
8	ZG50Cr18Ni4MoVWCuRe	0.45/0.6	1.0/1.4	1.50/2	16.0/20	3.50/5	√	√	√		0.40/0.6	√	≤0.35	≤0.35
9	ZGCr25Ni2Mo2WVCuRe	0.40/0.6	0.80/1.2	1.20/1.6	23.0/v	1.50/2.5	√	√	√		0.20/0.4	√	≤0.035	≤0.035
10	ZG40Cr25Ni6MoWVCuRe	0.35/0.45	1.2/1.6	1.50/2	23.0/26	5.0/7	√	√	√	√	√	√	≤0.35	≤0.045
11	ZG90CrMn13MoSiVRe	0.40/1.3	11.0/14	0.30/0.8	√		√						≤0.04	≤0.04
12	ZGCrMu10MoSiVRe	1.0/1.2	8.0/11	0.30/0.8	√		√						≤0.04	≤0.04
13	ZGW5Cr4Re	2.50/3.5	1.5/1	0.50/1	35.0/4.5	√						√	≤0.10	≤0.15
14	ZGCr25MoRe	2.30/3	0.50/0.9	0.30/0.6	23.0/28	√						√	≤0.06	≤0.10
15	ZGCr15MoRe	3.0/3.5	≤1.0	0.15/1	15.0/18.6		2.80/3.3					√	≤0.06	≤0.10
16	ZG30CrMnSi	0.27/0.33	1.30/1.5	1.20/1.5	√		√					√	≤0.03	≤0.04
17	ZG40CrNiRe	0.28/0.43	1.10/1.4	0.80/1	√		√					√	≤0.06	≤0.10
18	ZG33Cr13Ni4Re	0.30/0.35	≤0.80	≤0.60	12.0/14	4.0/4.5	√					√	≤0.06	≤0.10
19	ZG40CrSiN	0.35/0.45	1.0/1.5	1.50/2	√		√						≤0.04	≤0.08

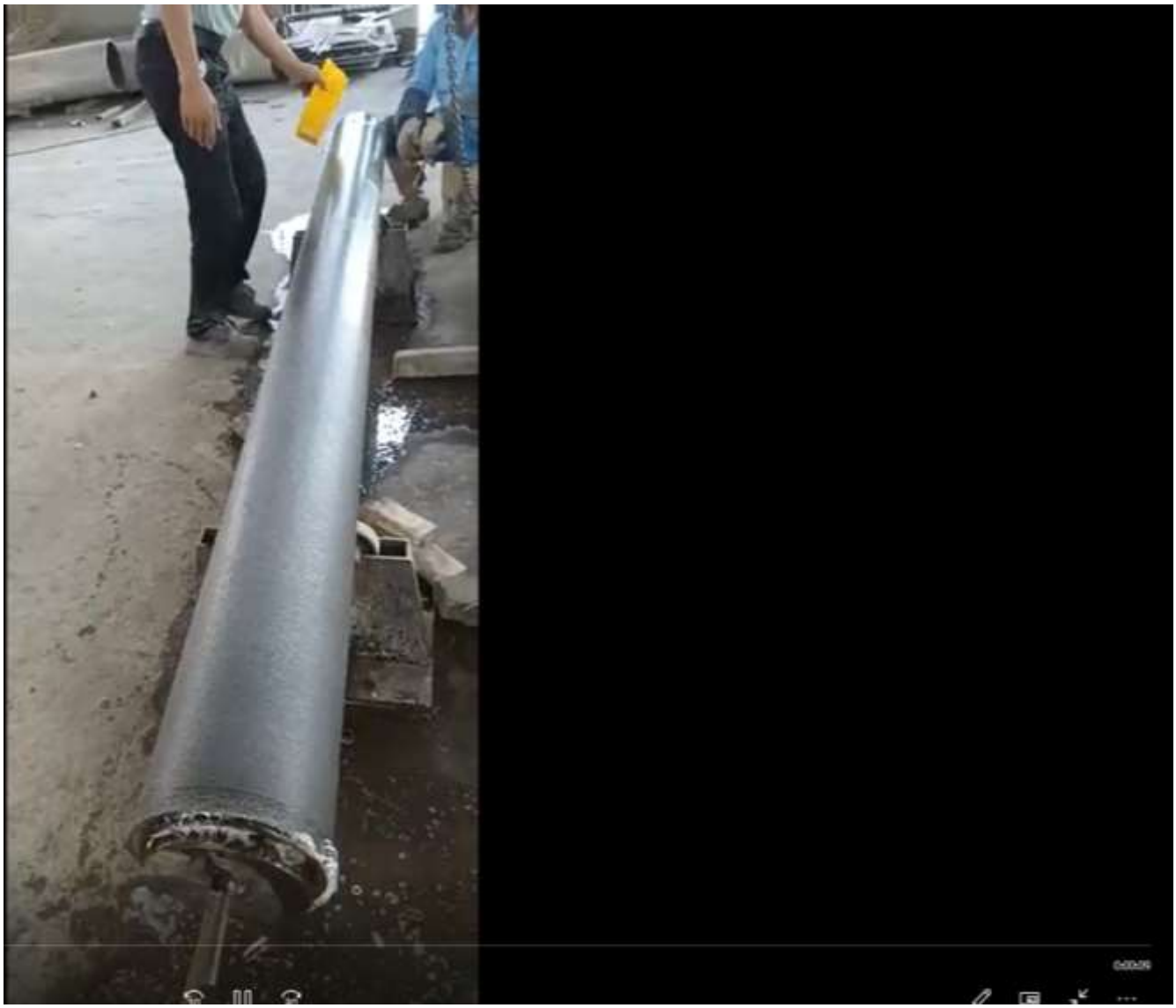
www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

