

Inner Mongolia Baotou Steel
Rare Earth Magnetic Materials
Corporation Limited

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1. Company Introduction

Inner Mongolia Baotou Steel Rare Earth Magnetic Materials Co., Ltd (BGM) specializes in Sintering NdFeb Magnets and NdFeB Strip Casting Alloy which are all in high qualities. It is a wholly owned subsidiary company of Inner Mongolia Baotou Steel Rare Earth (Group) Hi-Tech Co., Ltd, with registered capital of RMB 176 million (USD 25.88 million).

The BGM's scale of production: By the end of 2012, its annual production will come up to 20,000-ton of NdFeB strip casting alloy and 6,000-ton of NdFeB magnets.



1. 1Resource advantage

Inner Mongolia Baotou Steel Rare Earth (Group) Hi-Tech Co., Ltd has abundant rare earth resources in the world, and a production line of 10,000-ton neodymium (and didymium) rare earth metal, which is the key reliable guarantee of the raw material of BGM`s NdFeB magnets.

Inner Mongolia Baotou Steel Rare Earth (Group) Hi-Tech Co., Ltd has a solid team on scientific R&D, and administration, covering the fields of rare earth separation, metal preparation, research on functional materials and analysis & test of rare earths; a national class rare earth analysis & test center, and the largest research institution on rare earths in China, which are all the reliable basic guarantees.

Baotou Research Institute of Rare Earths, a subsidiary company of Inner Mongolia Baotou Steel Rare Earth (Group) Hi-Tech Co., Ltd, is the largest inspection center on rare earth in China, and built the first domestic production line of NdFeB magnets in 1987. The Institute achieved a world record of 52.2MGOe in the laboratory in 1990. Nowadays, relying on the mature NdFeB manufacturing technology of the Baotou Research Institute of Rare Earths, Inner Mongolia Baotou Steel Rare Earth Magnetic Materials Co., Ltd can put into steady production of the N54 magnets.

The Institute achieved a world record of 52.2MGOe in laboratory in 1990. In 1996, they undertook an international cooperation project with Mr. Zhaozhong Ding on α magnetic spectrometer, supplied high performance NdFeB magnetic materials for AMS project. They built the first pilot production line of high performance NdFeB magnets in China.

In 2003, the Institute had accomplished a project of National Development and Reform Committee, “a 300-ton annual output of high performance NdFeB magnets industrialization demonstration project”, which turned the industrialization of high performance NdFeB magnets into reality in China. During 2000~2005, they constructed the First Domestic High Magnetic Materials Line.



