

冷轧无取向电工钢带(片)

特性曲线



冷轧无取向电工钢带(片)

COLD-ROLLED NON-ORIENTED ELECTRICAL STEEL SHEETS

特性曲线

PROPERTY CURVES



太原钢铁(集团)有限公司  
TAIYUAN IRON & STEEL (GROUP) COMPANY LTD.

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## 公司简介

### Company Profile

太原钢铁(集团)有限公司(简称太钢)是以生产板材为主的特大型钢铁联合企业,始建于1934年,前身为西北炼钢厂,中国第一炉不锈钢、第一炉硅钢、第一张硅钢片的诞生地,是国内主要冷轧硅钢生产厂之一。

太钢拥有铁矿石等钢铁冶炼原料的采掘与加工、钢铁冶炼、钢铁材料压力加工、冶金设备及备品备件制造等方面先进技术和装备,主要产品有不锈钢、冷轧硅钢片(卷)、热连轧卷板、火车轮轴钢、合金模具钢、军工钢等。不锈钢、不锈钢复合板、电磁纯铁、火车轮轴钢、花纹板、焊瓶钢等产品市场占有率国内第一。

太钢拥有国家级的技术中心,以及优秀的技术人才队伍和实力雄厚的研发力量。2007年国家认证国家企业技术中心共438家,太钢技术中心排名第4位。

2006年底冷轧硅钢扩建项目竣工投产后形成年产35万吨冷轧硅钢的生产能力,产品规格、牌号系列将进一步加宽,更好的满足国内经济发展要求。



Taiyuan Iron & Steel (Group) Co., Ltd. (TISCO in short), grown out of the formerly Northwest Steel-making Plant established in 1934, is an extra-sized iron and steel complex mainly for flat product. It produced the first heat of stainless steel, the first heat of silicon steel and the first silicon sheet in China and remains one of leading and major Chinese cold-rolled silicon steel makers.

TISCO operates with advanced equipment and technologies for iron ore and other raw material mining & dressing, steel making and rolling process, metallurgical equipment and spare parts manufacturing, etc. Main products are stainless steel, cold-rolled silicon sheet (coil), hot-rolled steel strip/coil, train axle steel, alloyed die steel, military steel and others. Of which the stainless steel, stainless steel clad plate, electromagnetic pure iron, train axle steel, checker plate, gas cylinder steel hold lion's share in domestic market respectively.

TISCO has under it a technology center at state level, staffed with a strong force of technical talents and of solid R&D strength. TISCO technology center comes 4th among 438 enterprise-based technology centers certified by state authority in 2007.

After cold-rolled silicon steel expansion project completes by the end of 2006, TISCO's annual capacity of cold-rolled silicon steel will reach 350,000 tons, with a wider range of specifications and grades, to meet the demand of economic development.



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## 产品主要用途

### Product Designations and Applications

用途 Applications	牌号 Grade	35TW250 50TW250 50TW270	50TW290	35TW270 35TW300 50TW310 50TW350	35TW360 50TW400	35TW440 50TW470	50TW600	50TW800
大型旋转机 Big rotating machine		●	●	●				
大型电机 Big motors		●	●	●				
中型电机 Medium motors			●	●	●	●		
小型电机 Small motors				●	●	●	●	
微型电机 Micro motors						●	●	●
密闭电机 Hermetically sealed motors					●	●	●	●
间歇电机 Intermittent service AC Motors						●	●	●
中频电机 Medium frequency motors		●	●	●				
分配变压器 Distribution transformers		●	●	●				
调压器 Voltage regulator		●	●	●				
电抗器及磁放大器 Reactor & magnetism magnifier		●	●	●				
电视机变压器 TV transformers						●	●	●
收音机变压器 Radio transformers						●	●	●
镇流器 Ballast				●	●	●	●	●
焊接变压器 Welding transformers				●	●	●	●	
扼流圈 Choke coil					●	●	●	●
继电器 Relays				●	●			
电磁开关 Magnetic switch				●	●			

注：● 表示合理牌号

Remarks: ● Represent reasonable grade

## 产品性能保证值 Guaranteed Properties

牌号 Grade	厚度 Thickness mm	密度 Density $\times 10^3 \text{ kg/m}^3$	最大铁损 max P1.5 / 50 W / kg	最小磁感 min B5000 T	弯曲次数 No. of bends 次	叠装系数 Lamination factor %
35TW250	0.35	7.60	2.50	1.60	$\geq 2$	$\geq 95$
35TW270	0.35	7.65	2.70	1.60	$\geq 2$	$\geq 95$
35TW300	0.35	7.65	3.00	1.60	$\geq 3$	$\geq 95$
35TW360	0.35	7.65	3.60	1.61	$\geq 5$	$\geq 95$
35TW440	0.35	7.70	4.40	1.64	$\geq 5$	$\geq 95$
50TW250	0.50	7.60	2.50	1.62	$\geq 3$	$\geq 97$
50TW270	0.50	7.60	2.70	1.62	$\geq 3$	$\geq 97$
50TW290	0.50	7.60	2.90	1.62	$\geq 3$	$\geq 97$
50TW310	0.50	7.65	3.10	1.62	$\geq 5$	$\geq 97$
50TW350	0.50	7.65	3.50	1.62	$\geq 5$	$\geq 97$
50TW400	0.50	7.65	4.00	1.63	$\geq 10$	$\geq 97$
50TW470	0.50	7.70	4.70	1.64	$\geq 10$	$\geq 97$
50TW600	0.50	7.75	6.00	1.66	$\geq 10$	$\geq 97$
50TW800	0.50	7.80	8.00	1.68	$\geq 10$	$\geq 97$

- ◆ 1、表中数值测定按GB/T 3655、GB/T 235、GB/T 19289标准进行。
- 2、试样由纵向和横向条片各半组成。
- ◆ 1、Measurement is made in accordance with the standard GB/T3655、GB/T 235、GB/T 19289.
- 2、Same numbers of samples for measurement will be taken from vertical and horizontal direction.



## 磁性能典型值 Typical Magnetic Properties

牌号 Grade	厚度 Thickness mm	密度 Density $\times 10^3 \text{ kg/m}^3$	铁损 Core loss PT (W/kg)				磁感 Induction B (T)	
			P <sub>1.0/50</sub>	P <sub>1.5/50</sub>	P <sub>1.0/60</sub>	P <sub>1.5/60</sub>	B <sub>2500</sub>	B <sub>5000</sub>
35TW250	0.35	7.60	0.99	2.24	1.27	3.05	1.55	1.65
35TW270	0.35	7.65	1.02	2.42	1.30	3.11	1.56	1.65
35TW300	0.35	7.65	1.07	2.53	1.34	3.17	1.56	1.65
35TW360	0.35	7.65	1.07	2.68	1.35	3.37	1.58	1.67
35TW440	0.35	7.70	1.29	2.96	1.61	3.71	1.59	1.68
50TW250	0.50	7.60	0.96	2.32	1.24	2.95	1.56	1.66
50TW270	0.50	7.60	1.03	2.40	1.31	3.06	1.55	1.65
50TW290	0.50	7.60	1.11	2.61	1.43	3.35	1.57	1.66
50TW310	0.50	7.65	1.18	2.71	1.51	3.47	1.58	1.67
50TW350	0.50	7.65	1.19	2.74	1.52	3.50	1.59	1.68
50TW400	0.50	7.65	1.32	3.02	1.69	3.87	1.60	1.69
50TW470	0.50	7.70	1.64	3.64	2.09	4.64	1.58	1.67
50TW600	0.50	7.75	1.75	3.84	2.25	4.95	1.60	1.69
50TW800	0.50	7.80	2.37	5.11	3.02	6.54	1.62	1.70

- ◆ 1、铁损和磁感的测定按GB/T3655标准进行。
- ◆ 2、试样由纵向和横向条片各半组成。
- ◆ 3、表中的数值不作保证值。
- ◆ 1、Measurement of core loss and induction is made in accordance with the standard GB/T3655.
- ◆ 2、Same numbers of samples for measurement will be taken from vertical and horizontal direction.
- ◆ 3、The above-mentioned values are not guarantee values.

## 机械性能典型值 Typical Mechanical Properties

牌号 Grade	厚度 Thickness mm	抗拉强度 Tensile strength MPa	屈服强度 Yield strength MPa	延伸率 Elongation %	硬度 Hardness HV
35TW250	0.35	593	481	23	196
35TW270	0.35	550	437	32	178
35TW300	0.35	534	416	34	173
35TW360	0.35	480	355	35	168
35TW440	0.35	449	290	46	134
50TW250	0.50	576	483	17	207
50TW270	0.50	610	505	27	198
50TW290	0.50	567	447	29	187
50TW310	0.50	543	429	29	184
50TW350	0.50	536	409	34	176
50TW400	0.50	490	349	37	153
50TW470	0.50	479	300	44	143
50TW600	0.50	429	265	46	122
50TW800	0.50	402	241	49	102

- ◆ 1、机械性能的测定按GB/T 228标准进行。
- ◆ 2、表中的数值不作保证值。
- ◆ 1、Measurement of mechanical properties is made in accordance with the standard GB/T228.
- ◆ 2、The above-mentioned values are not guarantee values.



## 尺寸偏差实物水平

### Actual Thickness Tolerance

单位: mm

宽度 Width	厚度 Thickness	厚度偏差 Thickness tolerance	横向厚度差 Camber	宽度偏差 Width tolerance	长度偏差 Length tolerance
≤150	0.35	±0.015	≤0.015	+0.3	+10
	0.50	±0.02	≤0.02	0	0
>150~500	0.35	±0.015	≤0.015	+0.5	+10
	0.50	±0.02	≤0.02	0	0
>500~1000	0.35	±0.015	≤0.02	+1.5	+10
	0.50	±0.02	≤0.02	0	0
>1000	0.35	±0.015	≤0.02	+1.5	+10
	0.50	±0.02	≤0.025	0	0

## 特性曲线详细目录

### Property Curves list

牌号 Grade	交流铁损	直流磁化	直流磁导率	交流磁化	直流磁滞	视在功率
	AC Core Loss	DC Magnetization	DC Permeability	AC Magnetization	DC Hysteresis Loops	Apparent output
35TW250	7	8	9	10	11	12
35TW270	13	14	15	16	17	18
35TW300	19	20	21	22	23	24
35TW360	25	26	27	28	29	30
35TW440	31	32	33	34	35	36
50TW250	37	38	39	40	41	42
50TW270	43	44	45	46	47	48
50TW290	49	50	51	52	53	54
50TW310	55	56	57	58	59	60
50TW350	61	62	63	64	65	66
50TW400	67	68	69	70	71	72
50TW470	73	74	75	76	77	78
50TW600	79	80	81	82	83	84
50TW800	85	86	87	88	89	90

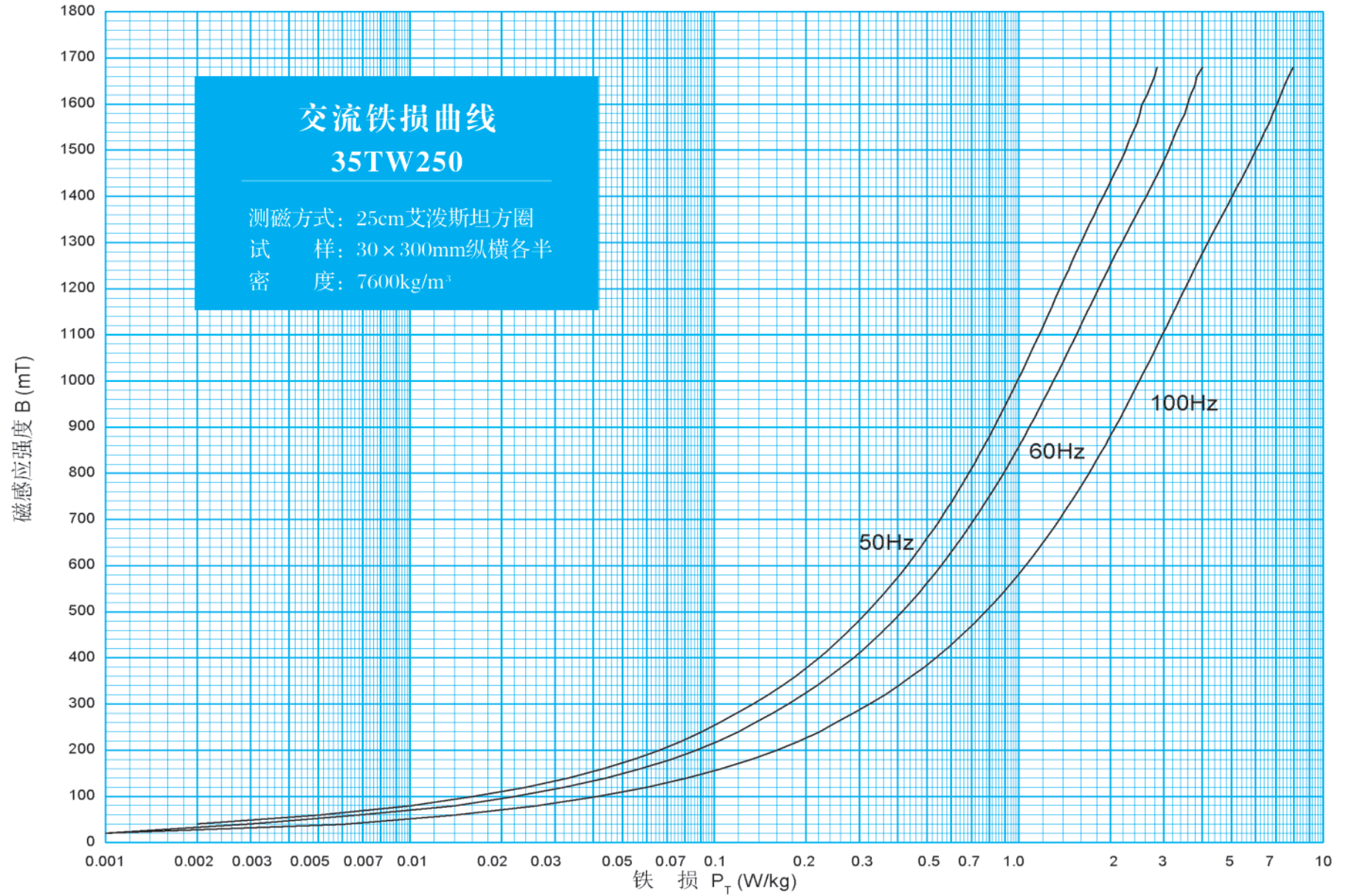
- 注: ◆ 特性曲线的测量按 GB/T3655 标准进行。  
 ◆ 试样由纵向和横向条片各半组成, 未经消除应力退火。  
 ◆ 曲线中的数值不作保证值。

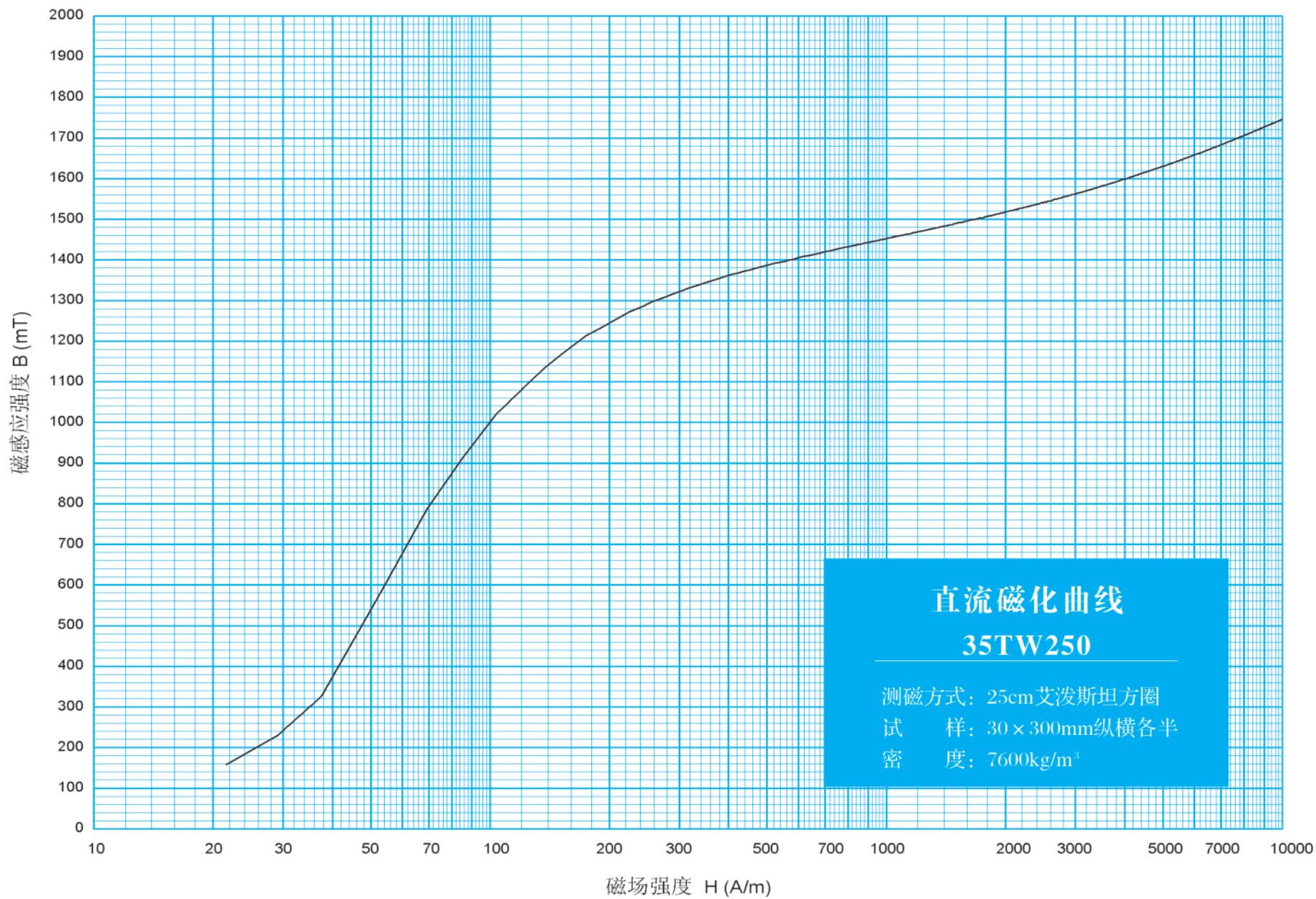
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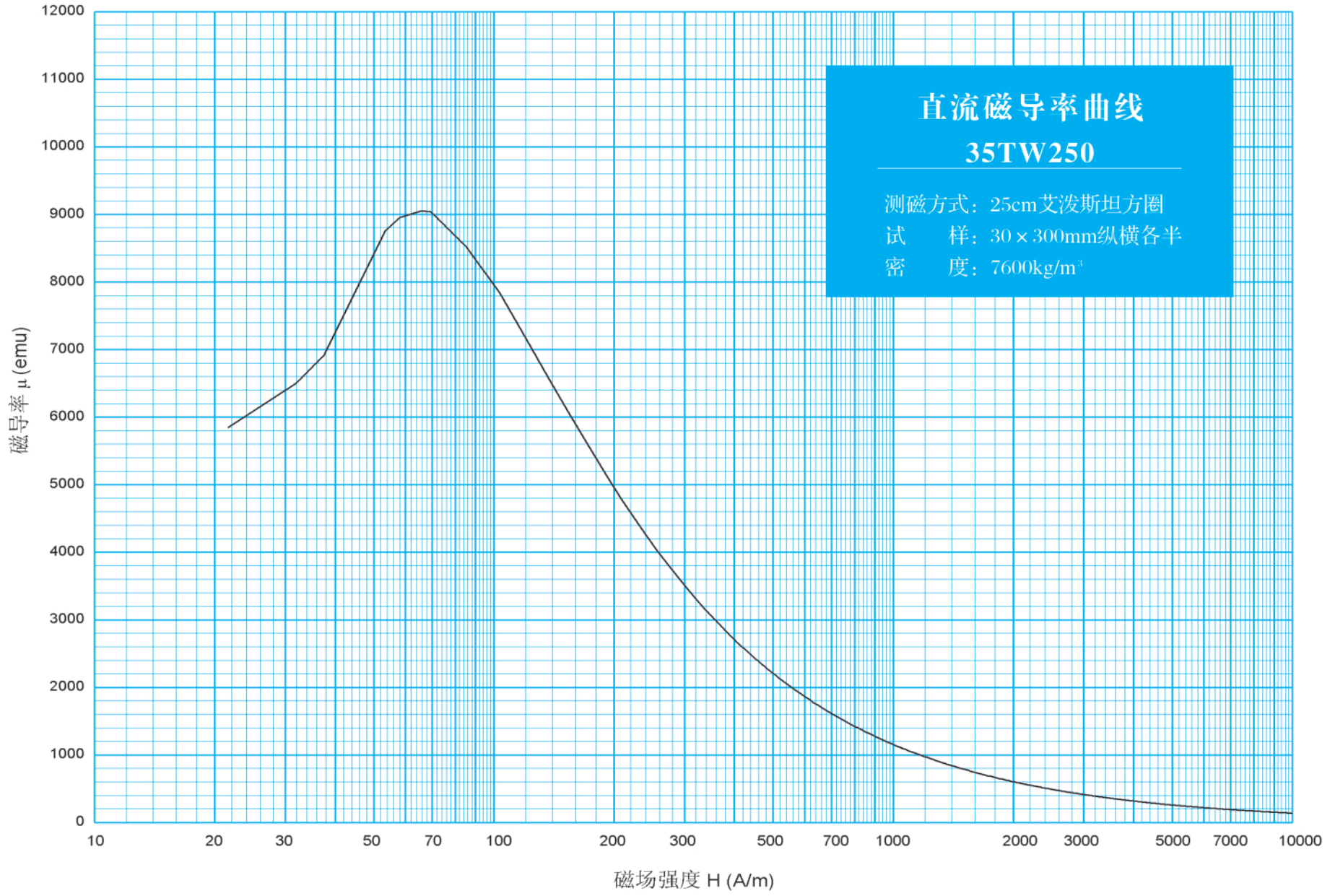
- ◆ Property curves is made in accordance with the standard GB/T3655.
- ◆ Same numbers of samples for measurement will be taken from vertical and horizontal direction, without eliminate stress annealing.
- ◆ The above-mentioned values of curves are not guarantee values.