Performance table of high strength rare earth alloy wear-resistant steel

No.	Grade	Yield Strength ≥Mpa	Compressive strength ≥Mpa	Impact J/cm²	Temperature ℃	Abrasive wear mg/g	Hardness ≥HRC≥HB
1	JM1		790	11	1100	0.026	45
2	JM2		810	9	1050	0.023	51
3	JM3		890	5	300	0.021	63
4	JM4		910	16	1050	0.033	-600
5	JM5		920	6	530	0.042	52
6	JM6		940	10	400	0.069	45
7	JM6A		730	100	750	0.091	-210
8	JM6B		680	90	760	0.096	-220
9	JM7C	450	690	5	1150	0.041	36
10	JM7	380	580	12	800	0.063	36
11	JM7A	400	530	16	900	0.083	34
12	JM7B	420	560	20	950	0.89	32
13	JMB		590	5	100	0.026	52
14	JM19		610	5.5	960	0.024	50
15	JM10		580	4.5	980	0.091	-441
16	JM11		1700	10	750	0.12	-300
17	JM12		980	6	600	0.59	-460
18	JM13		920	7	850	0.039	48
19	JM14		950	7.5	450	0.064	40

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

Hydraulic test



The hydraulic test is an indispensable procedure before the completion of the water supply or drainage project. It refers to the hydraulic pressure applied by the pressurized pump in the pipeline to the design pressure, and then to check whether there is leakage, etc., to ensure the construction quality.

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

Medium carbon alloy rare earth wear-resistant steel

Medium-carbon alloy rare earth wear-resistant steel is a wear-resistant alloy material jointly developed by our factory and North Jiaotong University in the 1980s. After years of continuous improvement, this alloy material has been serialized and can meet various working conditions of power plants.

Power plant boilers have used medium carbon alloy rare earth wear-resistant steel pipe fittings for powder feeding elbows and ash and slag discharge pipes for nearly 20 years, and have won their wide recognition.

Medium-carbon alloy rare earth wear-resistant steel materials have the advantages that other wear-resistant materials cannot be used in general, such as accessories for some equipment of power plant coal grinding, pulverizing, ash

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

removal, and slag discharge systems that cannot be manufactured by bimetallic materials. Such as slag scraper, pulverized coal mixer, spiral pipe, etc., can all be made of this material, which brings great convenience to the operation, maintenance and management of the power plant.

The composition design of medium carbon alloy rare earth wear-resistant steel adopts medium carbon multi-alloy system to ensure that the material maintains comprehensive performance indicators. Combining the characteristics of our country's resources, this material adopts a small amount of multi-element alloy body, and adds FeV, FeNb, Cu and other multi-alloy elements on the basis of the original alloy materials FeCr, FeMn, Ni, Re, FeSi, etc., to ensure the performance of the product.