1.4 Magnetic grade and magnetic property parameters

The Grade and Performance Sheotional Magnetic Products

材 料		主 要 磁 性 能								其 它 性 能			
系列号	牌 号	剩 磁		内禀矫顽力		磁感矫顽力		最大磁能积		密度	温度系数		工作温度
		Br		H _{ci}		H _{cb}		(BH) _{AX}		ρ	la(Br)	la(H _{ci})	
		T	kGs	kA/m	kOe	kA/m	kOe	KJ/m ³	MGOe	g/Cm ³	%/°C	%/°C	°C
		范 围		最小值		最小值		范 围		最小值	最大值		最大值
N系列	N54	1.45~1.50	14.5~15.0	876	11	836	10.5	406~438	51~55	7.5	0.12	0.65	80
	N52	1.42~1.47	14.2~14.7	876	11	836	10.5	390~422	49~53	7.5	0.12	0.65	80
	N50	1.39~1.44	13.9~14.4	955	12	836	10.5	374~406	47~51	7.5	0.12	0.65	80
	N48	1.37~1.42	13.7~14.2	955	12	892	11.2	366~390	46~49	7.5	0.12	0.65	80
M系列	50M	1.39~1.44	13.9~14.4	1114	14	1035	13.0	374~406	47~51	7.5	0.12	0.65	100
	48M	1.36~1.42	13.6~14.2	1114	14	1019	12.8	358~390	45~49	7.5	0.12	0.65	100
	45M	1.32~1.37	13.2~13.7	1114	14	995	12.5	342~366	43~46	7.5	0.12	0.65	100
H系列	48H	1.36~1.42	13.6~14.2	1353	17	1027	12.9	358~390	45~49	7.5	0.12	0.65	120
	45H	1.32~1.37	13.2~13.7	1353	17	971	12.2	342~366	43~46	7.5	0.12	0.65	120
	42H	1.28~1.32	12.8~13.2	1353	17	955	12.0	318~342	40~43	7.5	0.12	0.65	120
SH 系列	42SH	1.28~1.32	12.8~13.2	1592	20	971	12.2	318~342	40~43	7.55	0.12	0.65	150
	40SH	1.25~1.28	12.5~12.8	1592	20	939	11.8	302~326	38~41	7.55	0.12	0.65	150
	38SH	1.22~1.25	12.2~12.5	1592	20	907	11.4	287~310	36~39	7.55	0.12	0.65	150
UH 系列	40UH	1.25~1.28	12.5~12.8	1990	25	915	11.5	302~326	38~41	7.6	0.12	0.60	180
	38UH	1.22~1.25	12.2~12.5	1990	25	876	11.0	287~310	36~39	7.6	0.12	0.60	180
	35UH	1.17~1.22	11.7~12.2	1990	25	860	10.8	263~287	33~36	7.6	0.12	0.60	180
EH 系列	35EH	1.17~1.22	11.7~12.2	2388	30	836	10.5	263~287	33~36	7.6	0.12	0.60	200
	33EH	1.13~1.17	11.3~11.7	2388	30	820	10.3	247~271	31~34	7.6	0.12	0.60	200
	30EH	1.08~1.13	10.8~11.3	2388	30	812	10.2	223~247	28~31	7.6	0.12	0.60	200

2. Company Status

1. Employees: 255

Management, R & D personnel: 108

Workers: 147

2. Product Level : N54 Grade magnet in the highest grade in industry production can be manufactured successfully.

3. We undertake national key projects: "15,000 tons of high-performance NdFeB magnetic materials industry projects" which is supported by the Ministry of Industry and Information Technology.

4. Business performance in 2010:

Output (stripes+magnets): 1712 tons Value: 163 million(RMB)