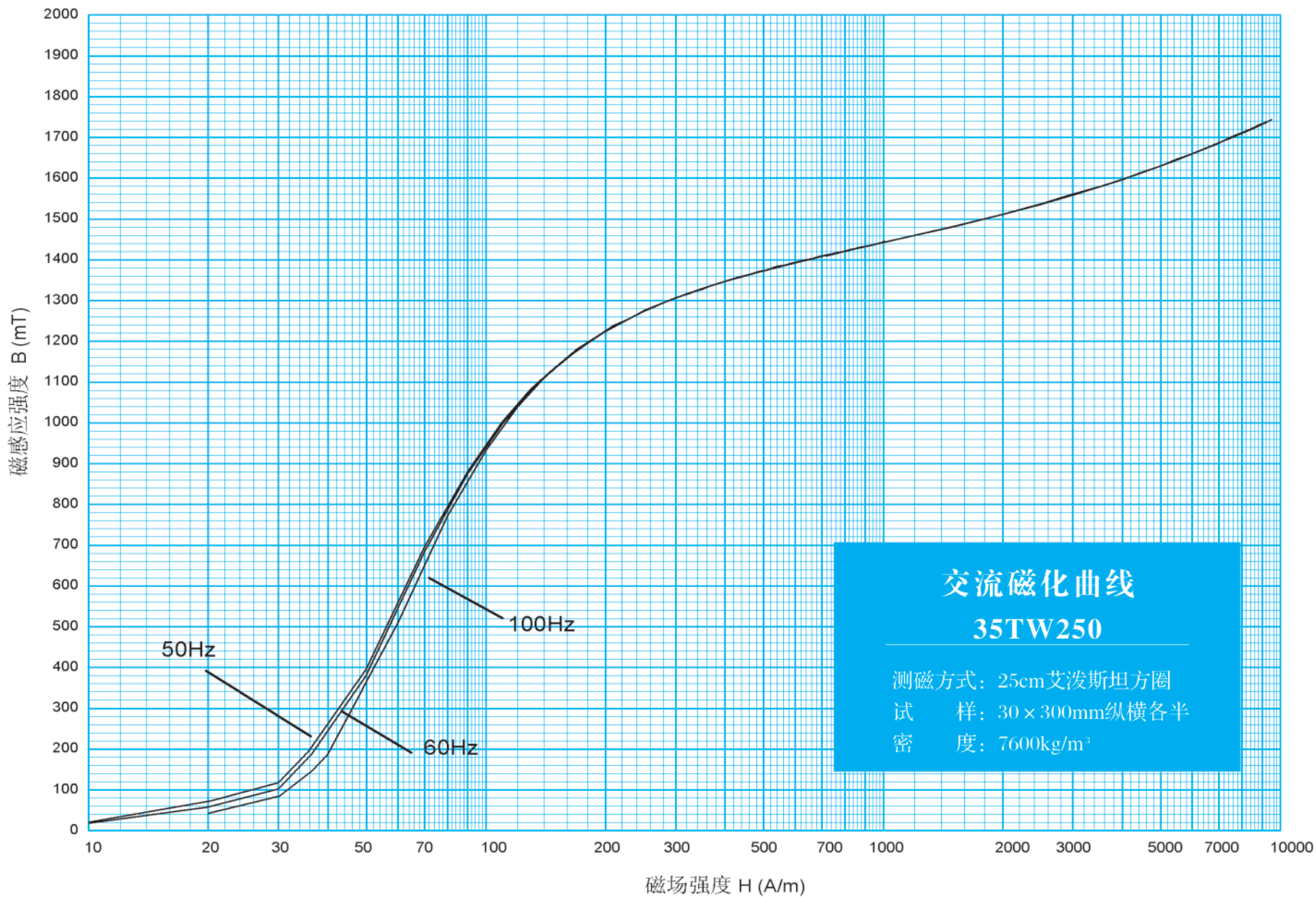
## 交流铁损曲线 35TW250

测磁方式：25cm艾泼斯坦方圈  
试样：30×30mm纵横各半  
密度：7600kg/m<sup>3</sup>

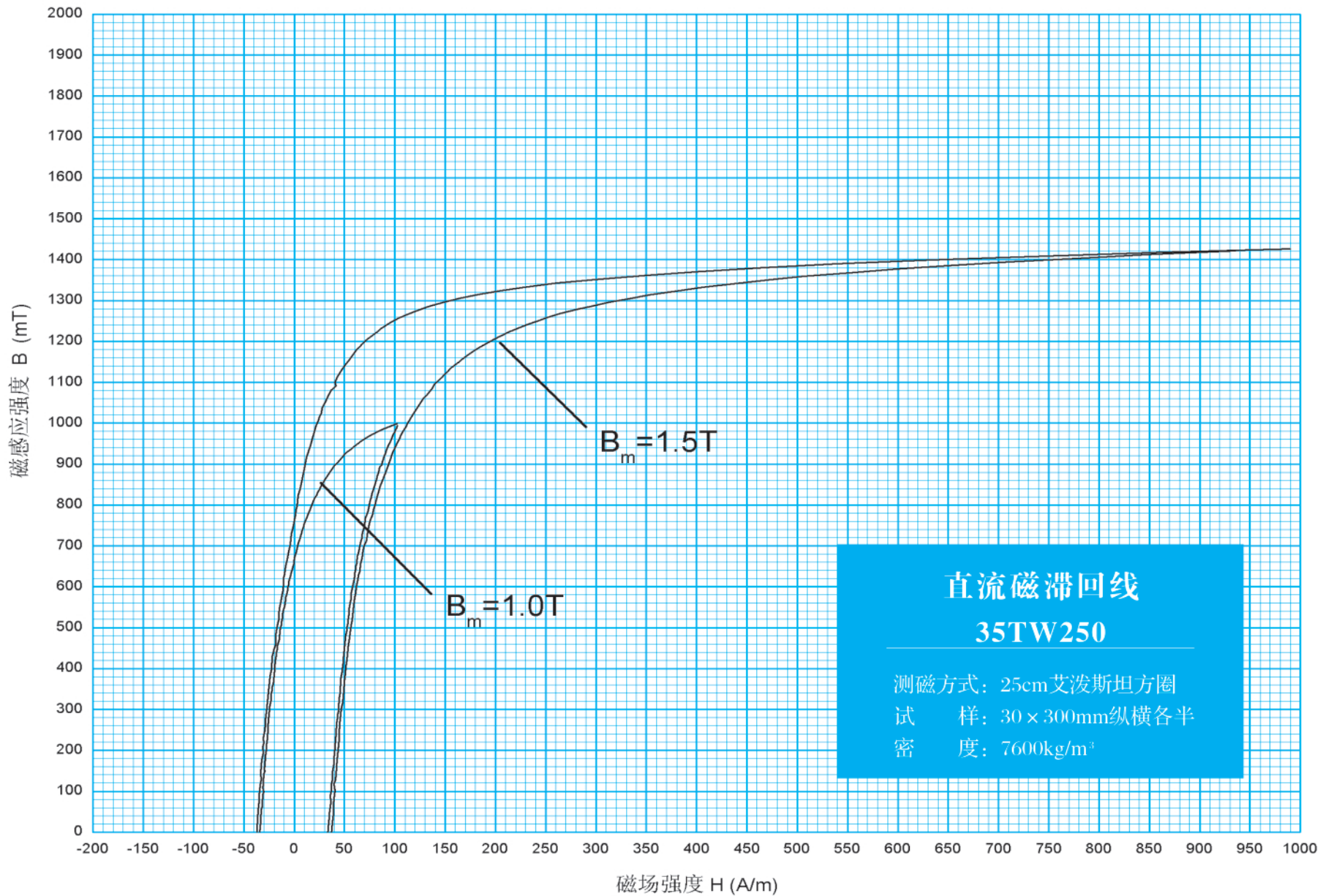


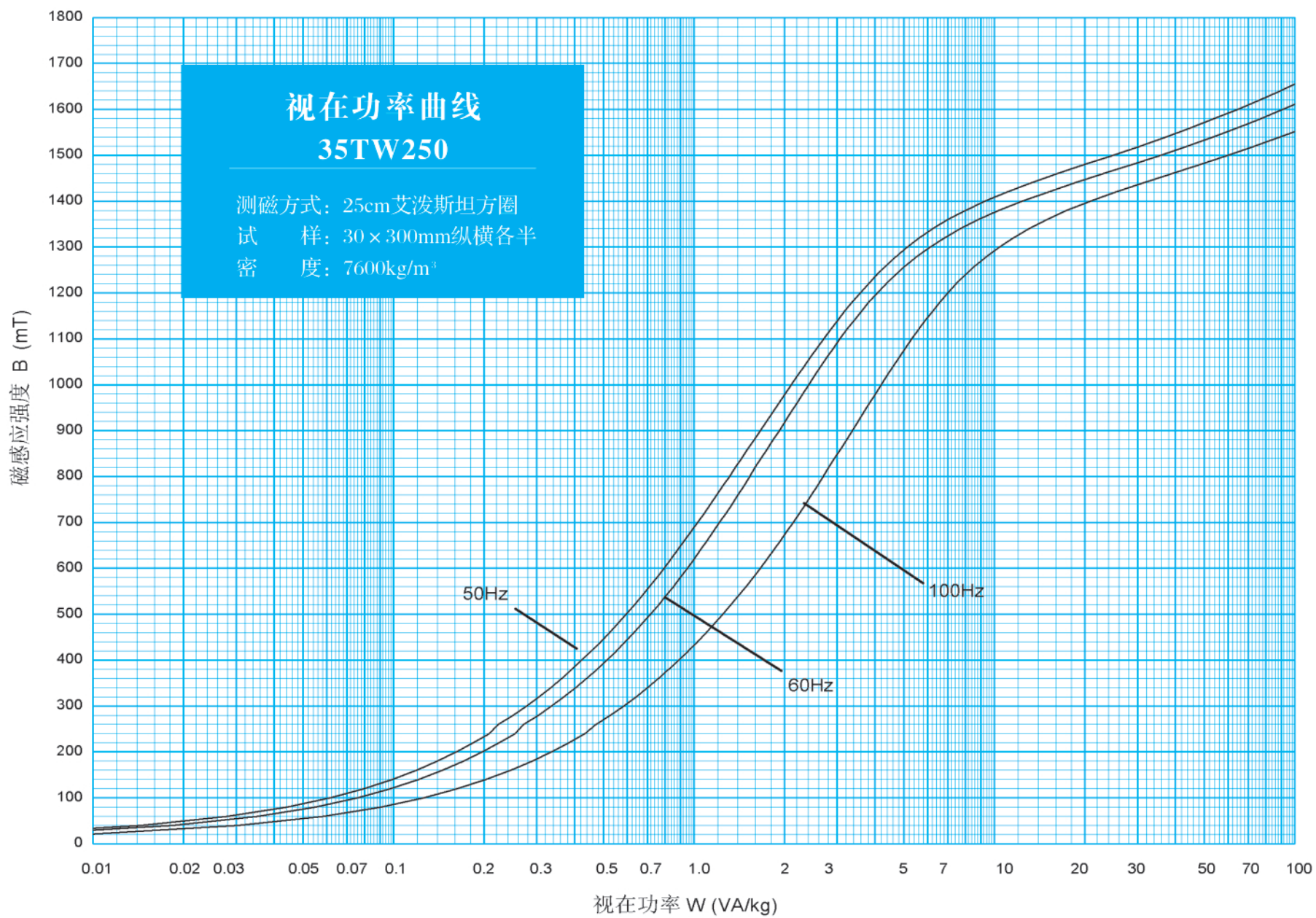


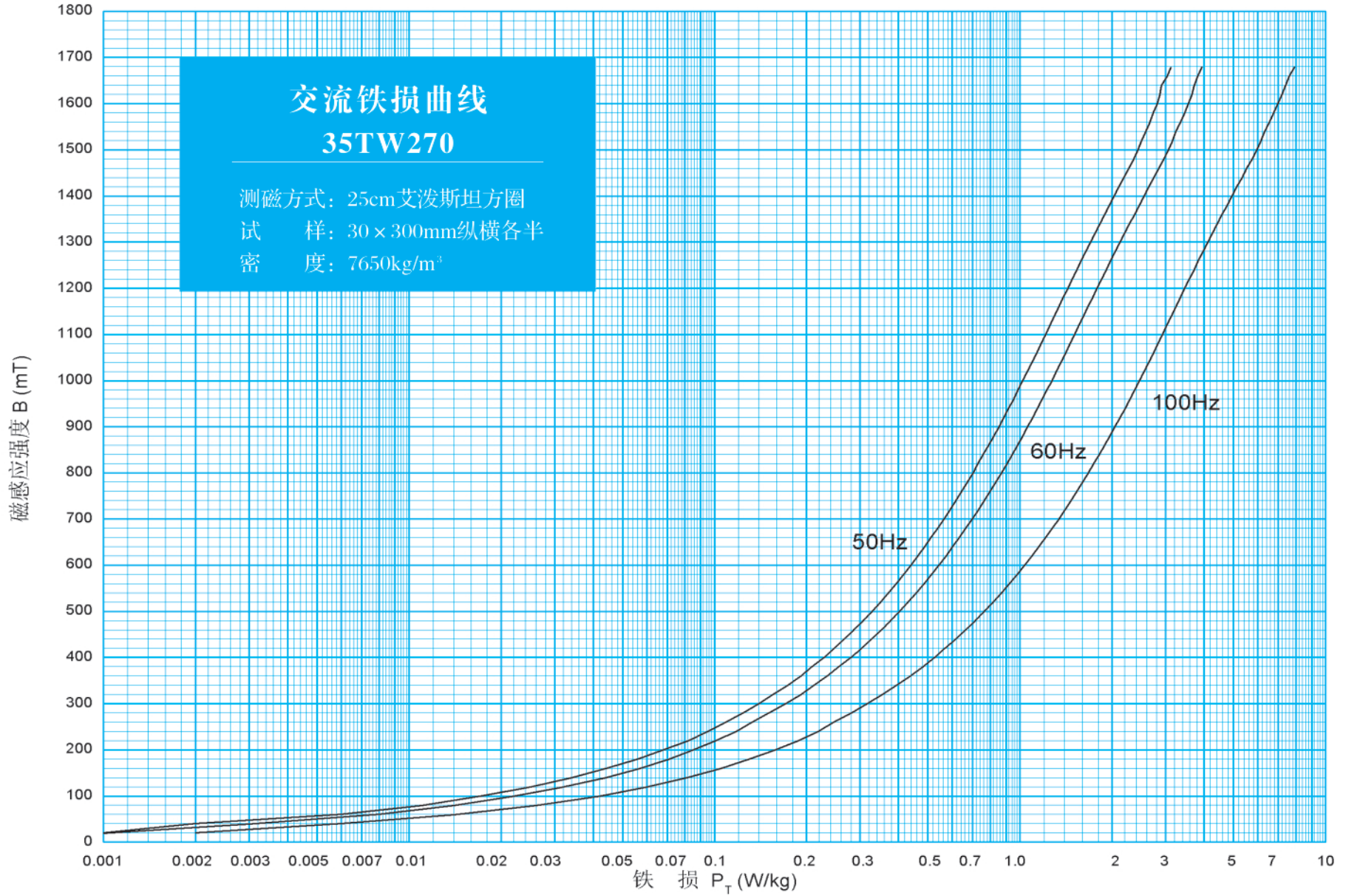


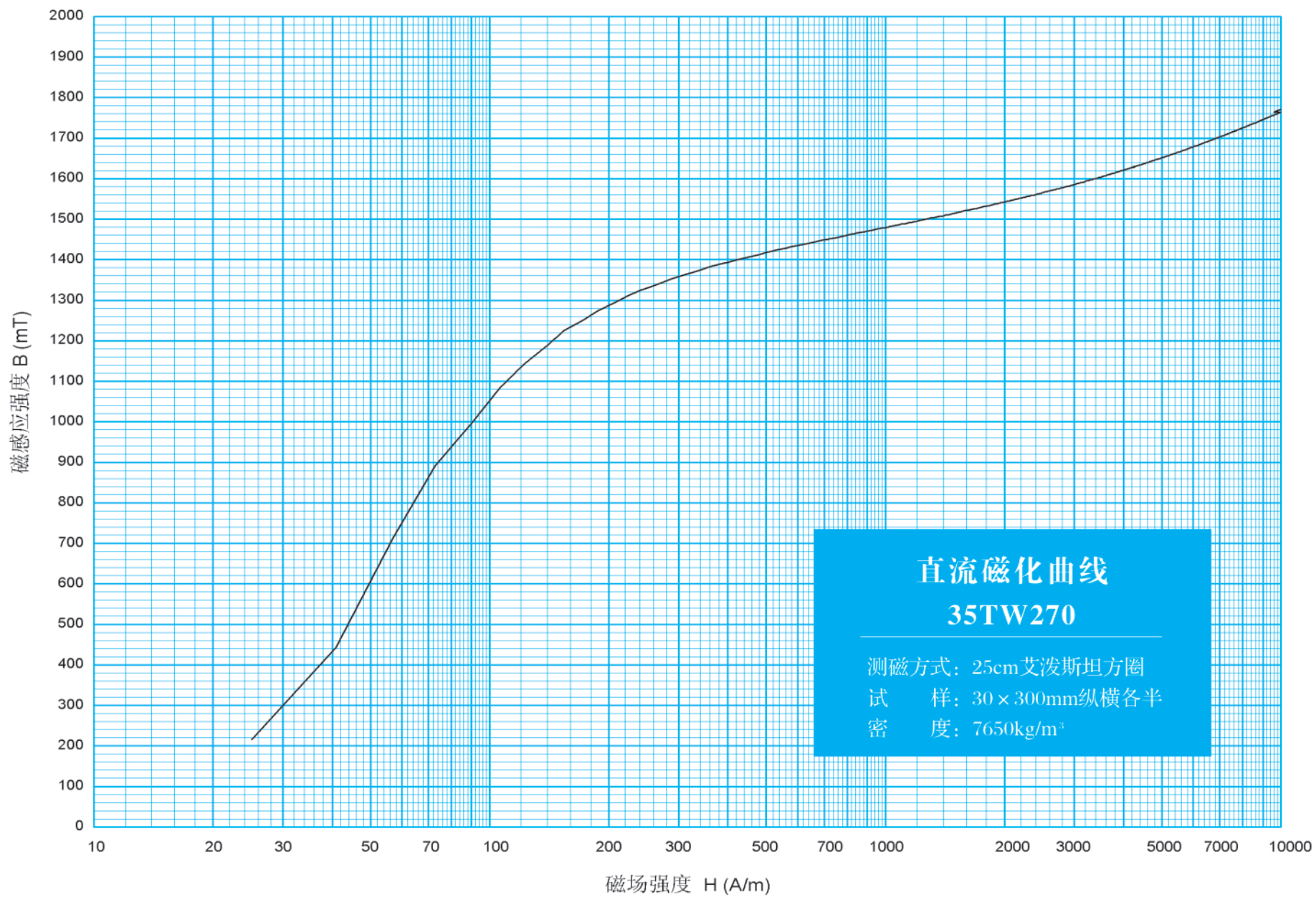




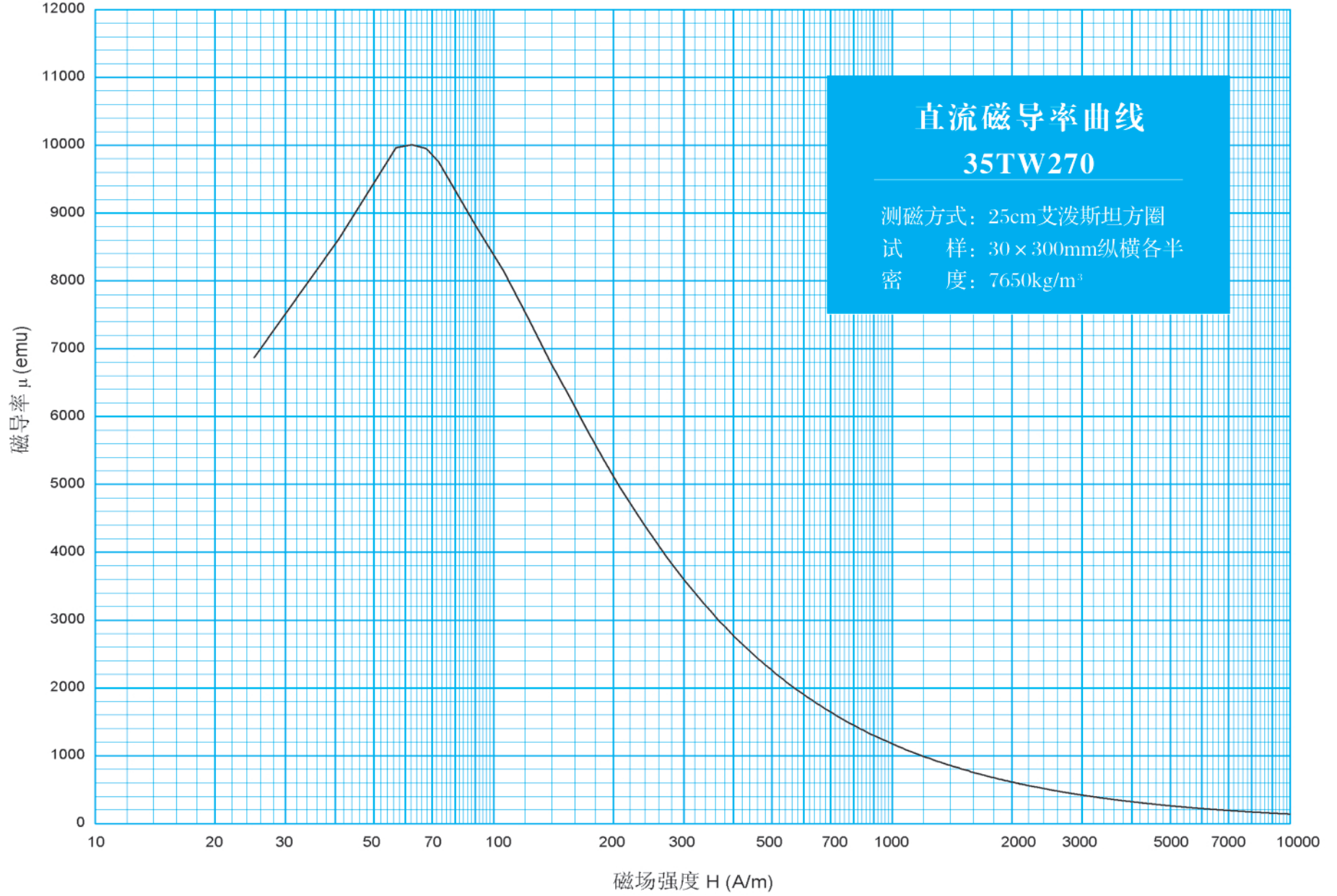