The medium carbon alloy rare earth wear-resistant steel has high wear

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

resistance, and the rare earth wear-resistant alloy steel has strong wear resistance. After adding FeV, FeNb, and Cu, the metallographic structure of the material has changed. The metallographic structure is: Lath Martensite + Bainite. The grains are finer, the strength is higher, the plasticity is stronger, and the metal matrix is further passivated, so that the wear resistance of the original material has been improved.

Medium carbon alloy rare earth wear-resistant steel has high temperature resistance, strong corrosion resistance and improved wear resistance. The content of Ni and Cr elements in the alloy directly determines the temperature resistance of the material. The content of Cr element and Cu element determines the corrosion resistance of the material. The reasonable combination of these elements makes the new rare earth wear-resistant alloy material have several properties at the same time, such as high wear resistance and high wear resistance. It has excellent corrosion resistance, so it can adapt to the use of various harsh working conditions.

The medium carbon alloy rare earth wear-resistant steel has advanced technology and stable performance. On the basis of centrifugal casting and resin sand molding, our factory has introduced a new EPC lost foam vacuum suction casting process to make molds according to product structure, application, use method, and quantity. High precision, uniform material structure and stable performance, especially for special-shaped parts such as wear-resistant spiral pipes, pulverized coal mixers, fork pipes, import and

export hoppers, round and round joints, cone buckets, etc., the wall thickness is uniform.