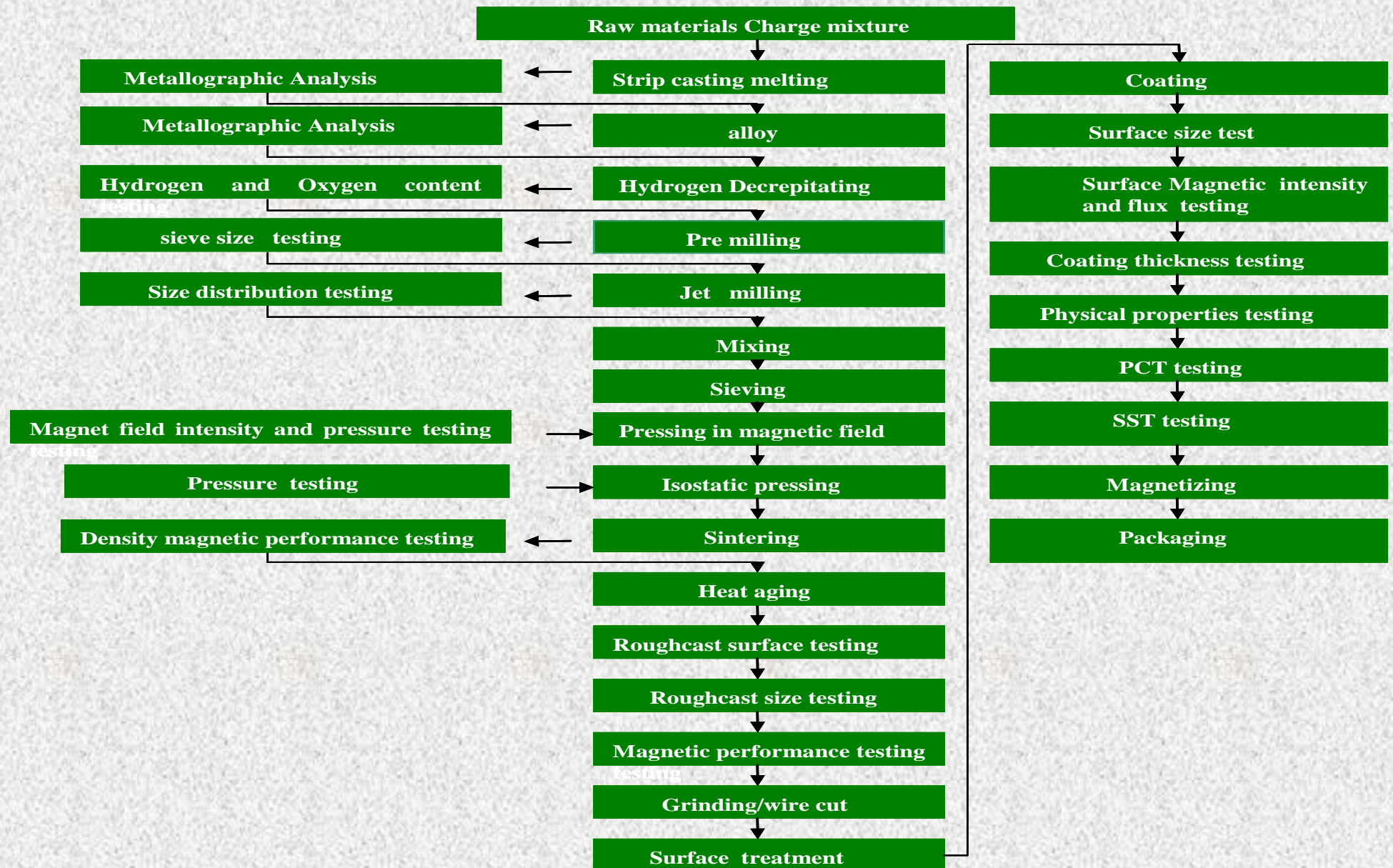
Sales Volume (Total): 1286 tons

Sales Revenue: 122 million(RMB)

BGM *Development Plan*

Calendar year	2010 (T)	2011 (T)	2012 (T)	2013 (T)	2014 (T)
NdFeB Magnets	1000	3000	6000	12000	15000
NdFeB Alloys	3000	10000	20000	30000	35000

3.1 Production flowchart



Main Equipments	Quantity
Strip Casting Furnace	4
Medium Milling	2
Jet Mill	6
Mixer	4
Vibrating Screener	2
Magnetic Field Shaping Press	11
Isostatic Press	3
Vacuum Sintering Furnace	15
Magnetizer	2

According to the features of products, we have built a machining line of processing big block, small pieces and special shape magnets. We can process high precision permanent magnetic components of variety shapes, like quadrate, round, tile shape and special shape, hollow magnet and rings. To ensure the quality and production capacity of the big block magnet for wind turbine, we have introduced 2 sets (6 machines) of continuous 3-work station pass-through grinding machine.

4. Quality Policy

With sophisticated technology to ensuring customer's satisfication; with excellent quality to producing dependable goods; with honest attitude to providing knight service.

Our company is operating under ISO/TS 16949 management system currently. We have been certified in May 2010. By online and offline control to the products, we have realized quality control and inspection to the full procedure from raw material purchase to after sale service of our products.