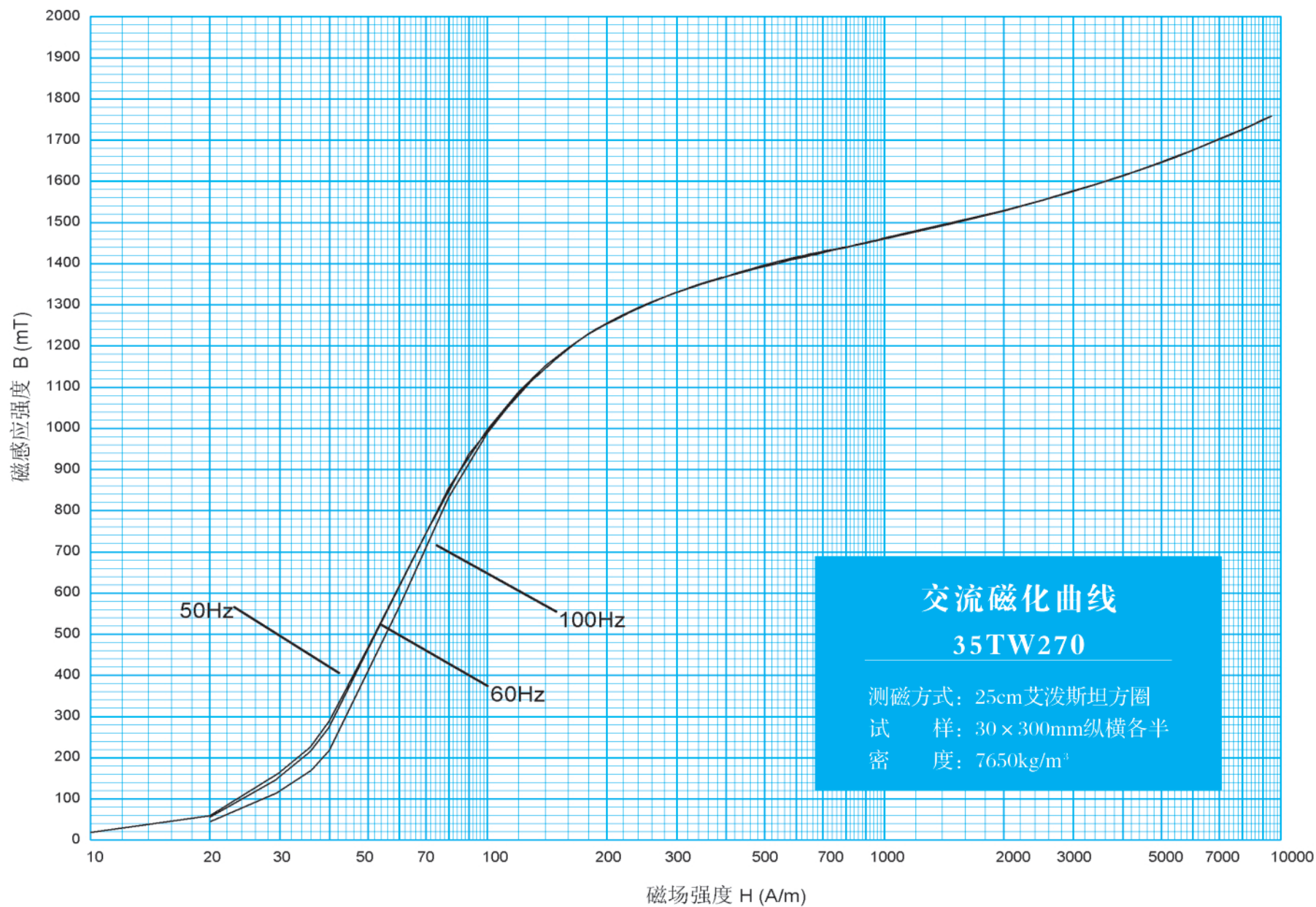


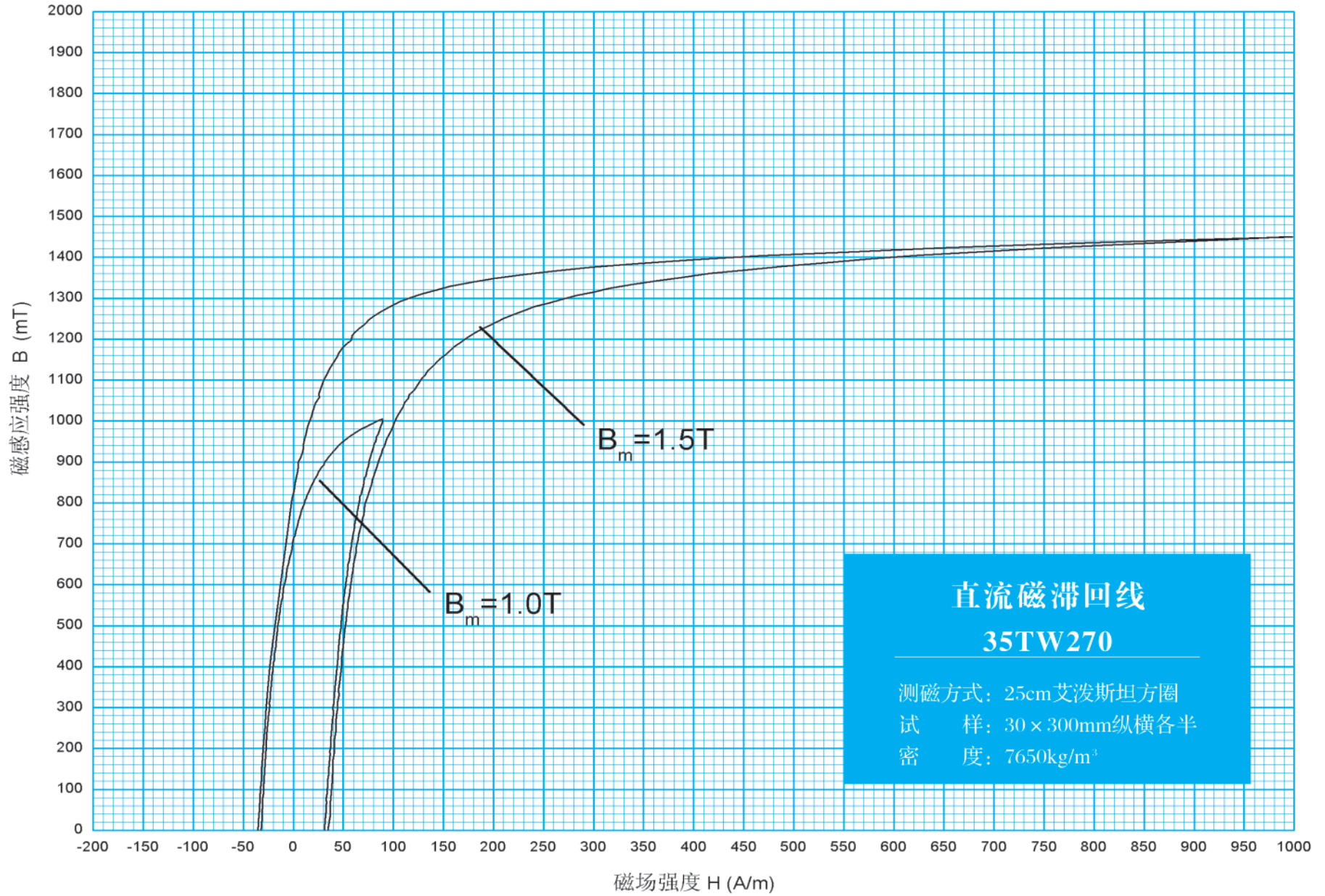


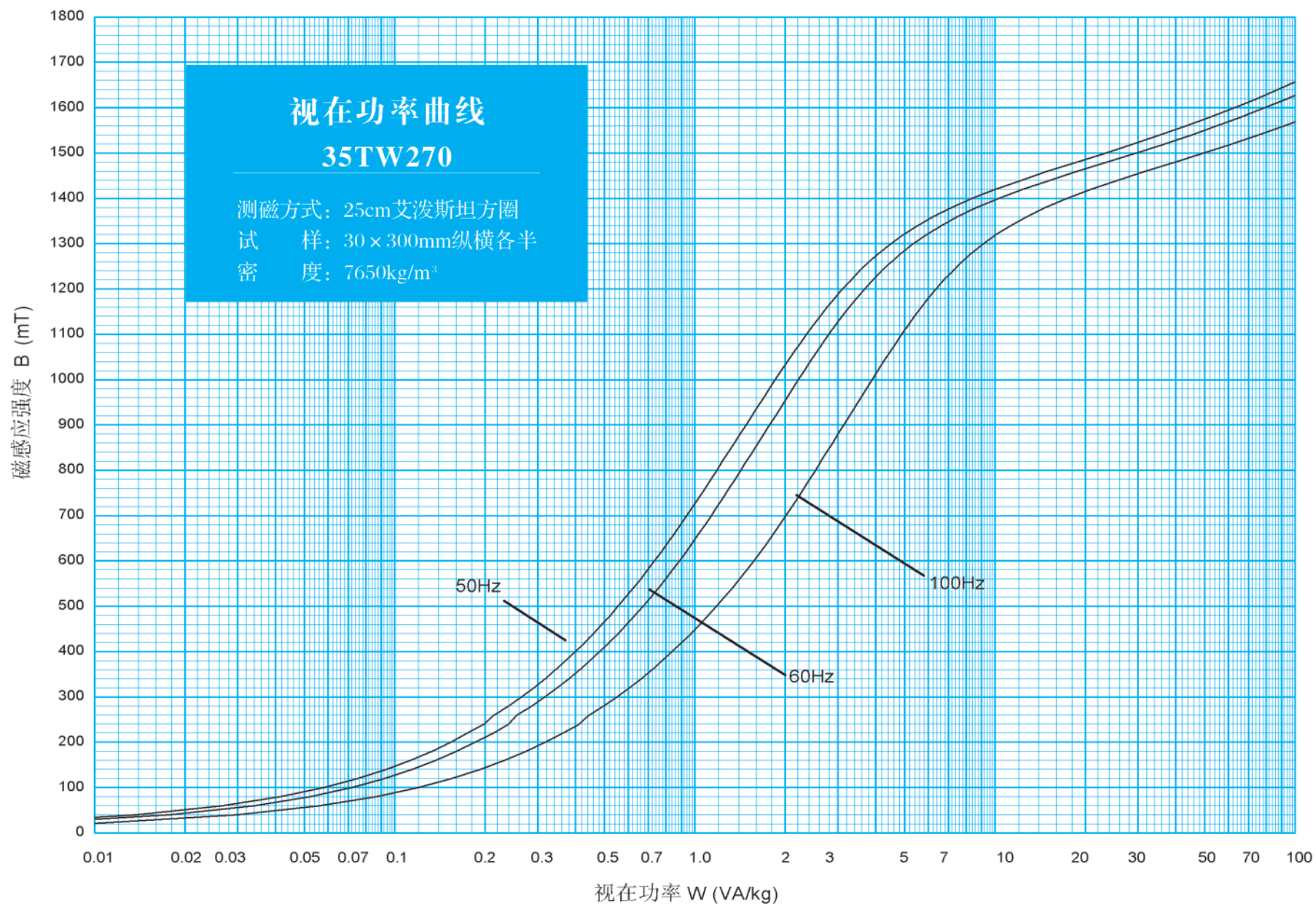






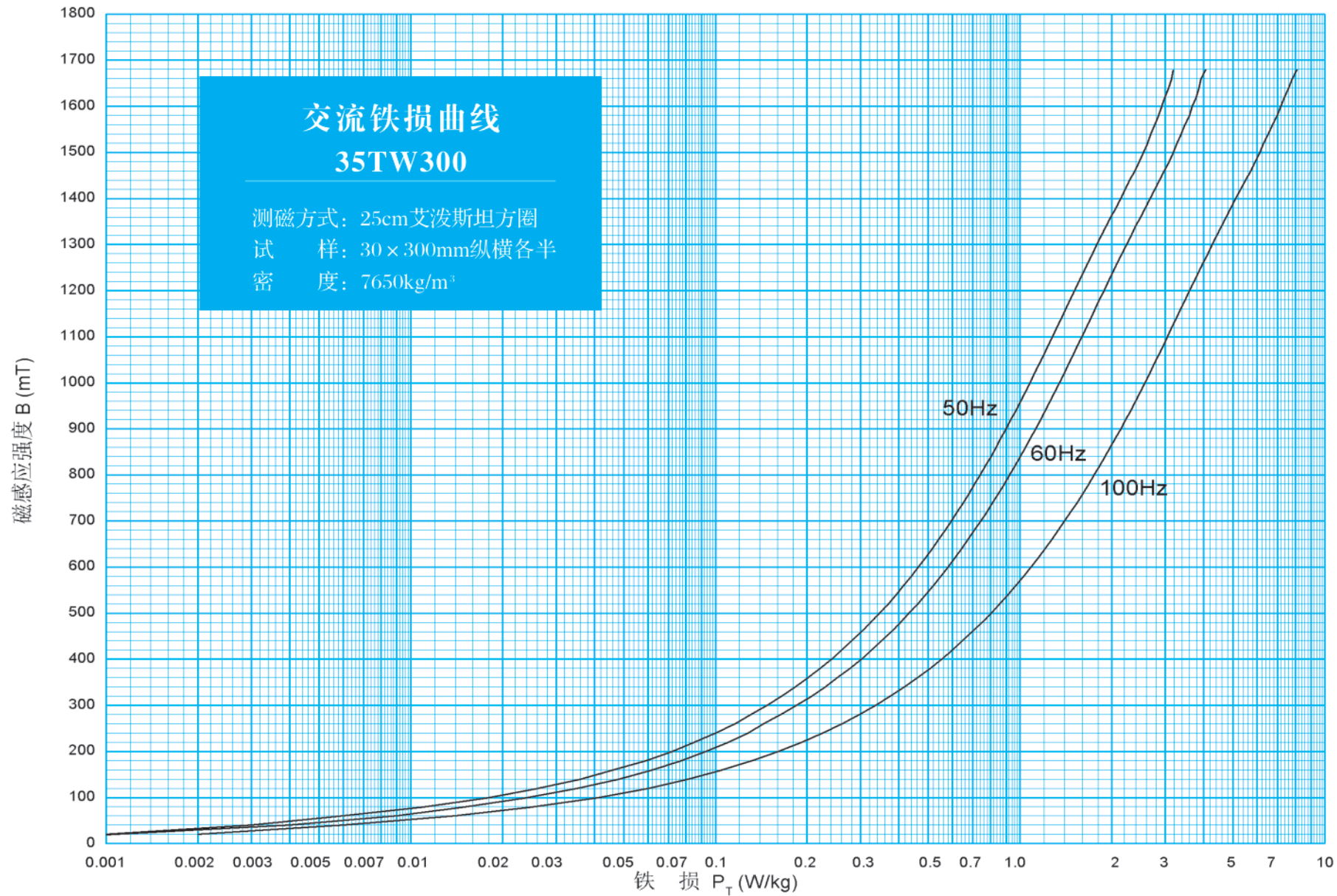




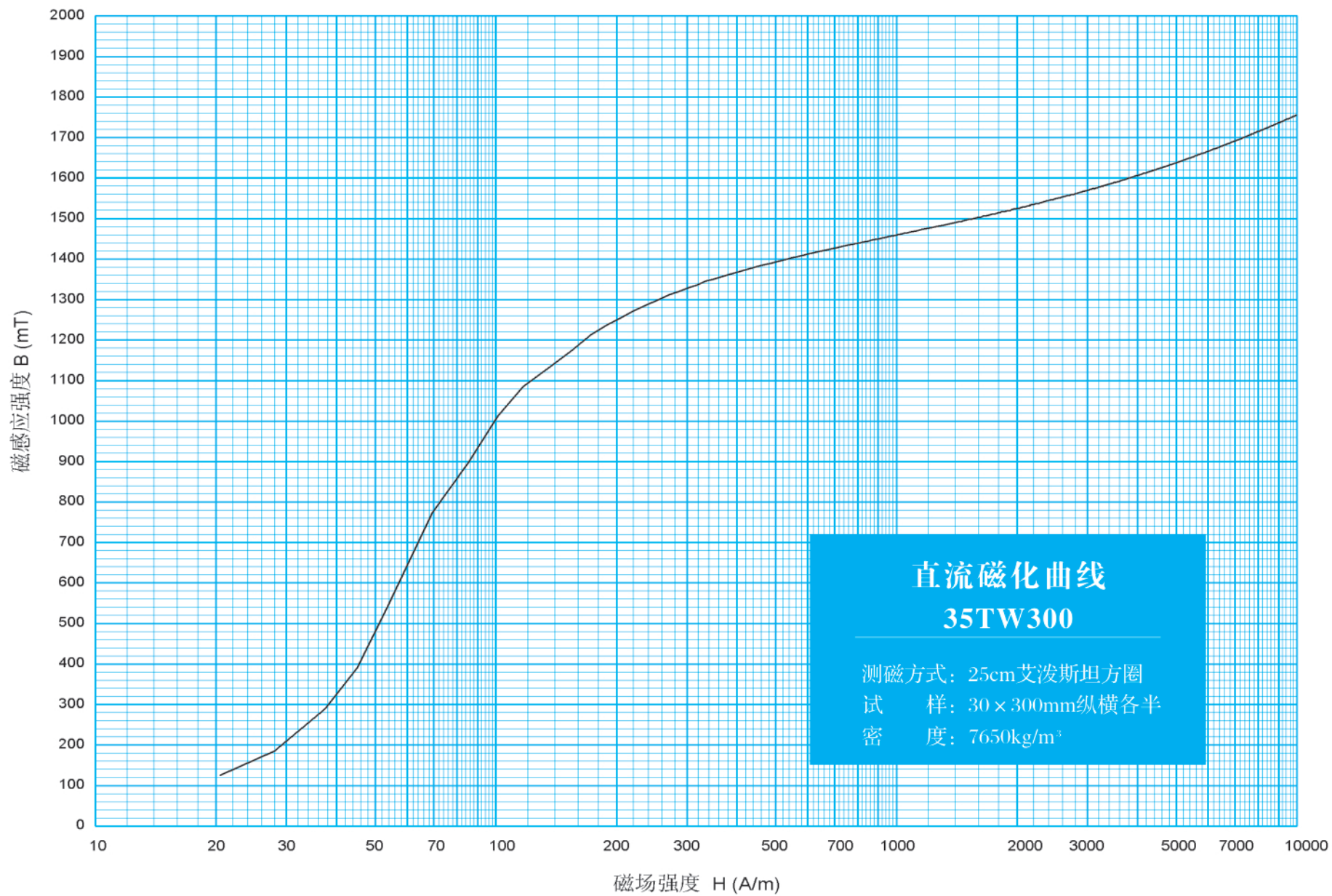


## 交流铁损曲线 35TW300

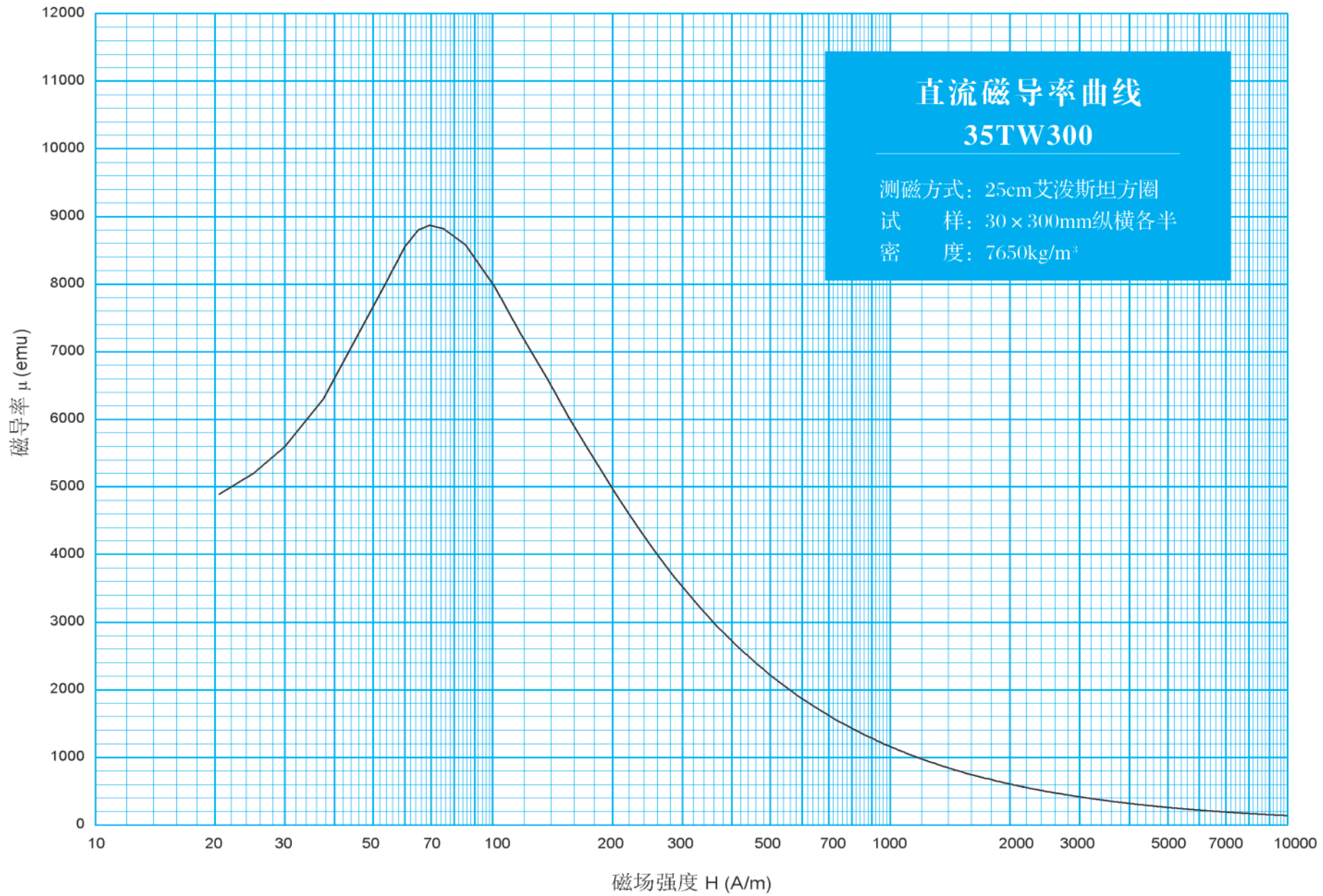
测磁方式: 25cm艾泼斯坦方圈  
试样: 30×300mm纵横各半  
密度: 7650kg/m<sup>3</sup>