poor wear resistance

prone to cracks

low pressure resistance

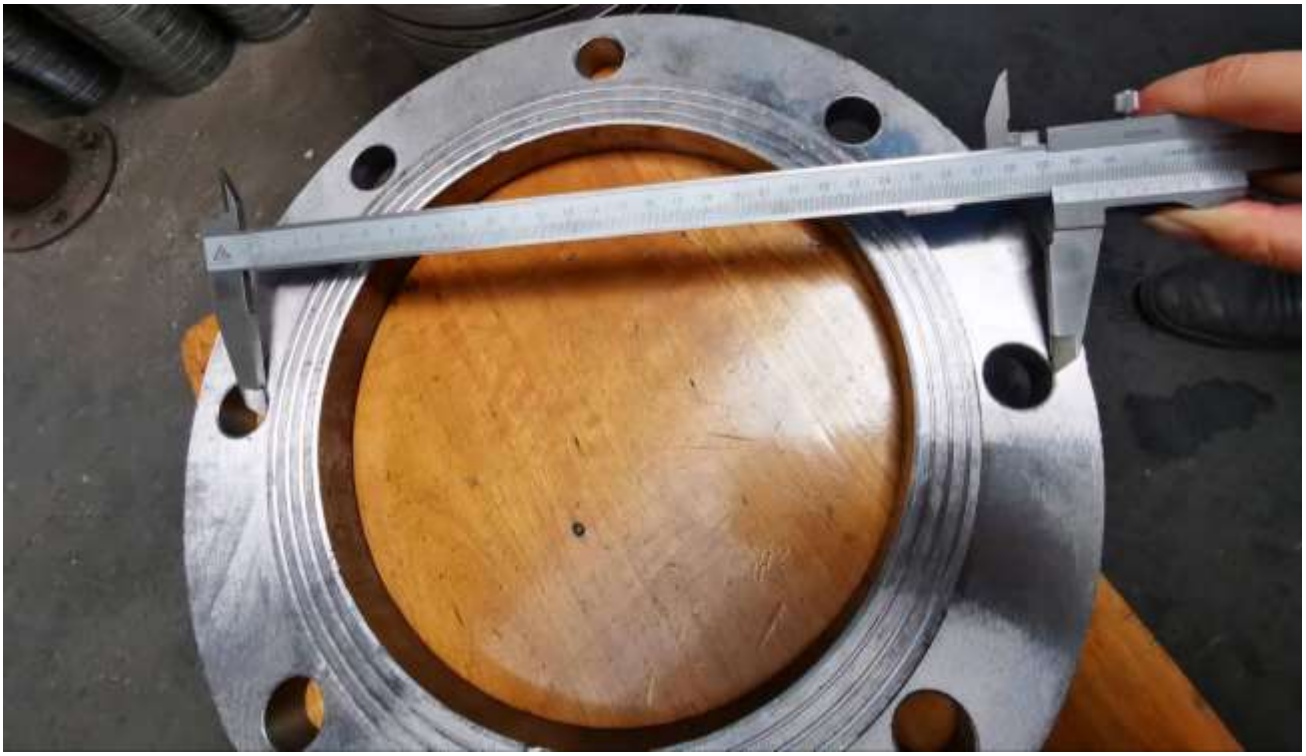
poor sealing

Installation

Rare earth alloy wear-resistant pipes are suitable for thermal power plants, coal washing plants, coal preparation plants, metallurgical mines and other working conditions in the coal industry. The common connection methods of rare earth alloy wear-resistant pipes include welding, flange connection, and V-connector connection.

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

Flange size inspection



www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

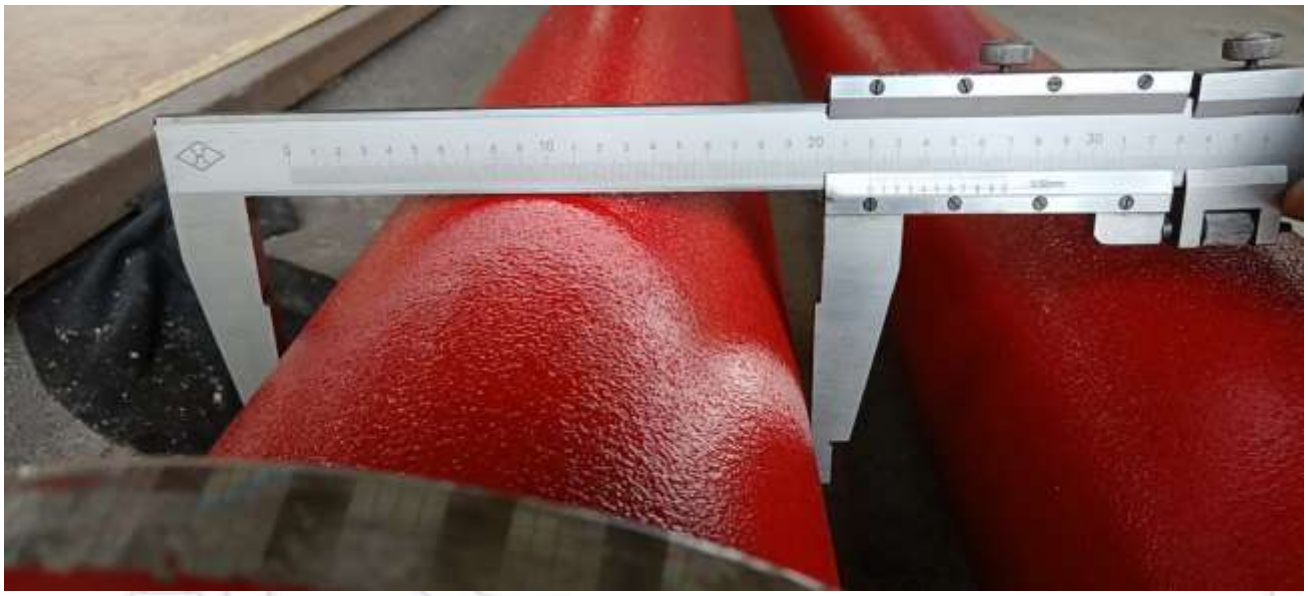
Wall thickness measurement

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

Welding flange

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

Final inspection



www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

SCAN WHATSAPP

More types of rare earth alloy products

Rare earth alloy wear-resistant straight pipe

Rare earth alloy wear-resistant elbow

Rare earth wear-resistant alloy tee

Rare Earth Alloy Coal Mill Spiral Tube

Rare earth alloy reducer

Rare earth alloy wear-resistant pulverized coal mixer

www.sunnysteel.com
Tel:+8621-3378 0199 sales@sunnysteel.com

SCAN WHATSAPP

List of Core values

Professional, Reliable, Efficient

SUNNY STEEL ENTERPRISE LTD.

Phone:+86 21 3378 0199
Fax:+86 21 5107 9722
E-mail:sales@sunnysteel.com

Collect steel pipes and fittings