No.	Name	Function	Quantity
1	ICP-OES	Raw material analysis	1
2	AAS	Raw material analysis	1
3	ICP MS	Raw material analysis	1
4	C and S analyzer	Inspection in the mid-process	1
5	O and N analyzer	Inspection in the mid-process	1
6	Low and high temperature B-H magnetic detector	Magnetic property detection	1
7	Nondestructive detection system for big block magnet	Magnetic property detection	1
8	Helium vacuum mass spectrometer leak detector	Reliability test	1
9	Laser particle size analyzer	Inspection in the mid-process	1
10	Magnetic flux meter	Magnetic property detection	1
11	Gauss meter	Mid-process detection and magnetic detection	1
12	Magnetic moment measuring instrument	Magnetic property detection	1
13	Surface magnetic field scanner	Magnetic property detection	1
14	PCT tester	Reliability test	1
15	Salt spray test chamber	Reliability test	1
16	SEM and CDS	Mid-process detection	1
17	X-ray diffraction	Mid-process detection	1
18	Thermal and cold shock test chamber	Magnetic property detection	1
19	High temperature chamber	Magnetic property detection	1
20	Projector	Intermediate process detection	1

Quality control in key procedures

Main controlled procedure	Controlled parameter	Controlling means
Proportioning	Composition	ICP-OES; ICP MS, AAS
Alloy	Microstructure	SEM and CDS
Milling	Particle size distribution	Laser particle size distribution analyzer
Shaping	Magnetic field and size	Gauss meter; Measuring tool
Vacuum sintering	Magnetic property	High and low temperature B-H measurement; non-destructive measurement system for big block magnet
Machining	Size	Measuring tool
Electroplating	Coating thickness	Thickness measuring tool

We adopt CPK statistic analyzing method to analyze the key procedures, to improve and optimize the process, ensuring the stability in production and guarantee the stability and consistency of our products.

BGM 5. *Product target*

The Sintering NdFeB Magnets in high quality(High Magnetic,High Consistency,High Stability) are mainly used in the high-end fields of wind power generation, nuclear magnetic resonance, permanent magnet motor,auto industry and so on. Besides, magnetic products that are developed by the company are also widely used in various motors , electro-acoustic field, instruments and medical equipments. Our products have excellent performances and different specifications. Moreover, we can design and produce products of special shapes or specifications according to customers' requests.



5.1 NdFeB strip casting alloys Application and Market share

Main products are NdFeB Strip Casting Alloys and NdFeB Magnets。

NdFeB Strip Casting Alloys are mainly supplied for the domestic manufacturer of the magnetic products.

Clients of NdFeB Strip Casting Alloys are below: DYTCH、ANHDDX、SHYZHB、SHXHQ、YTZHH、YSM、and other 6 domestic companies、 3 Japanese companies、 1 European company



5.2 NdFeB Magnets Application and Market share

The Sintering NdFeB Magnets in high quality(High magnetic, high consistency, high stability) are mainly used in the high-end fields of wind power generation, nuclear magnetic resonance, permanent magnet motor and motor vehicle, etc. Our main customers are XTDJ、DFDJ、GXYH、BJWD、XBBW、SIEMENS、LAFERT S.P.A.. We are on our way to pass the audits for suppliers from Continental、BOSCH、Brose、BMW etc.