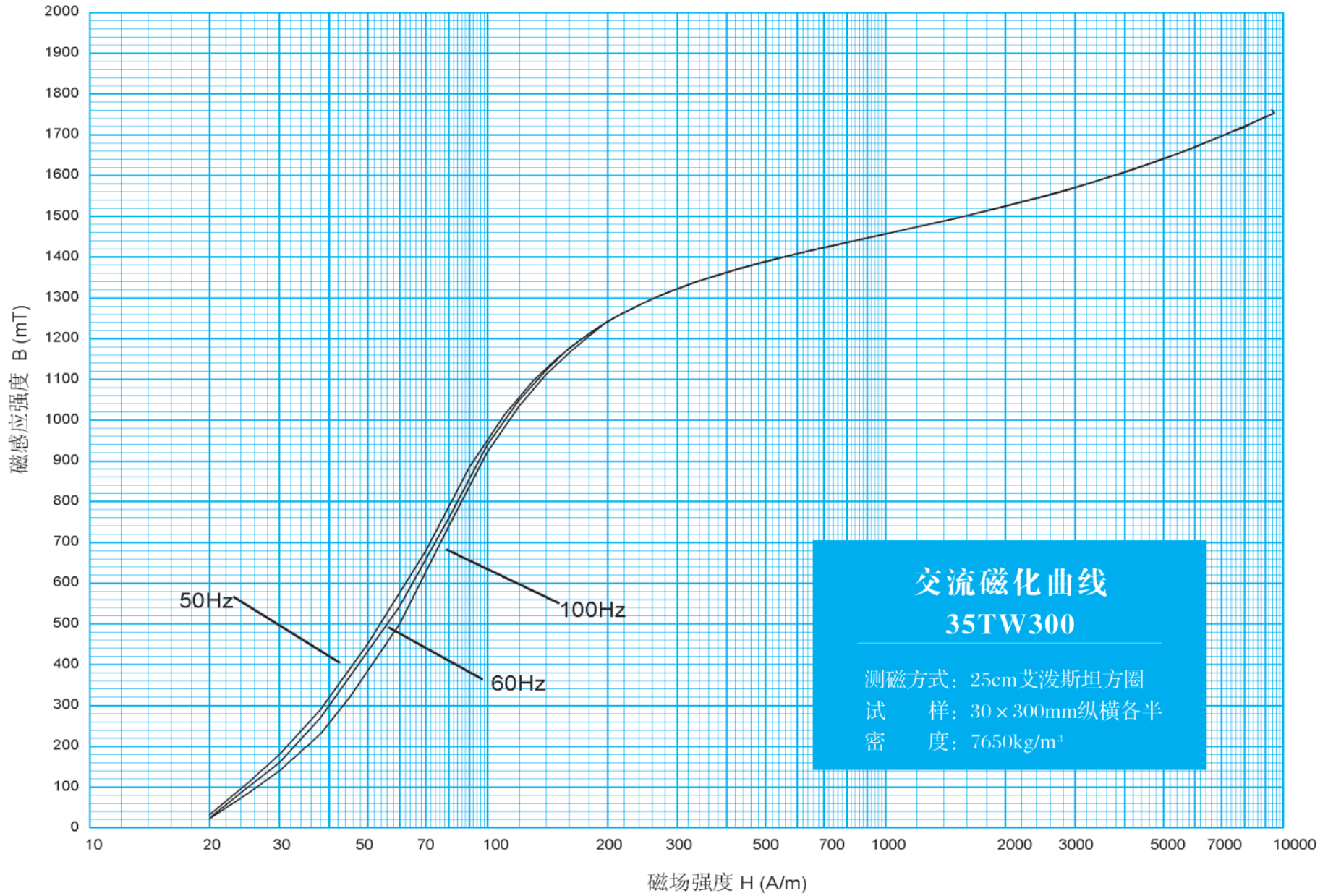


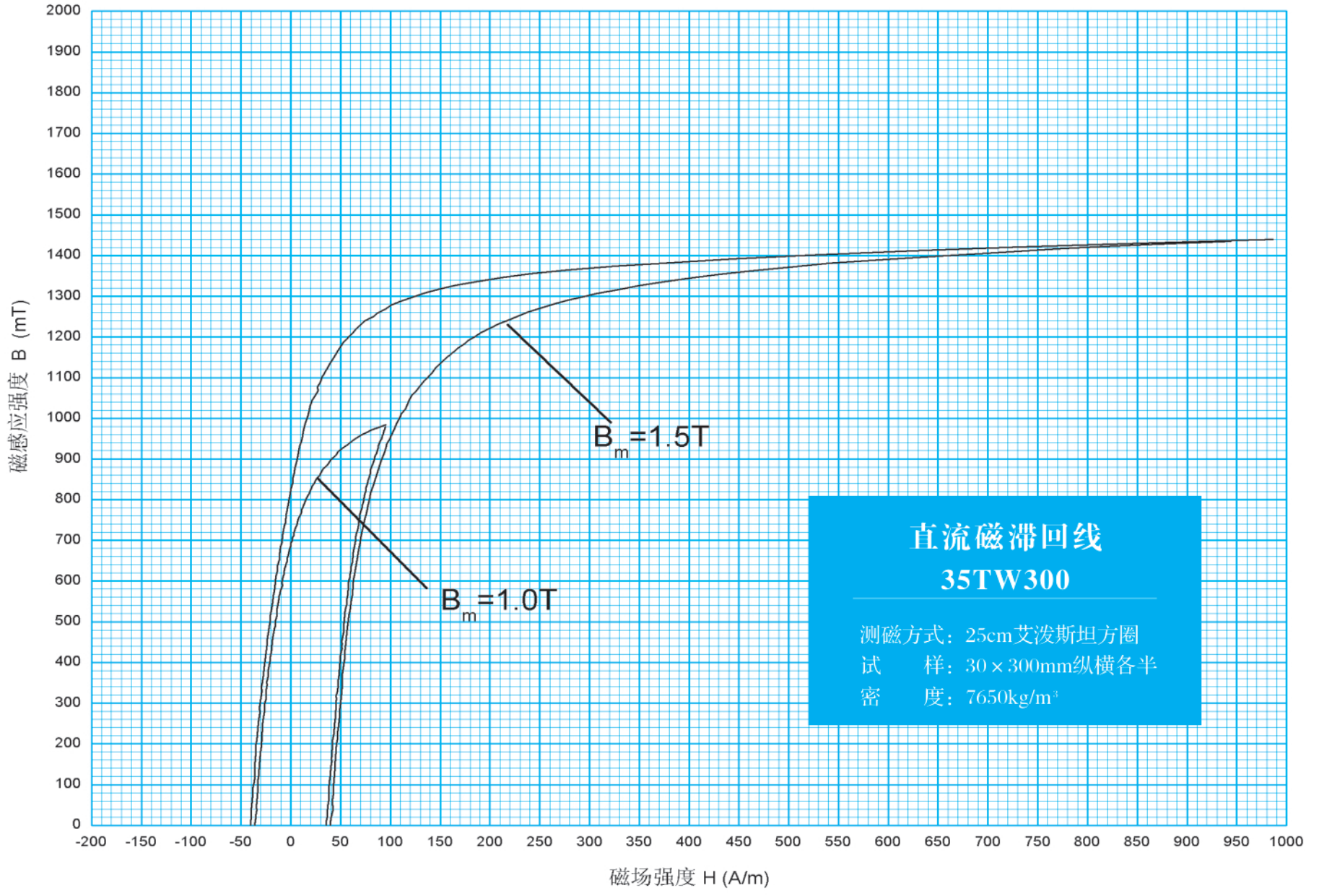


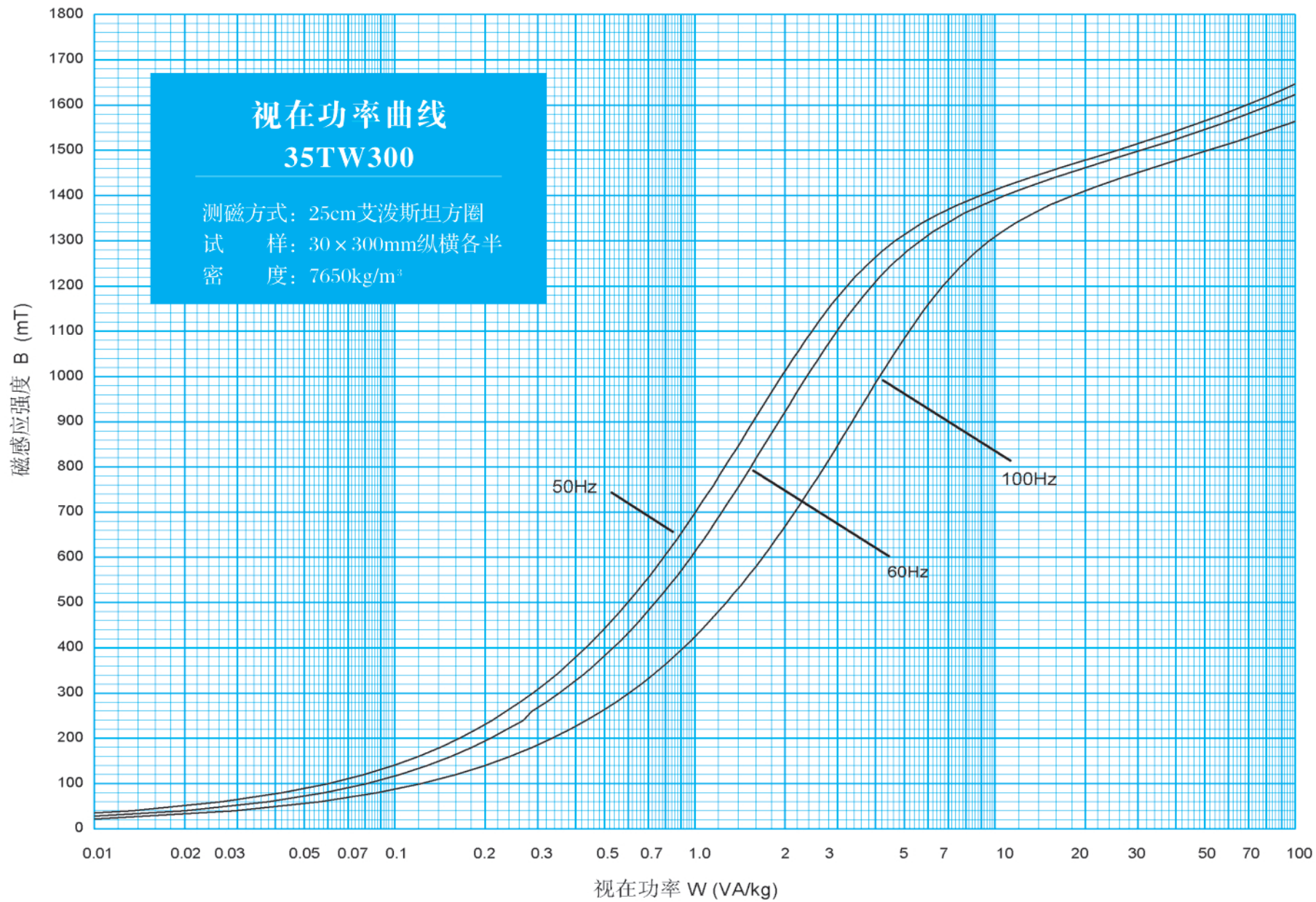




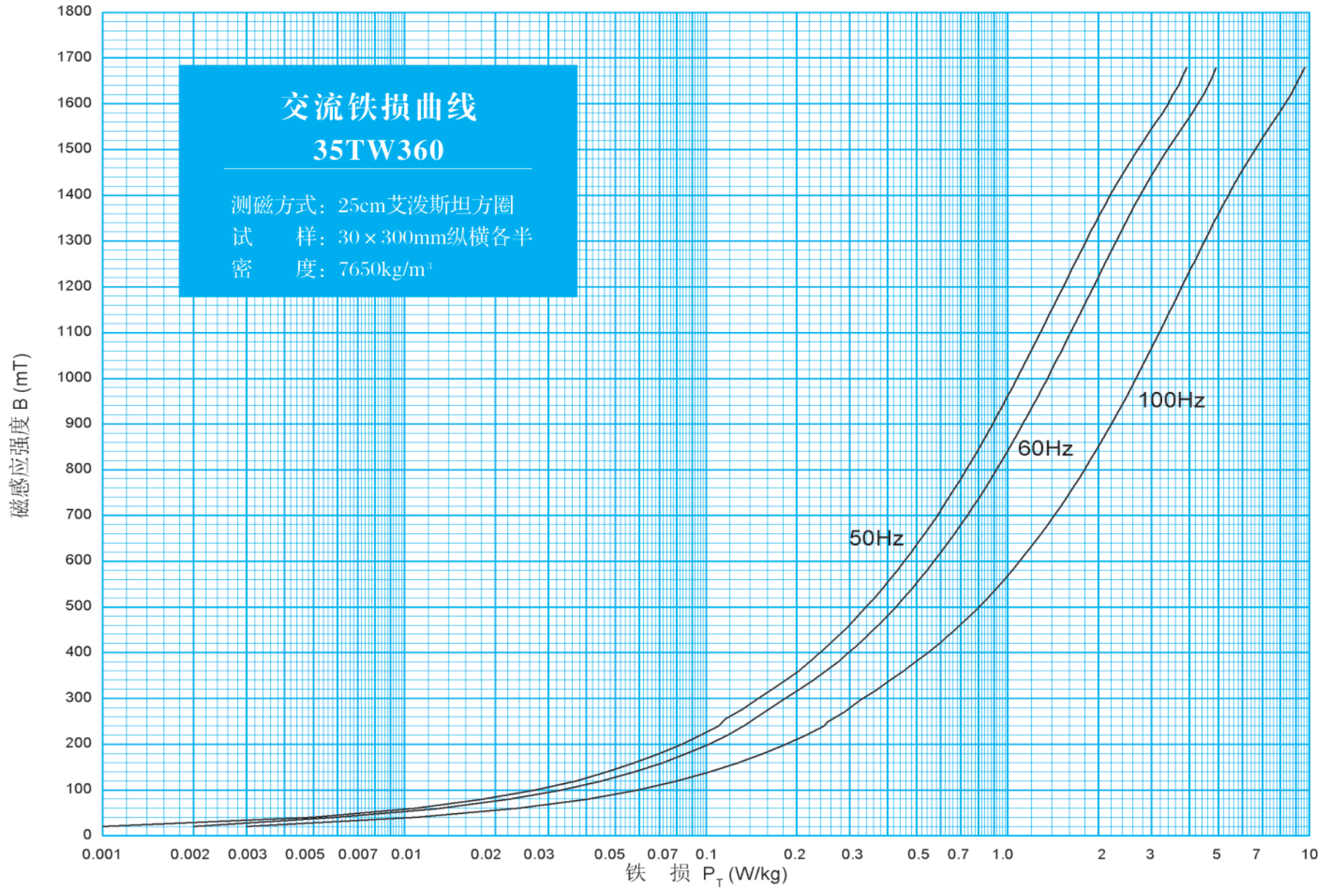




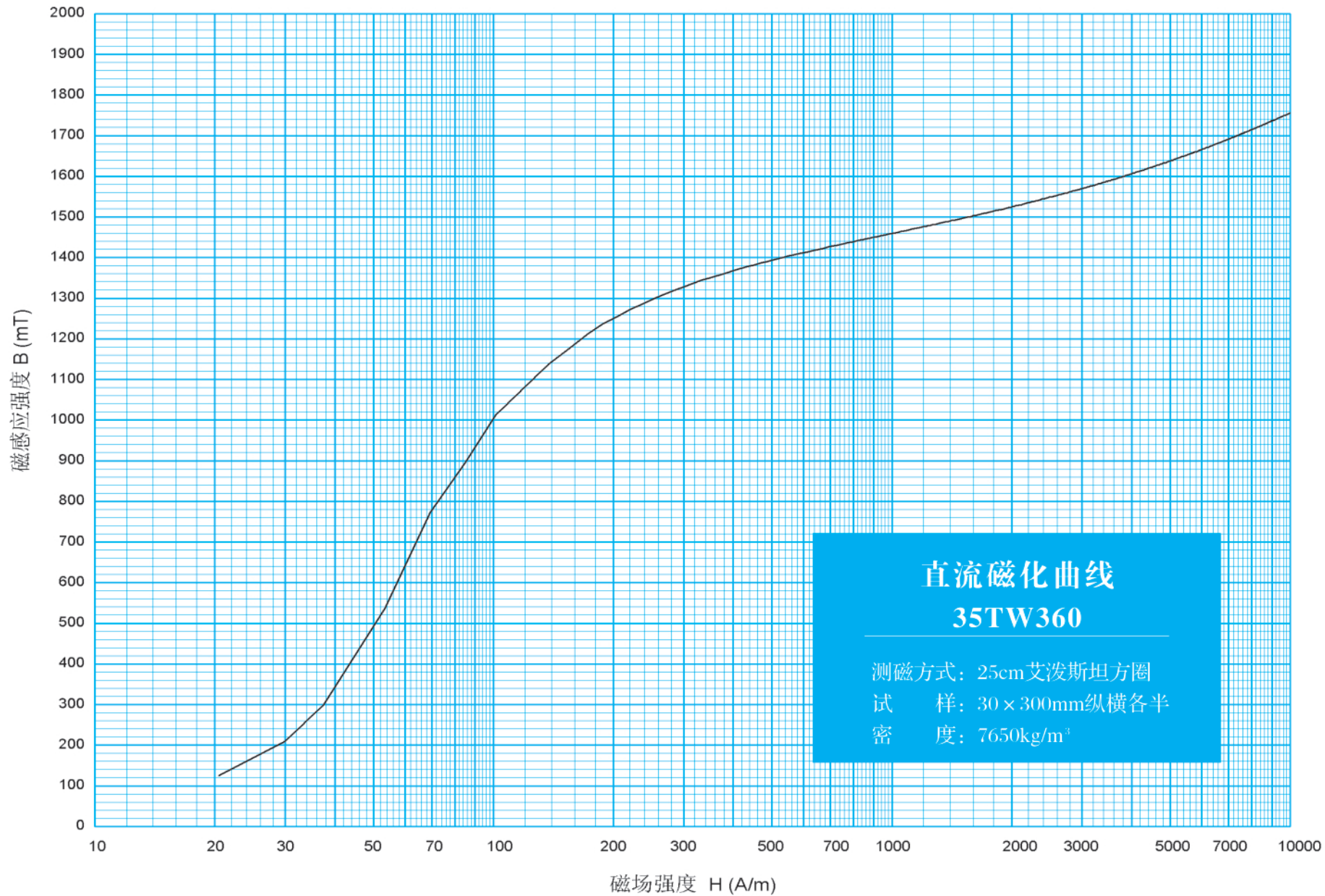