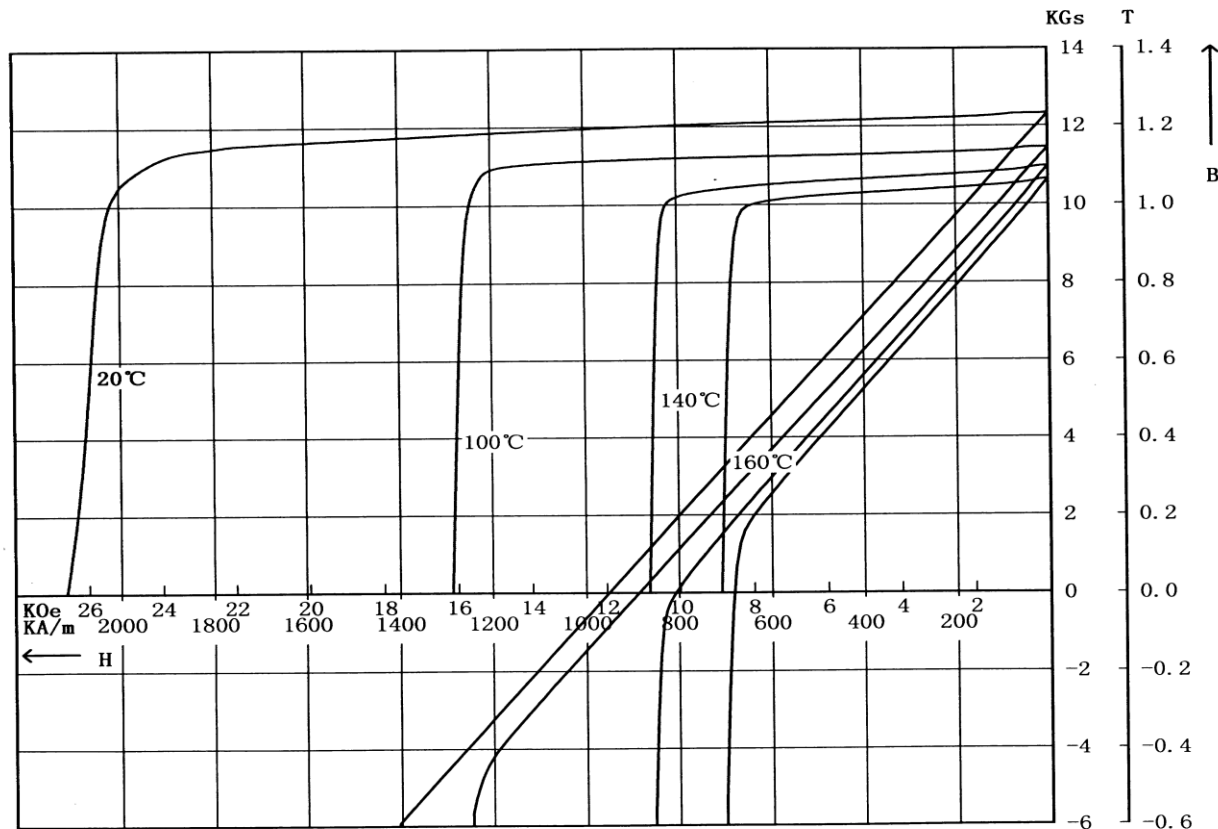


6. Environmental protection

Environmental protection is emphasized in each link of our production. Energy saving emission reduction is our long and persistent target. Alloy raw materials and other auxiliary raw materials do not contain prohibited compositions. We use clean electricity power. No harmful gas is generated. Water is recycled. The alloy wastes that produced during the magnet production and processing are sold to the company that specializes in the recycle rare earths. And we have got the certificates of ISO14001.

7.1 38UH Magnetic property B-H curve of 38UH magnet (20°C、140°C、160°C)

NIM-10000H HYSTERESIGRAPH TEST REPORT



Spe. No. : 091202s1
 Test No. : S
 Material: NdFeB
 Shape: Cylinder
 Size: 9.98mm
 Date: 2009-12-08
 Tester:

Temp °C	Br kGs T	Hcb kOe kA/m	Hcj kOe kA/m	(BH) _m MGsOe kJ/m ³	Hk kOe kA/m
20	12.32 1.232	11.97 952.6	26.63 2119	36.86 293.3	24.27 1931
100	11.45 1.145	11.16 887.9	16.18 1288	31.74 252.6	15.61 1242
140	10.97 1.097	10.15 808.0	10.86 864.5	28.31 225.3	10.44 830.9
160	10.64 1.064	8.556 680.9	8.912 709.2	26.46 210.6	8.437 671.4



7.2 Weight loss report

磁体失重报告

批次: 2009/091109-9

日期	牌号	规格	长	宽	高	表面积 (cm ²)	重量 (g)		失重(mg)	失重比率 (mg/cm ²)	判定标准 (mg/cm ²)	测试条件
							测试前	测试后				
11.15~12.05	38UH	10*10*10 (切块)	991	994	995	592	7.4678	7.4523	15.51	2.62	<5mg/cm ²	时间: 480h 温度: 130 ℃ 湿度: 95% 蒸汽压力: 2bar
			995	995	992	593	7.4686	7.4493	19.27	3.25		
			995	995	993	593	7.4706	7.4536	16.97	2.86		
			992	995	993	592	7.4905	7.4720	18.47	3.12		
			995	995	994	594	7.4806	7.4635	17.10	2.88		
			992	995	10.01	595	7.4902	7.4720	18.21	3.06		
			993	995	994	593	7.4703	7.4526	17.67	2.98		

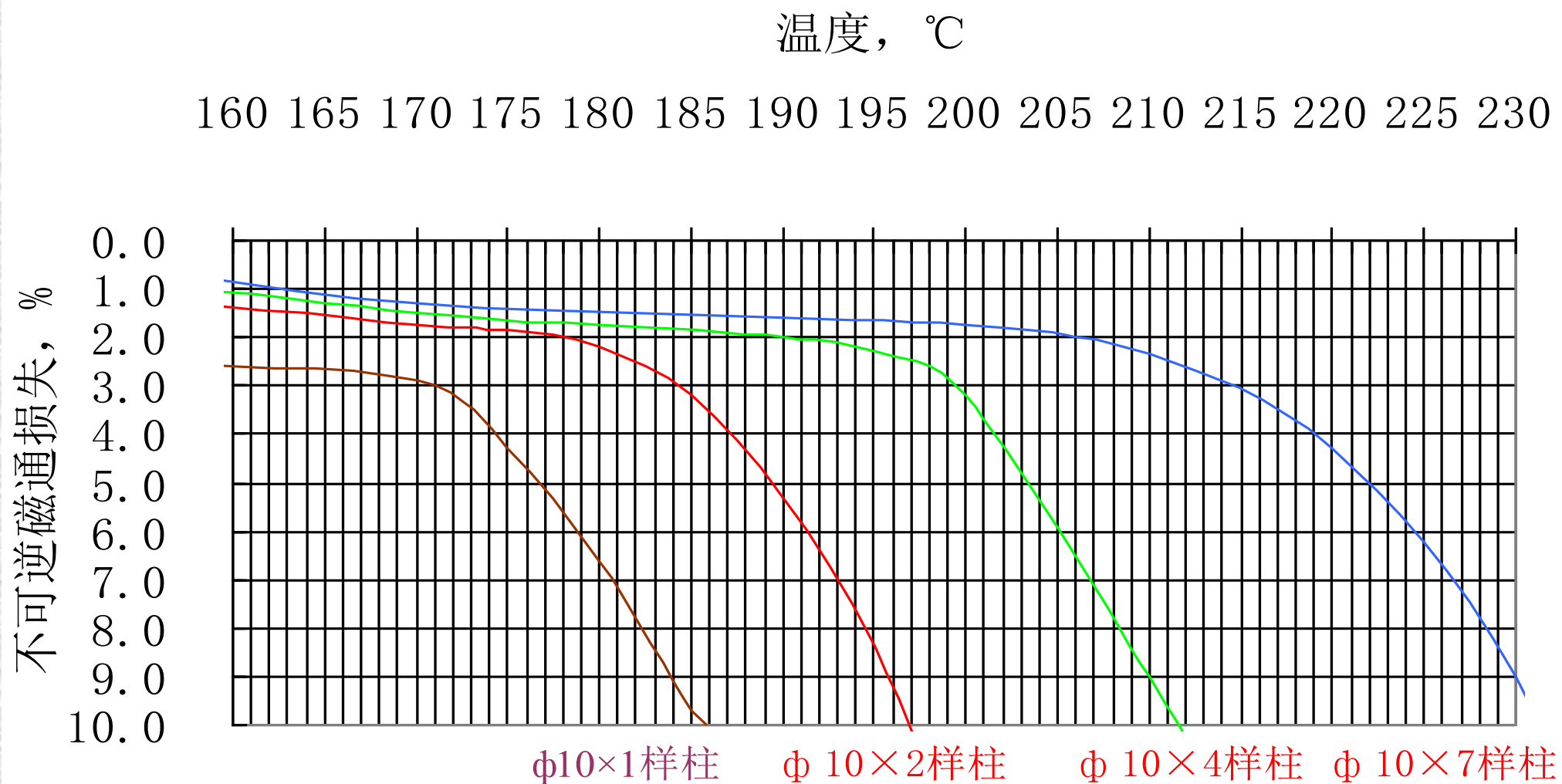
判定结果: 合格

测试: 王强

审核: 张红艳

日期: 2009年12月10日

Flux irreversible loss test report of 38UH magnet





7.4 Property test report of surface protection coat

Heat resistance test report