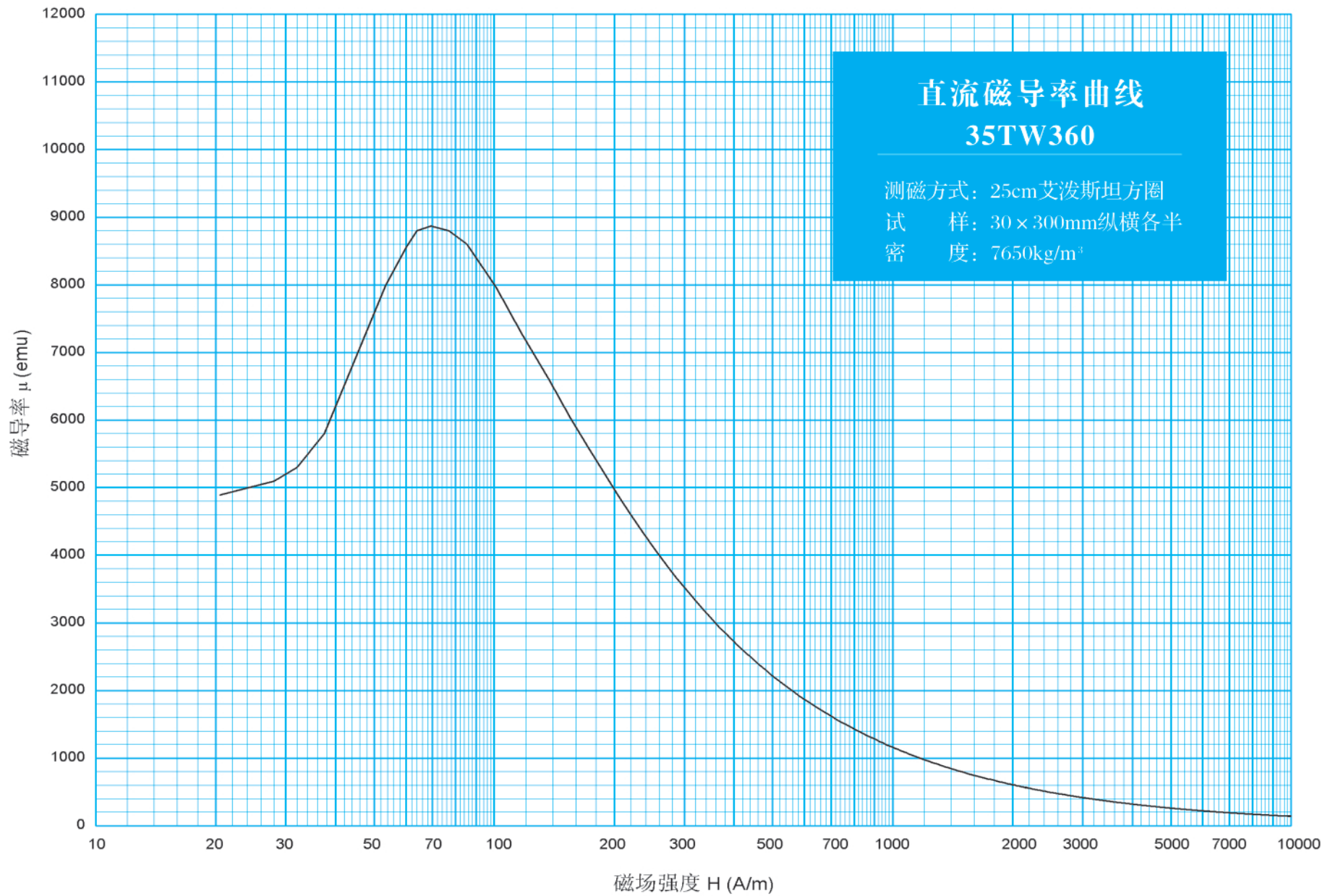


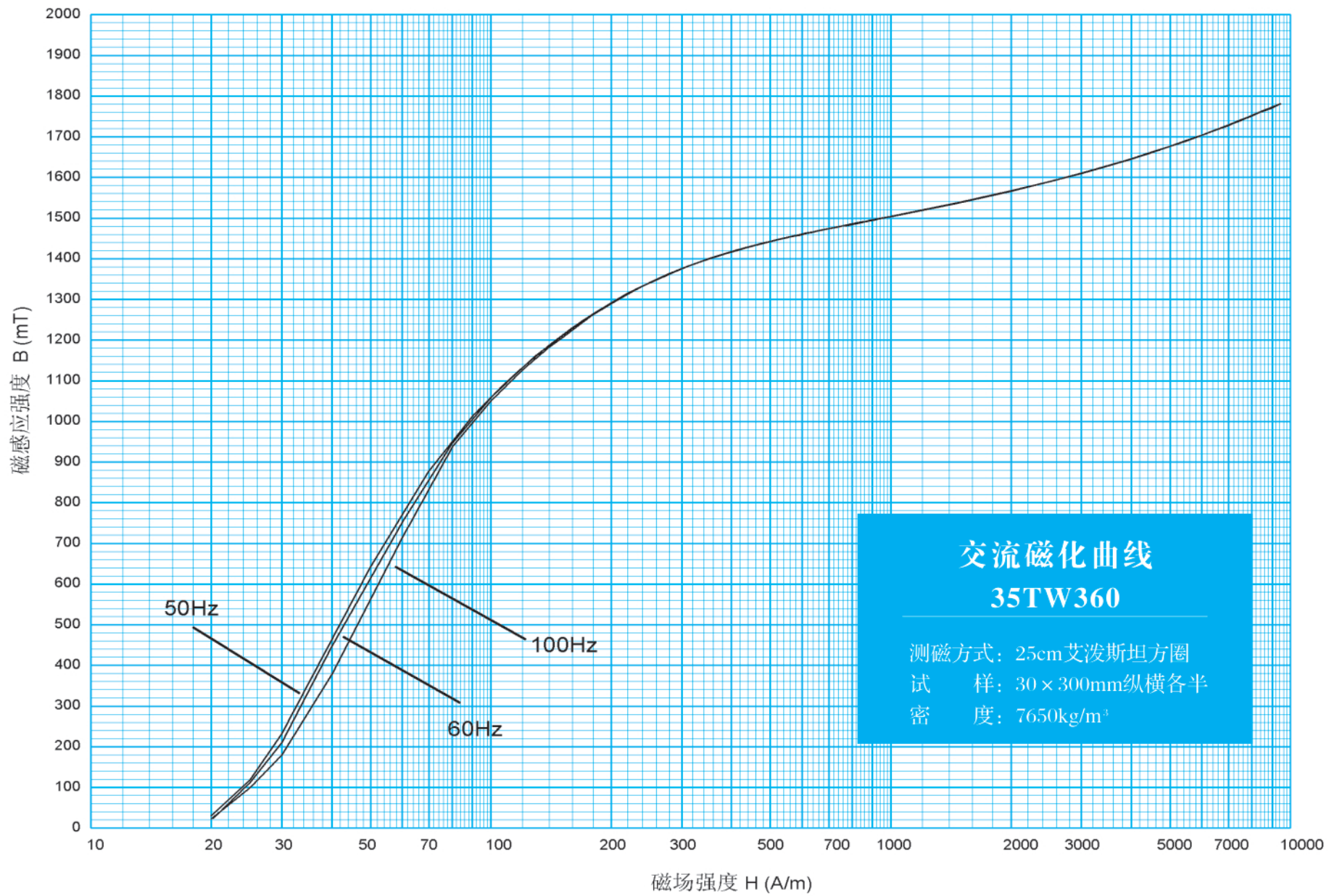


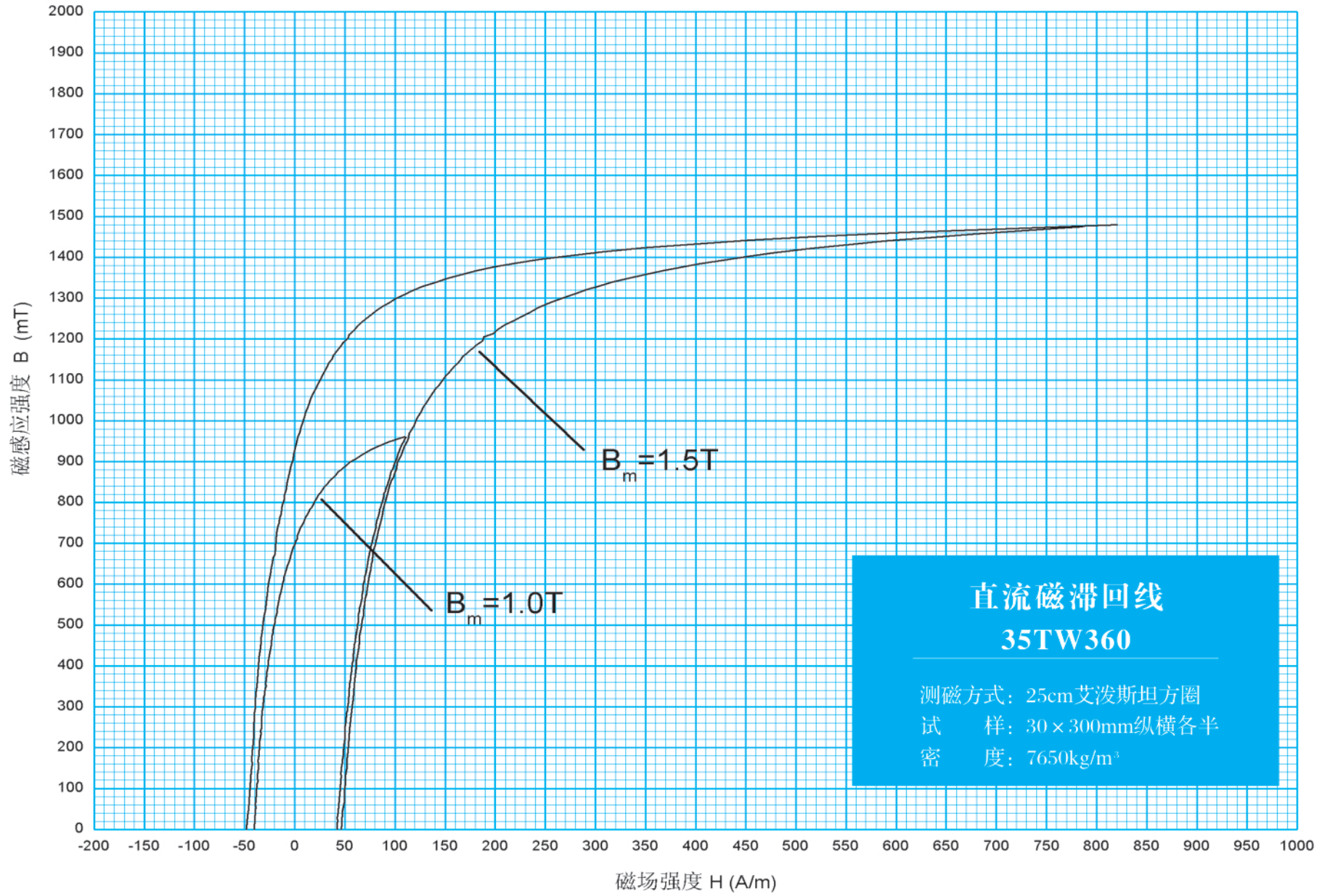




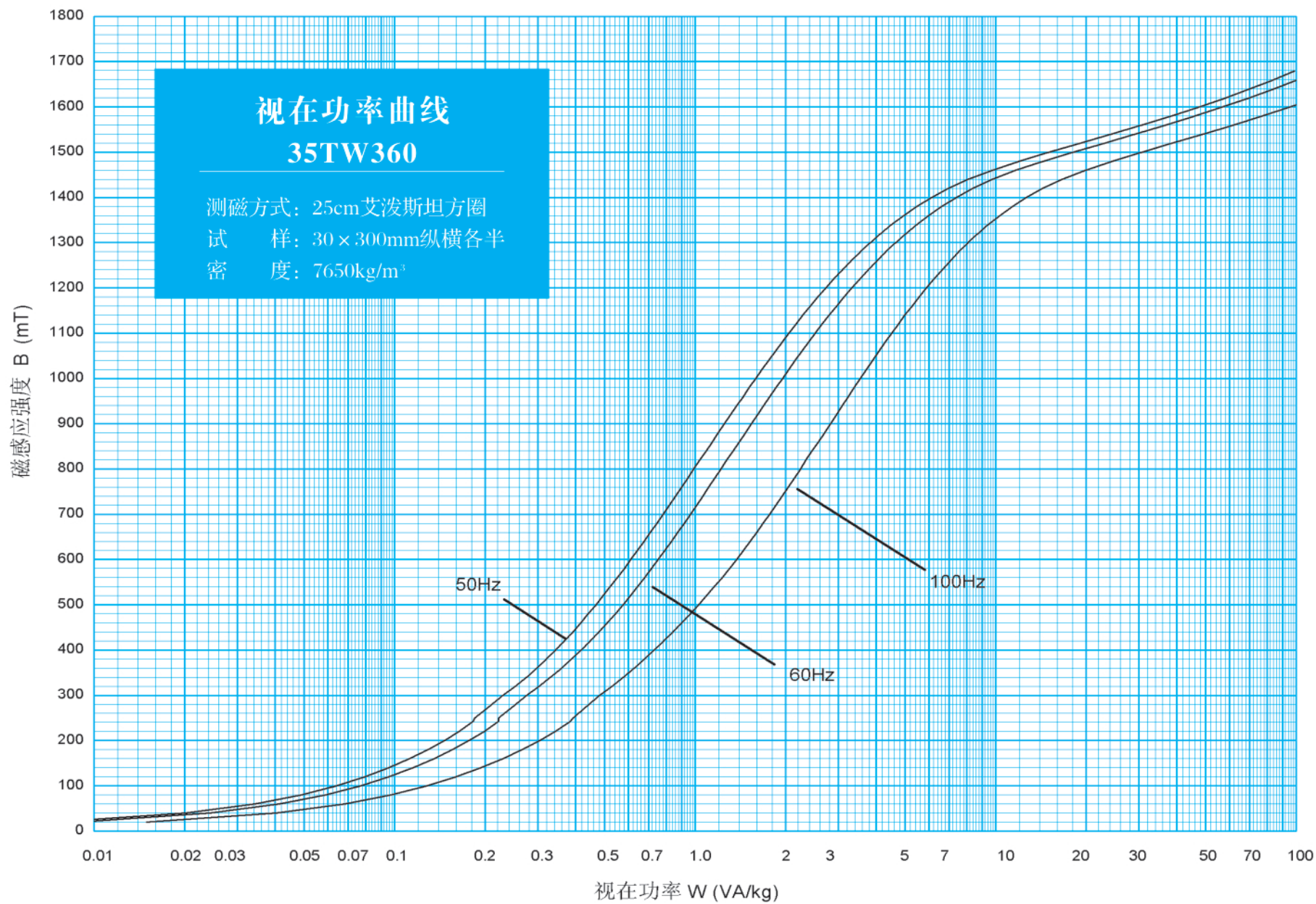




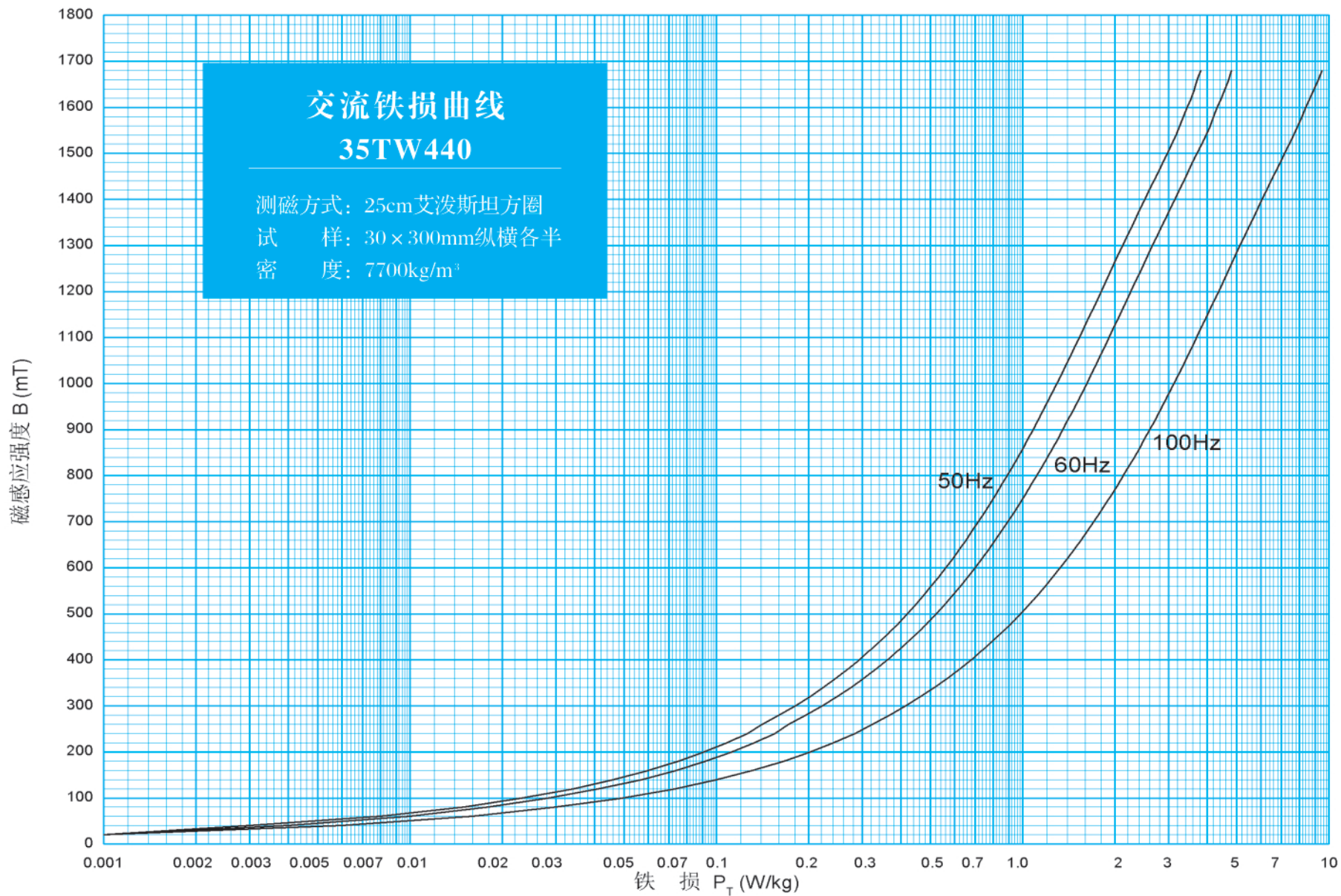


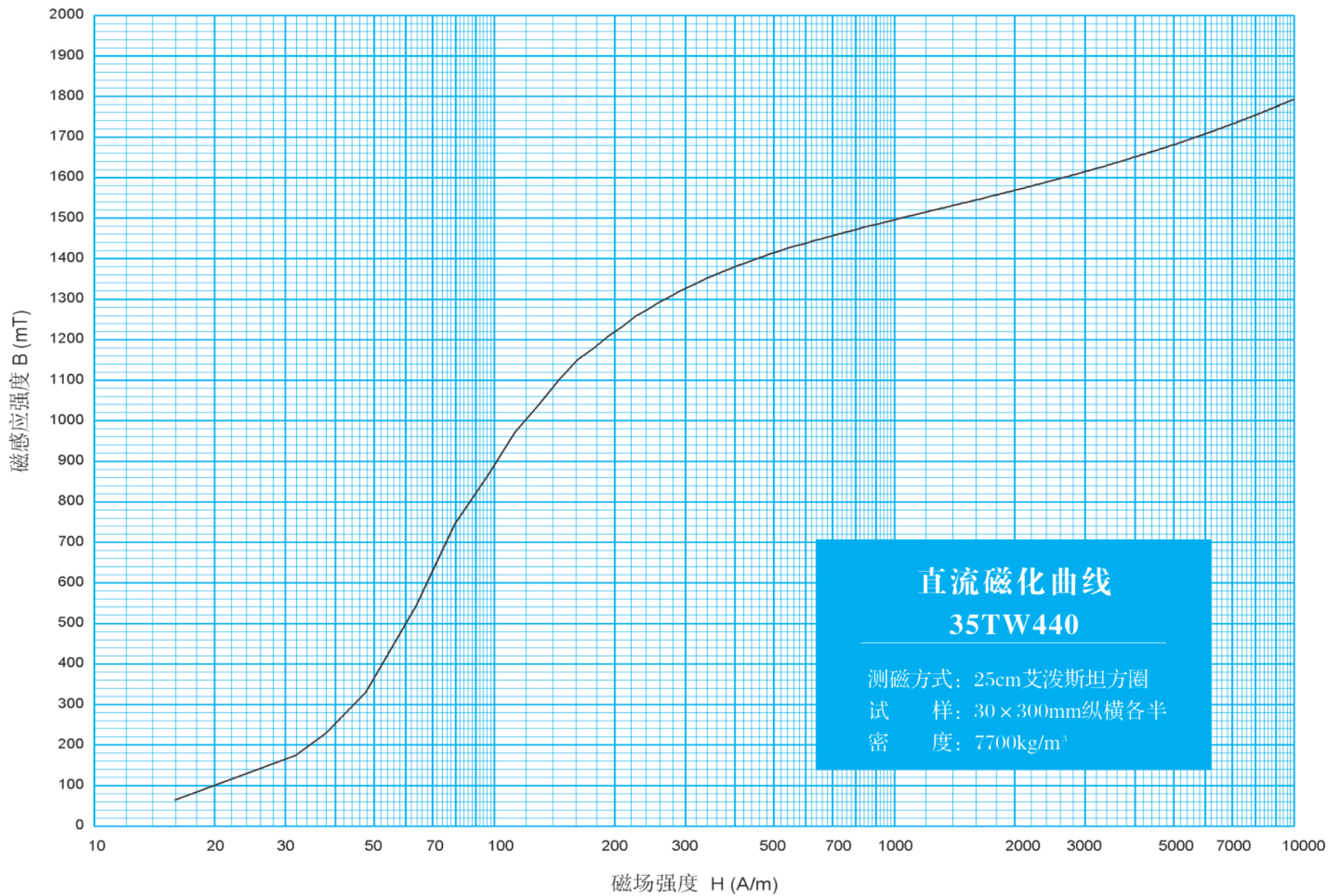


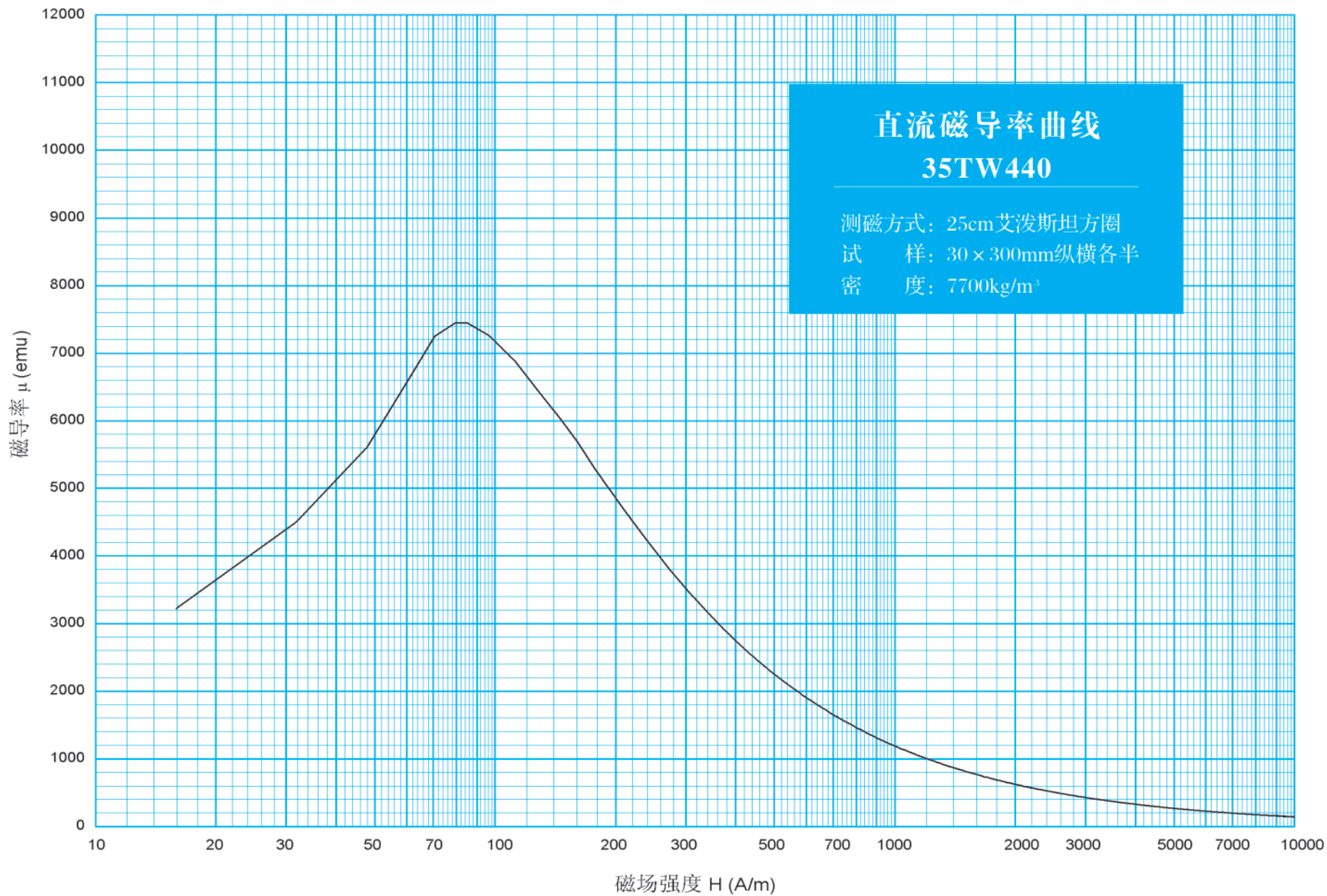


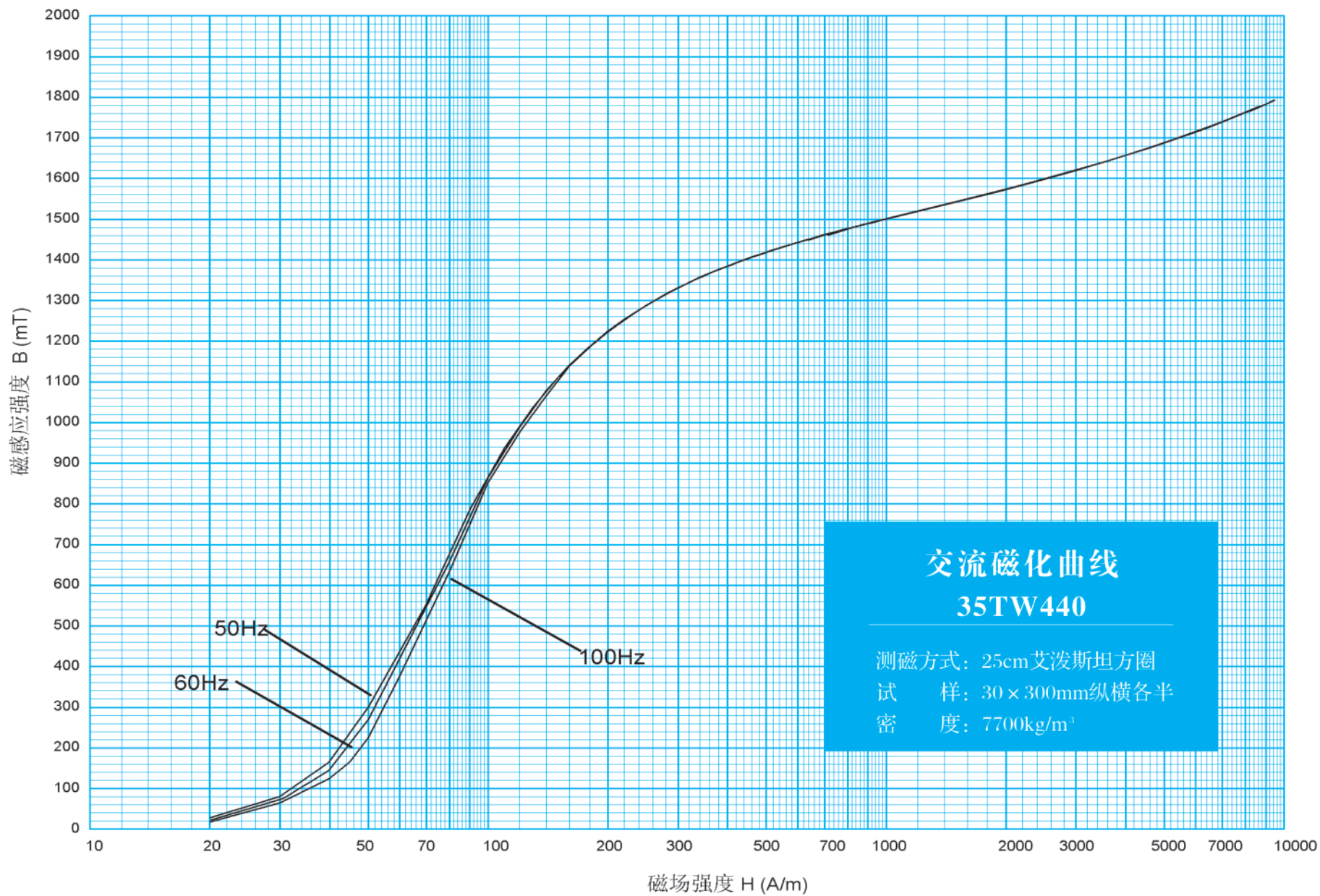




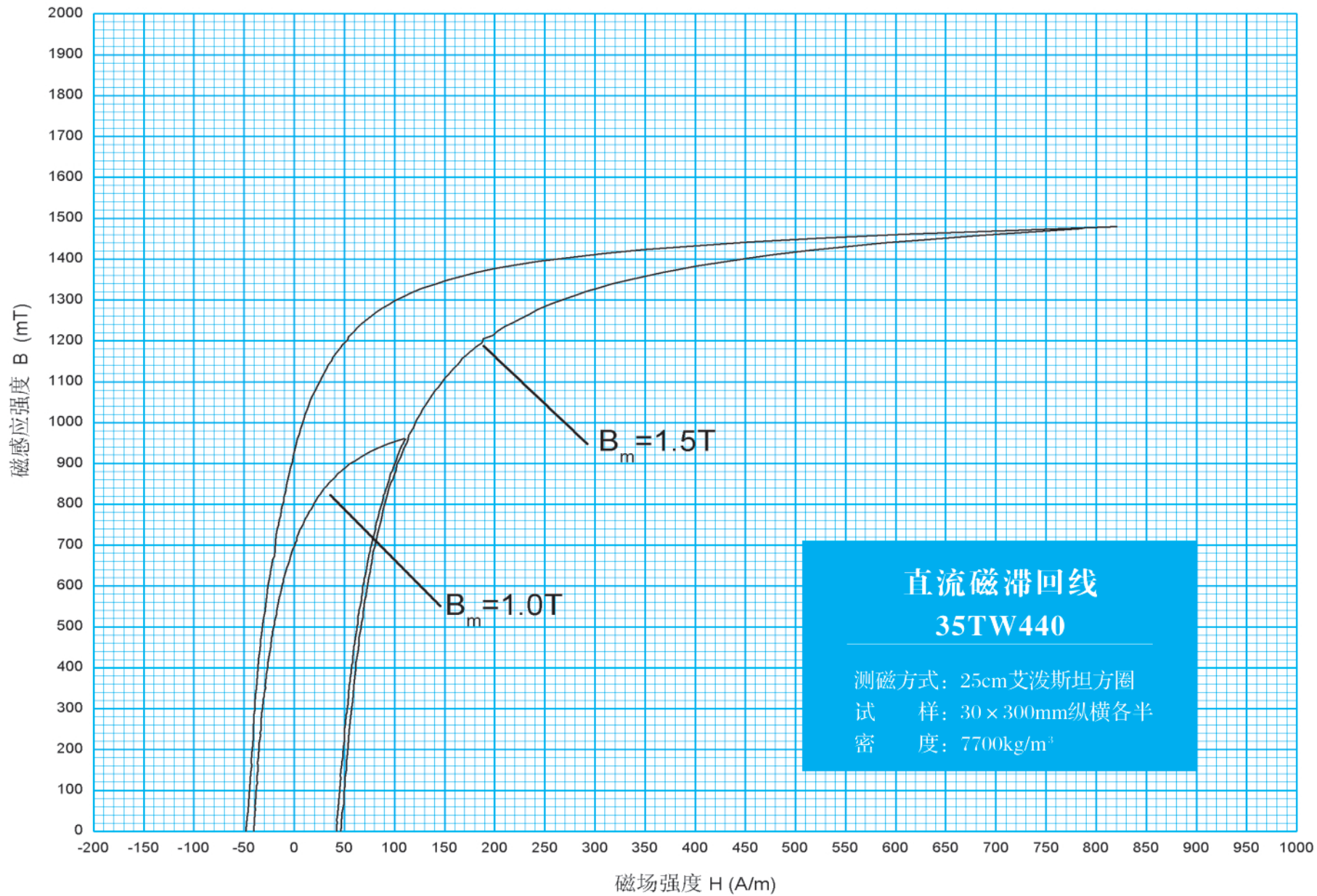




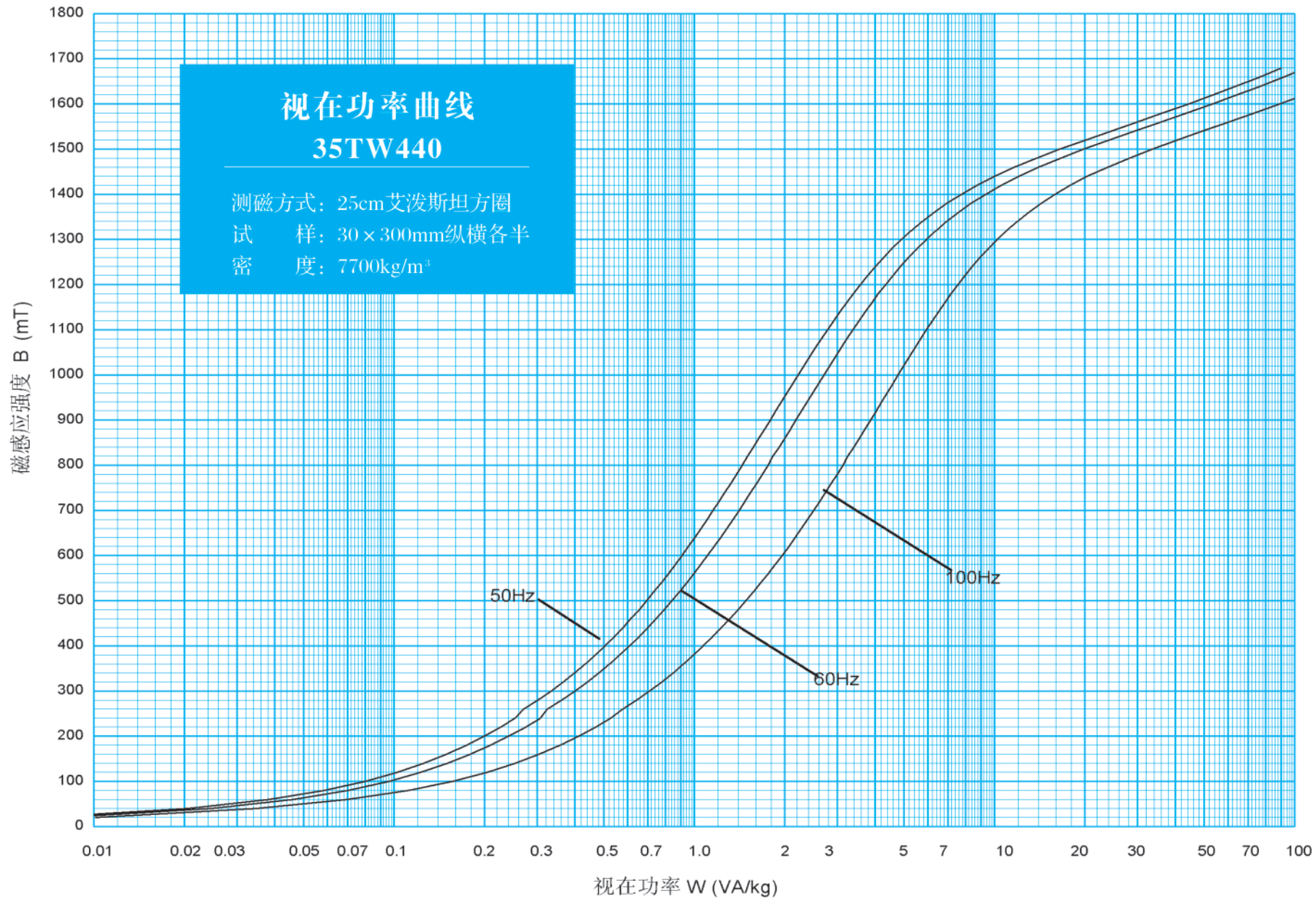


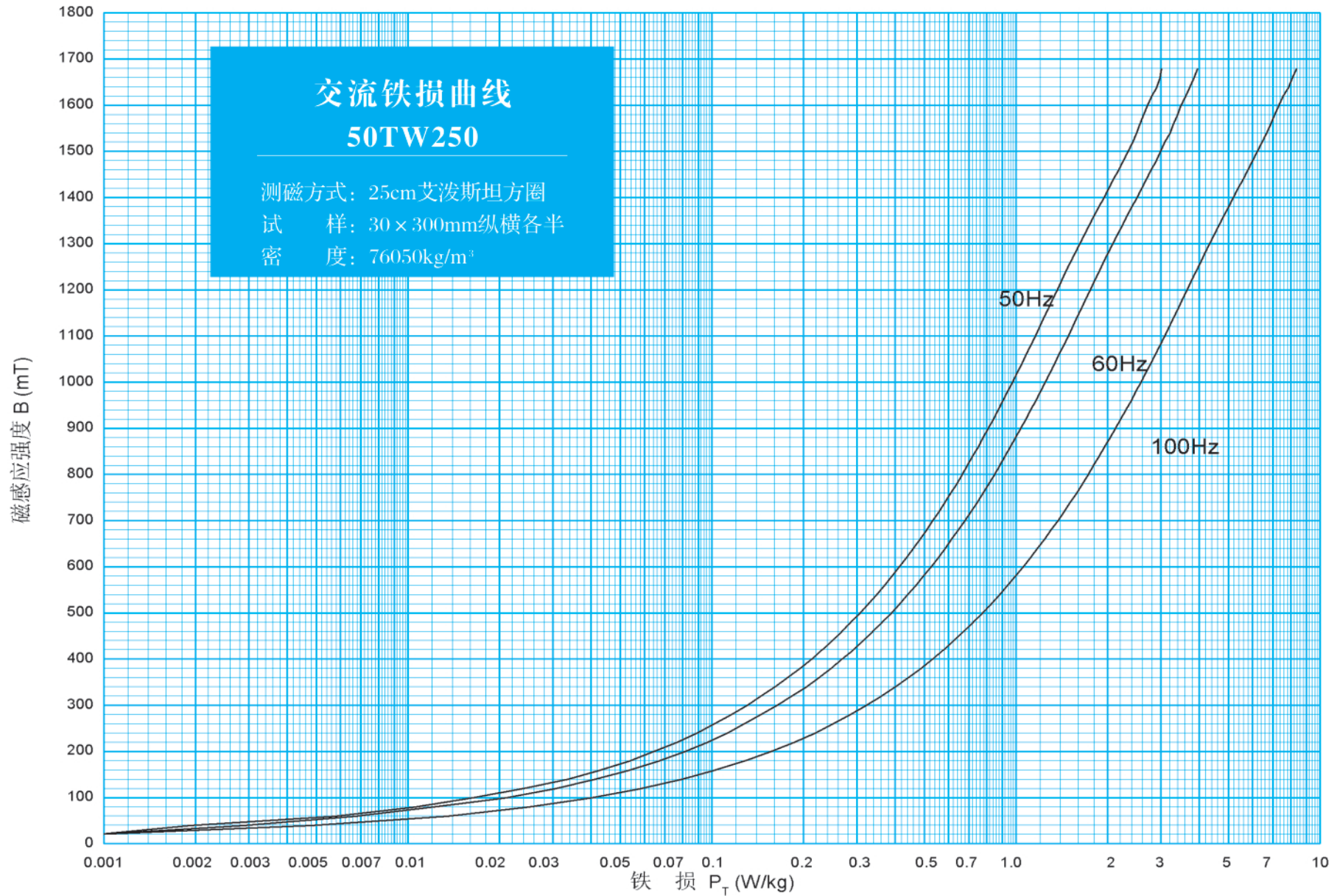