送检部门✎	电镀✎	数量✎	320✎	送检数✎	2✎
牌号✎	38UH✎	规格✎	64.5*43.75*10✎	镀种✎	Ni-Cu-环氧✎
检测项目✎	耐湿热试验✎				
标准✎	无锈迹、起泡、裂纹、脱落、粉化等现象；允许电泳层有轻微变色✎				
条件✎	温度 120℃，湿度 100%，压力 203kPa，时间 1000 小时✎				
判定结果✎	合格✎				
测试：王强		审核：张红艳		日期：20091118✎	

Anti-salt spray test report (SST)

送检部门✎	电镀✎	数量✎	320✎	送检数✎	2✎
牌号✎	38UH✎	规格✎	64.5*43.75*10✎	镀种✎	Ni-Cu-环氧✎
检测项目✎	耐中性盐雾试验✎				
标准✎	无锈迹、起泡、裂纹、脱落、粉化等现象；允许电泳层有轻微变色✎				
条件✎	温度 35℃，5%氯化钠水溶液，时间 1000 小时✎				
判定结果✎	合格✎				
测试：王强		审核：张红艳		日期：20091122✎	

BGM *Strip casting furnace*



BGM

Jet mill





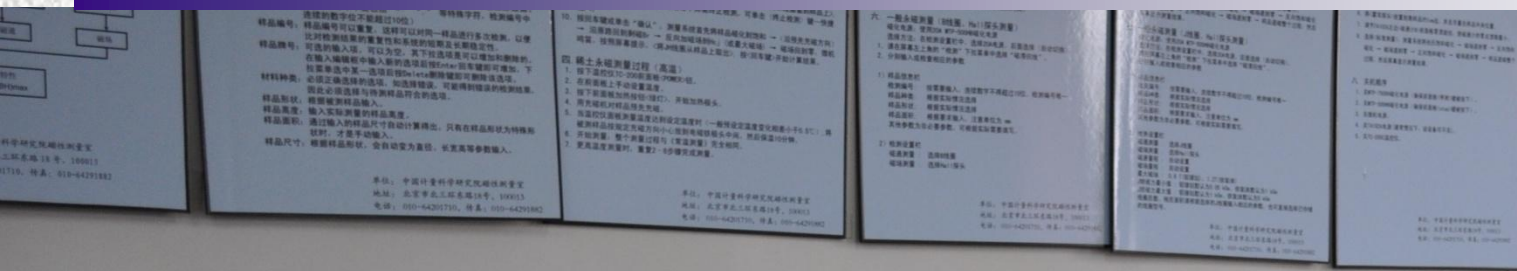
Magnetic field shaping press







Magnetic performance inspection instrument



BGM *machining line*



中国·包头——稀土储量世界之最

The largest rare earth mine in the world – Baotou • China





Thanks for your
attention!