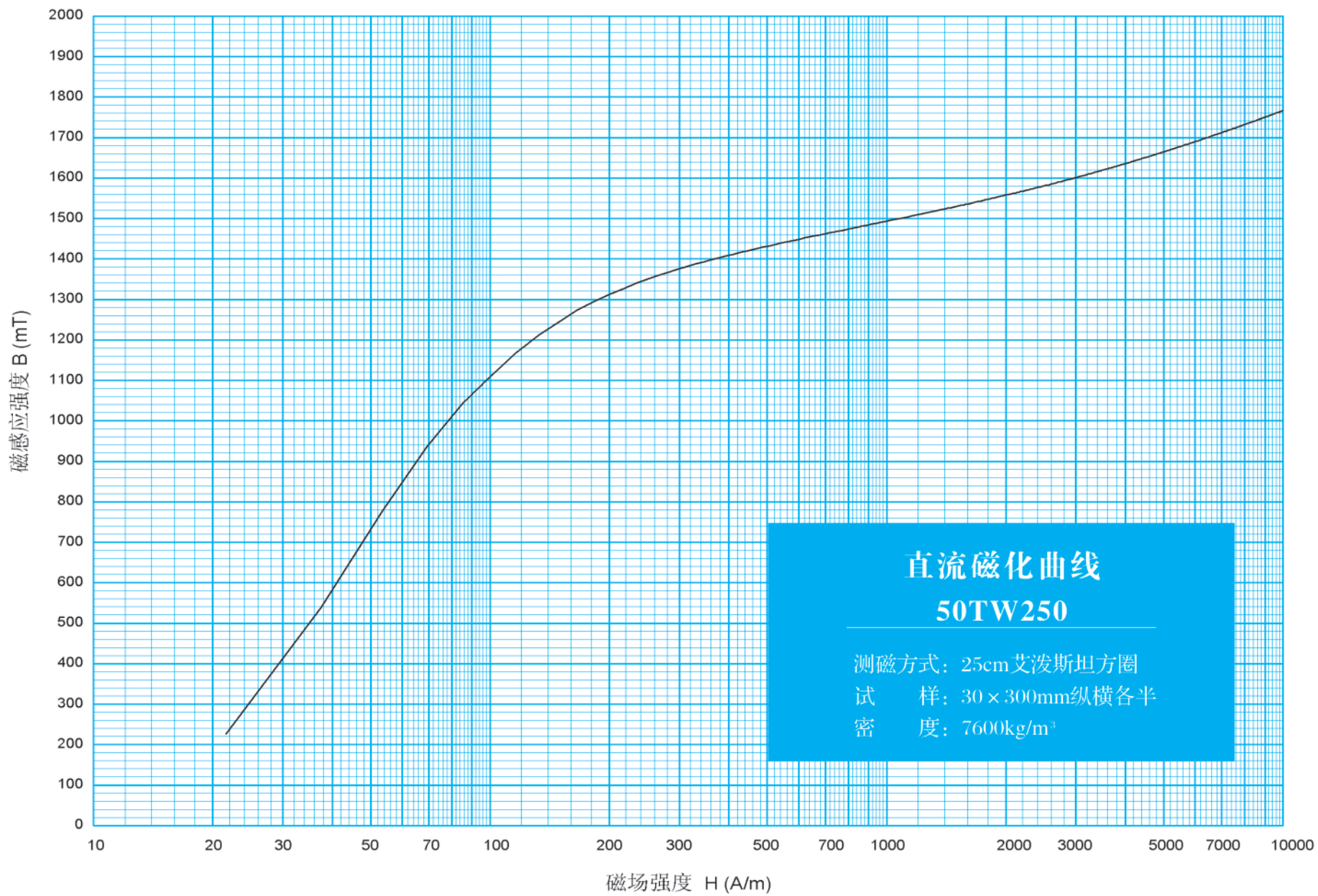


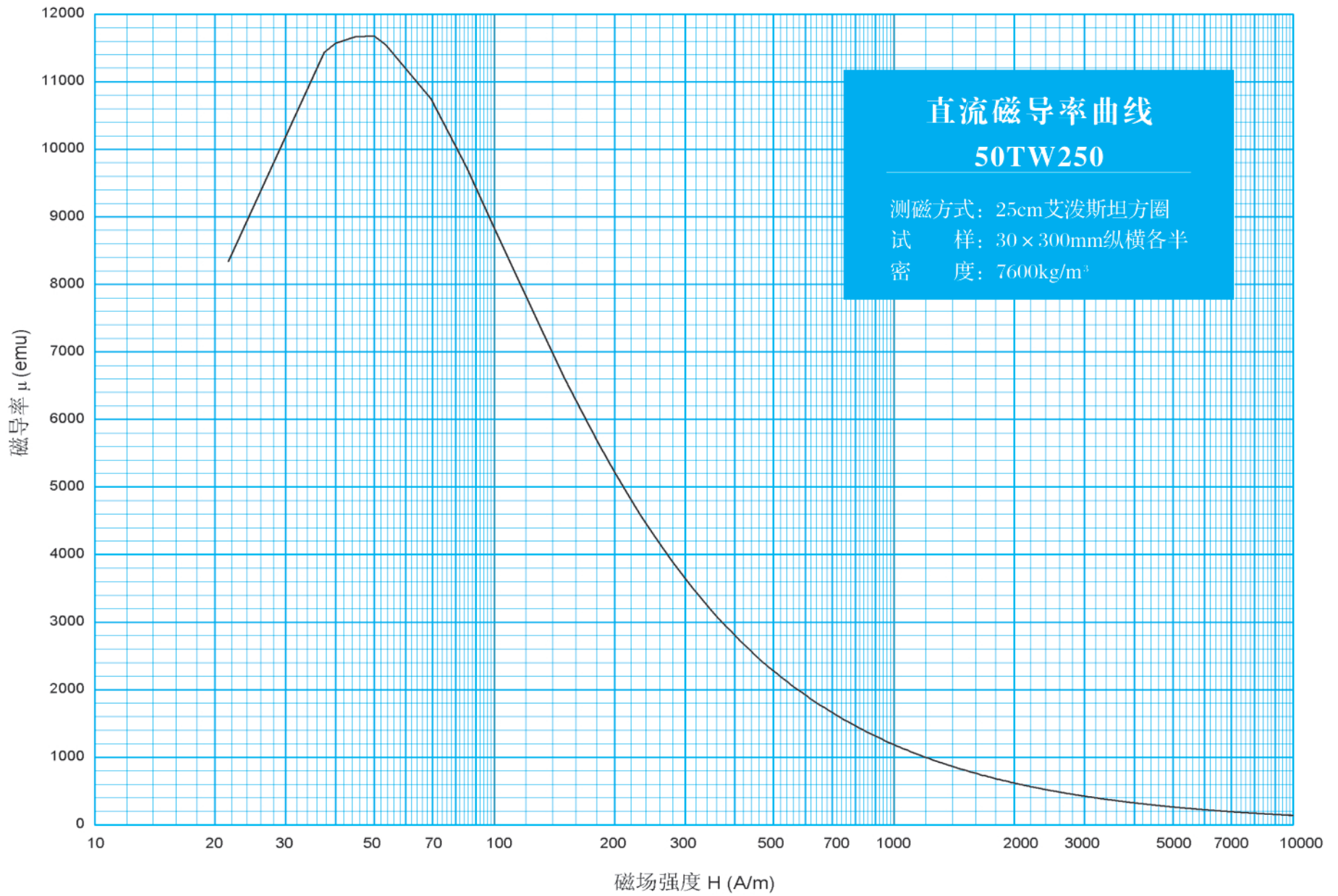




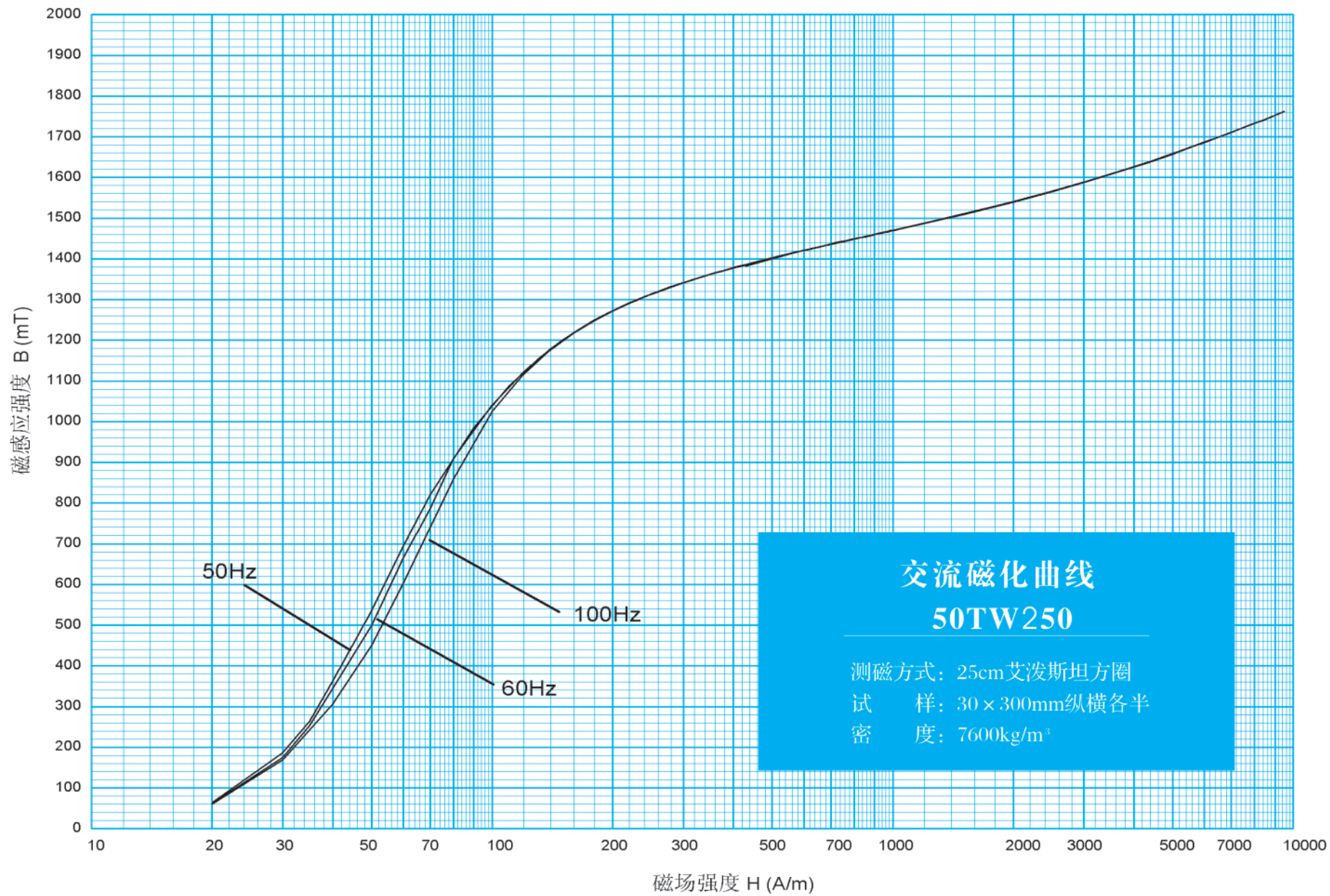




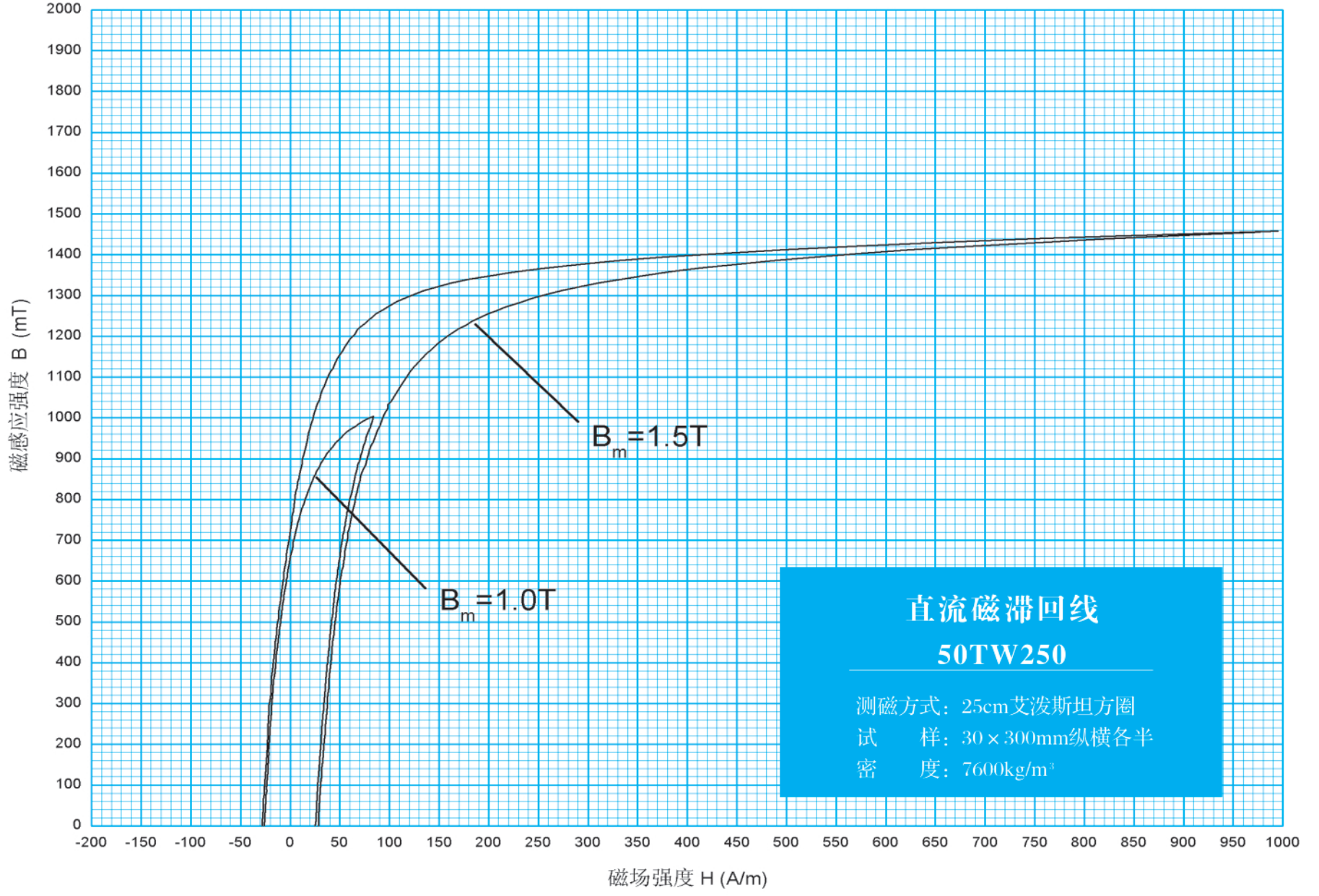


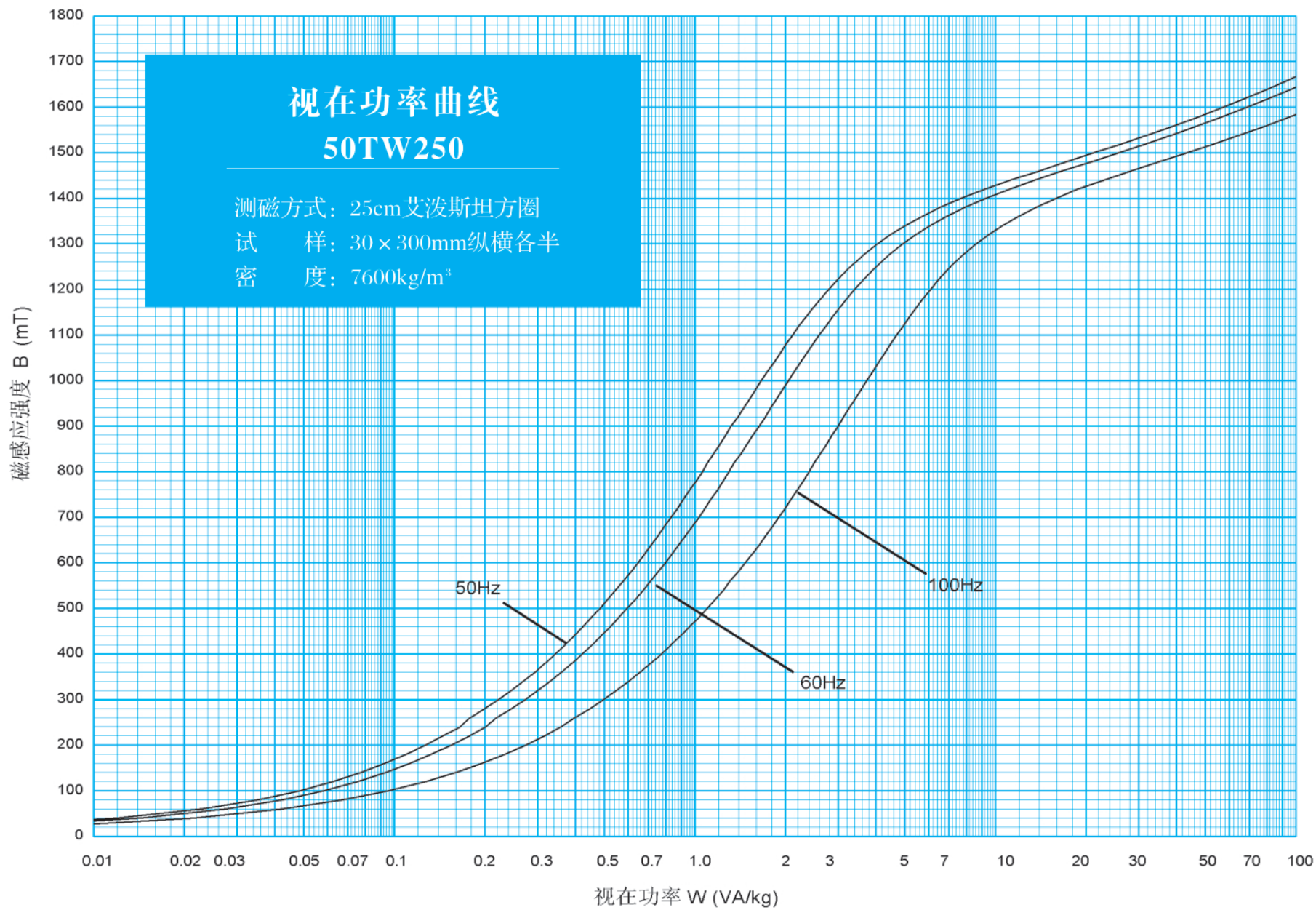


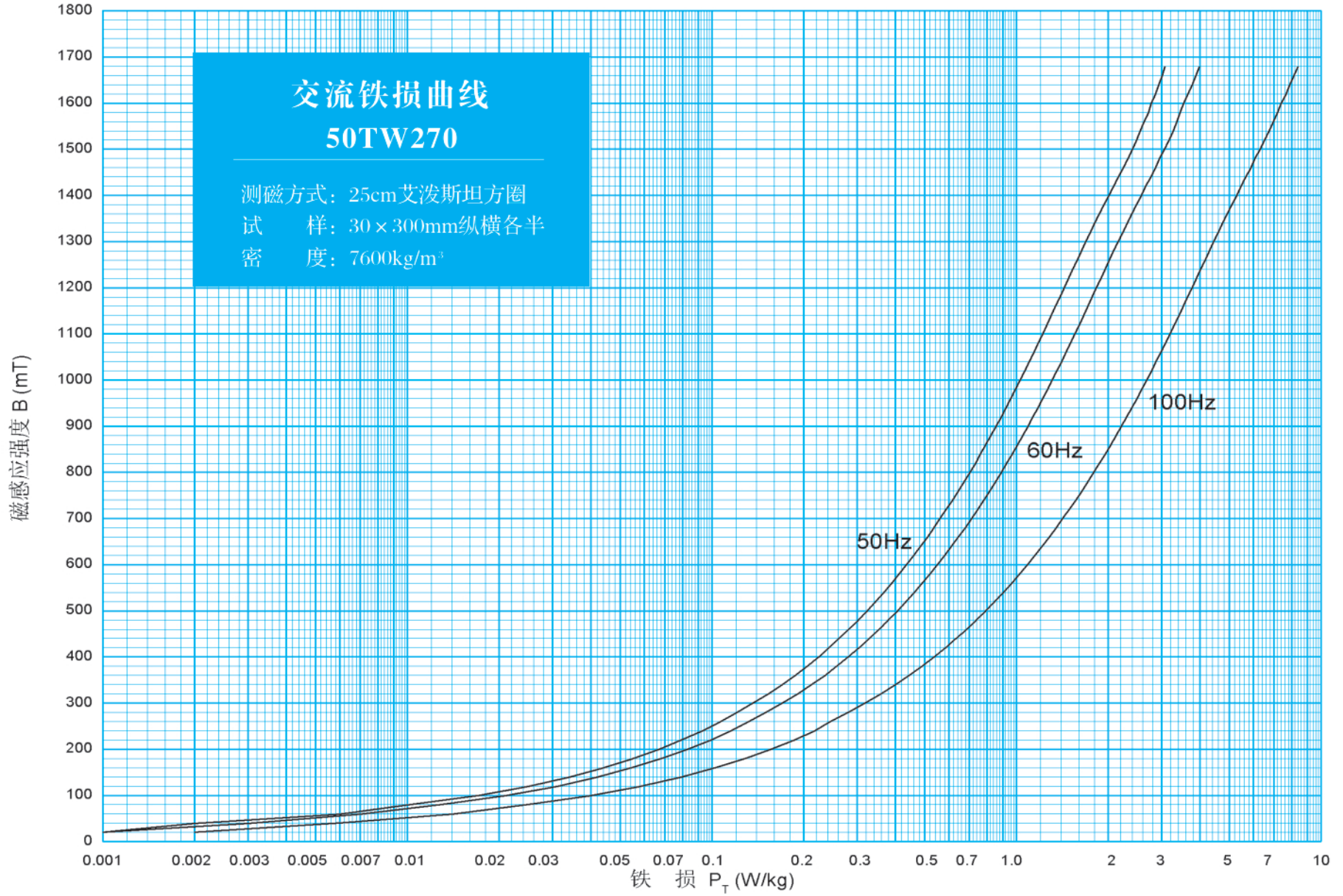




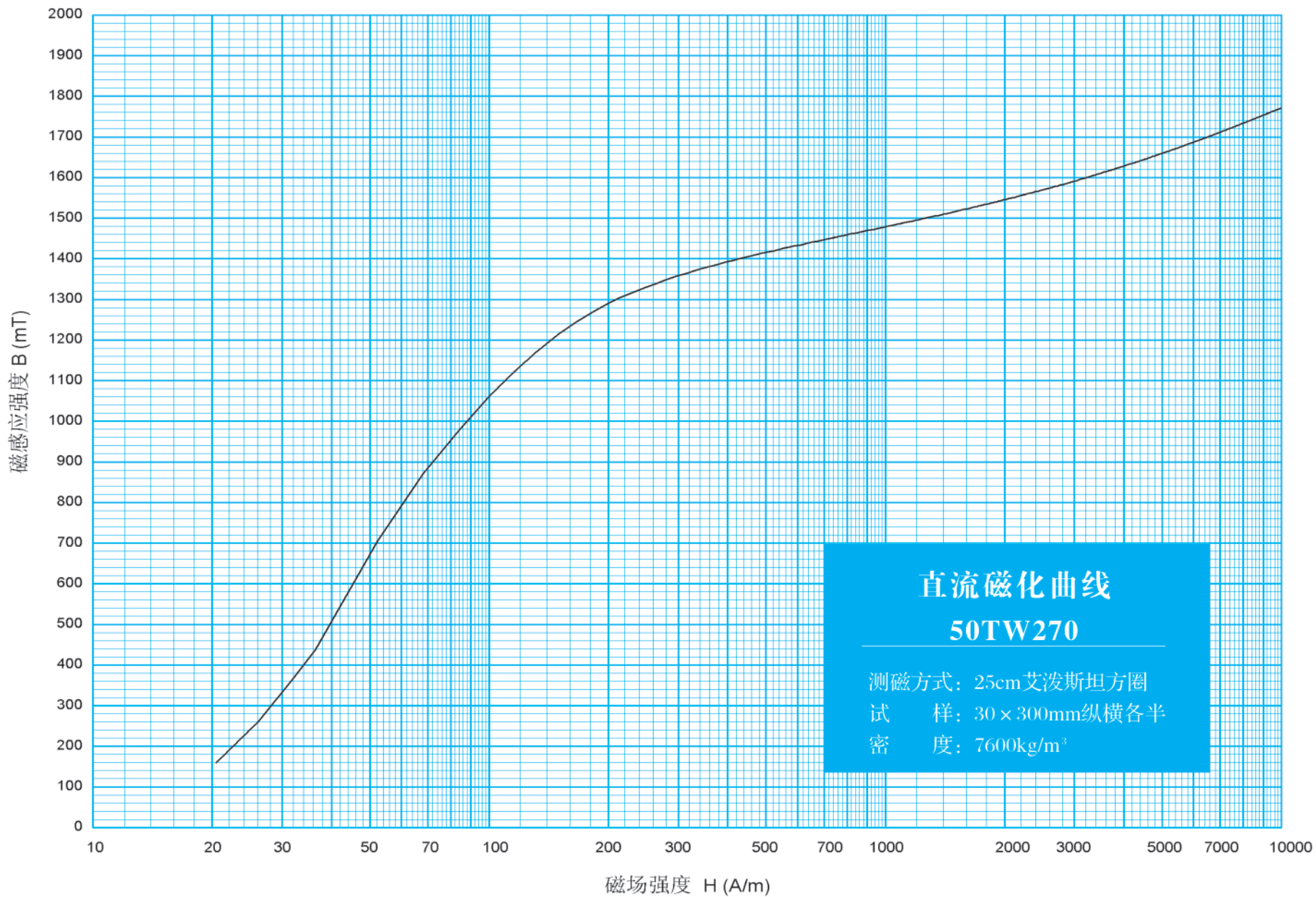




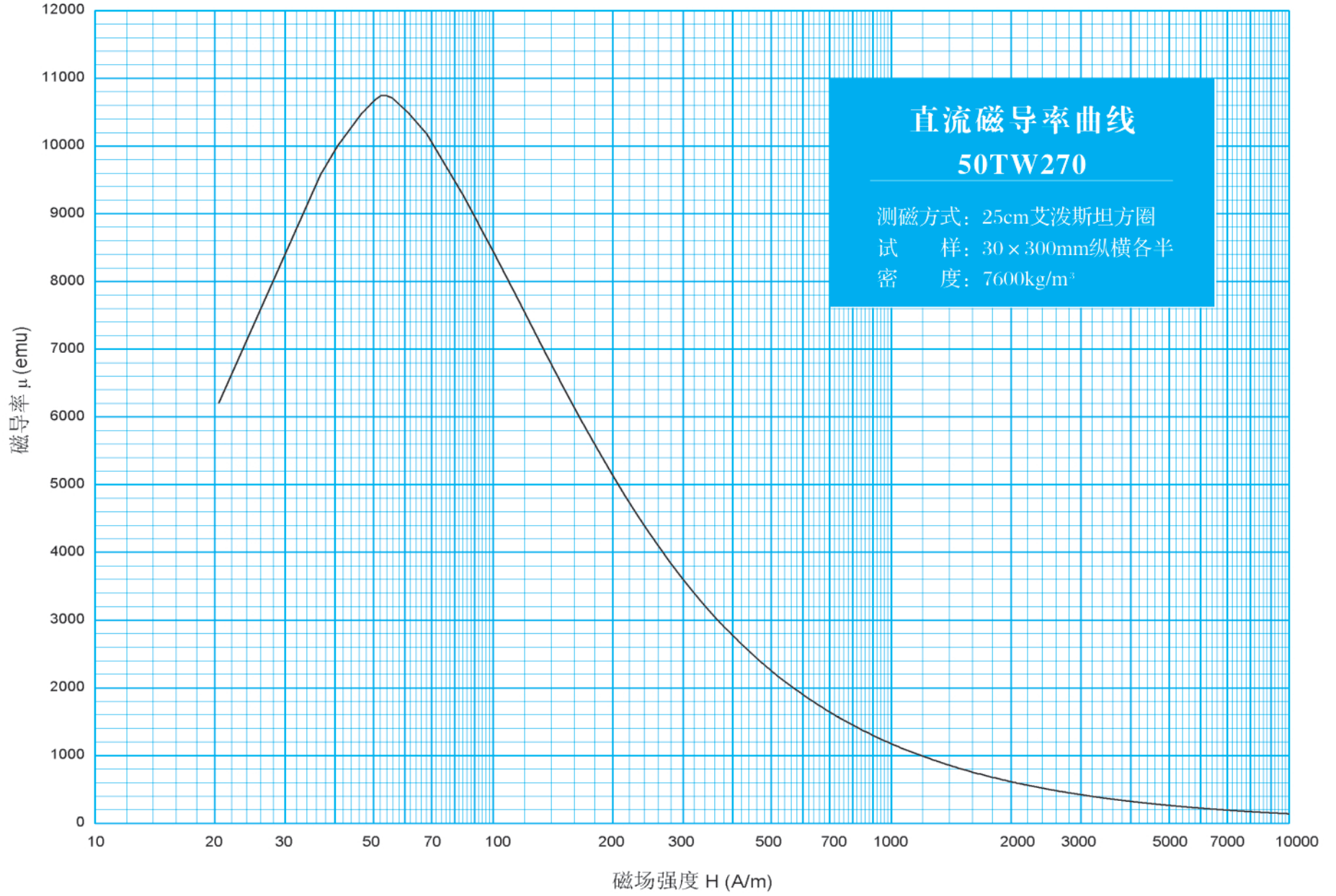




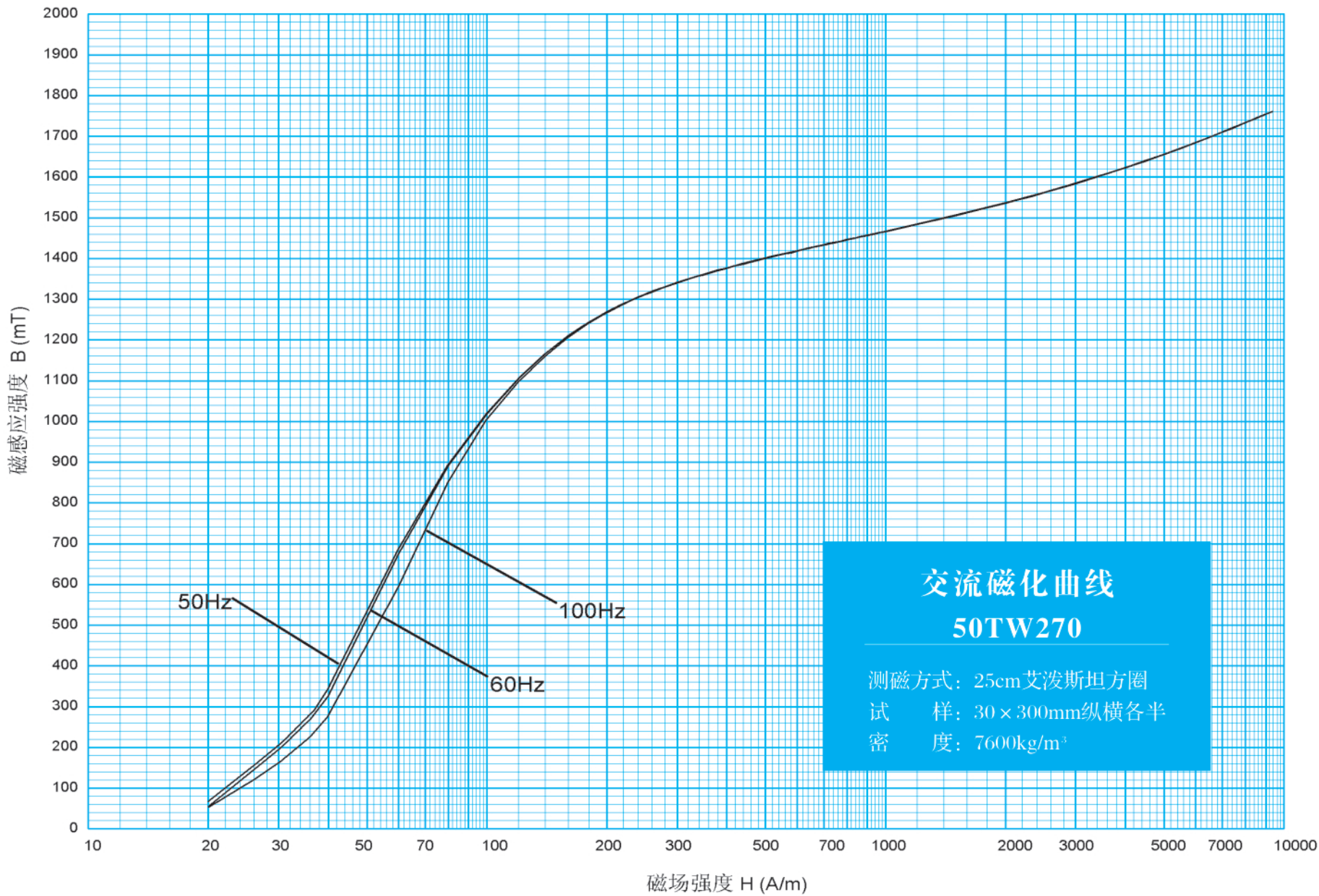
50TW270

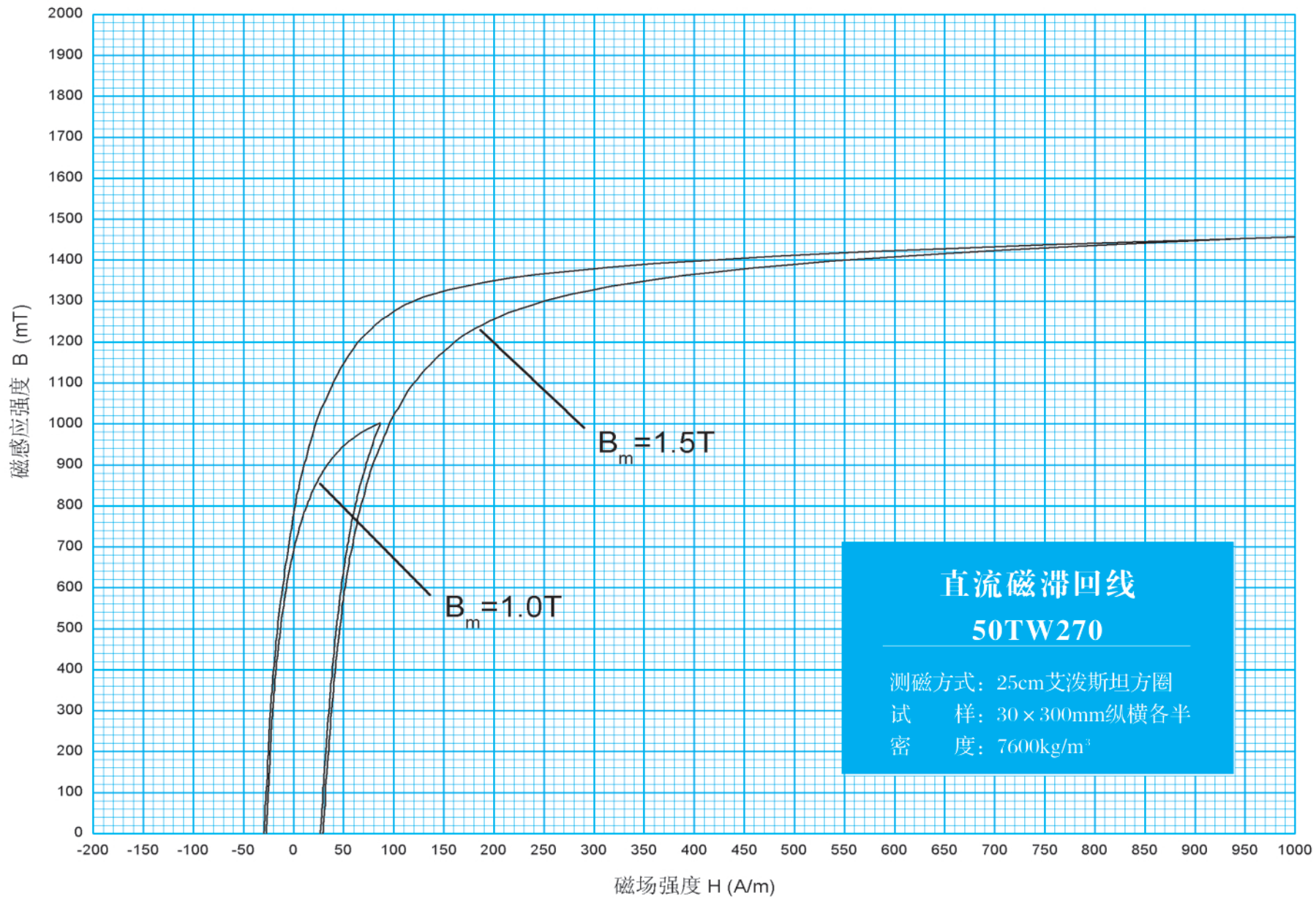




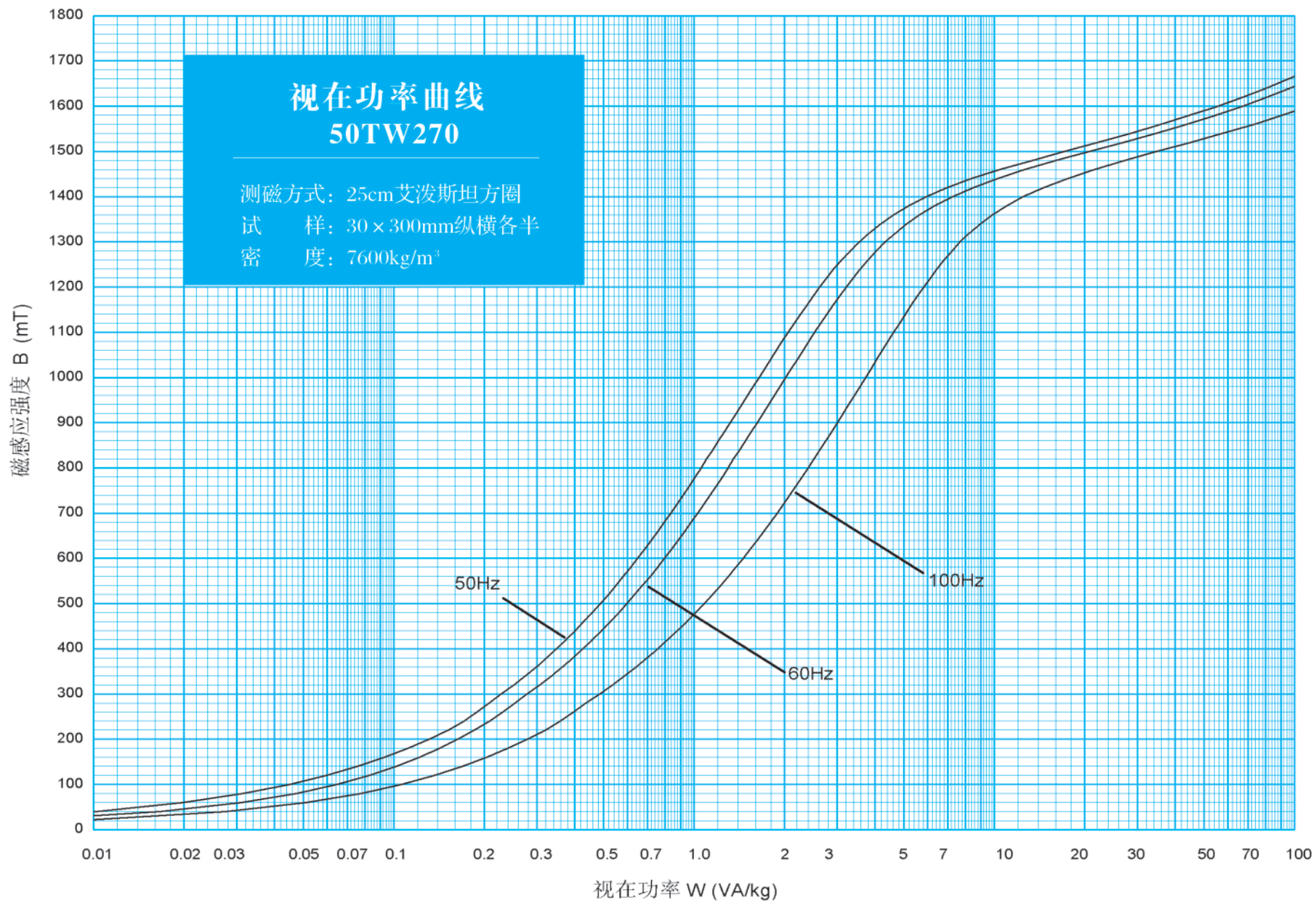


50TW270

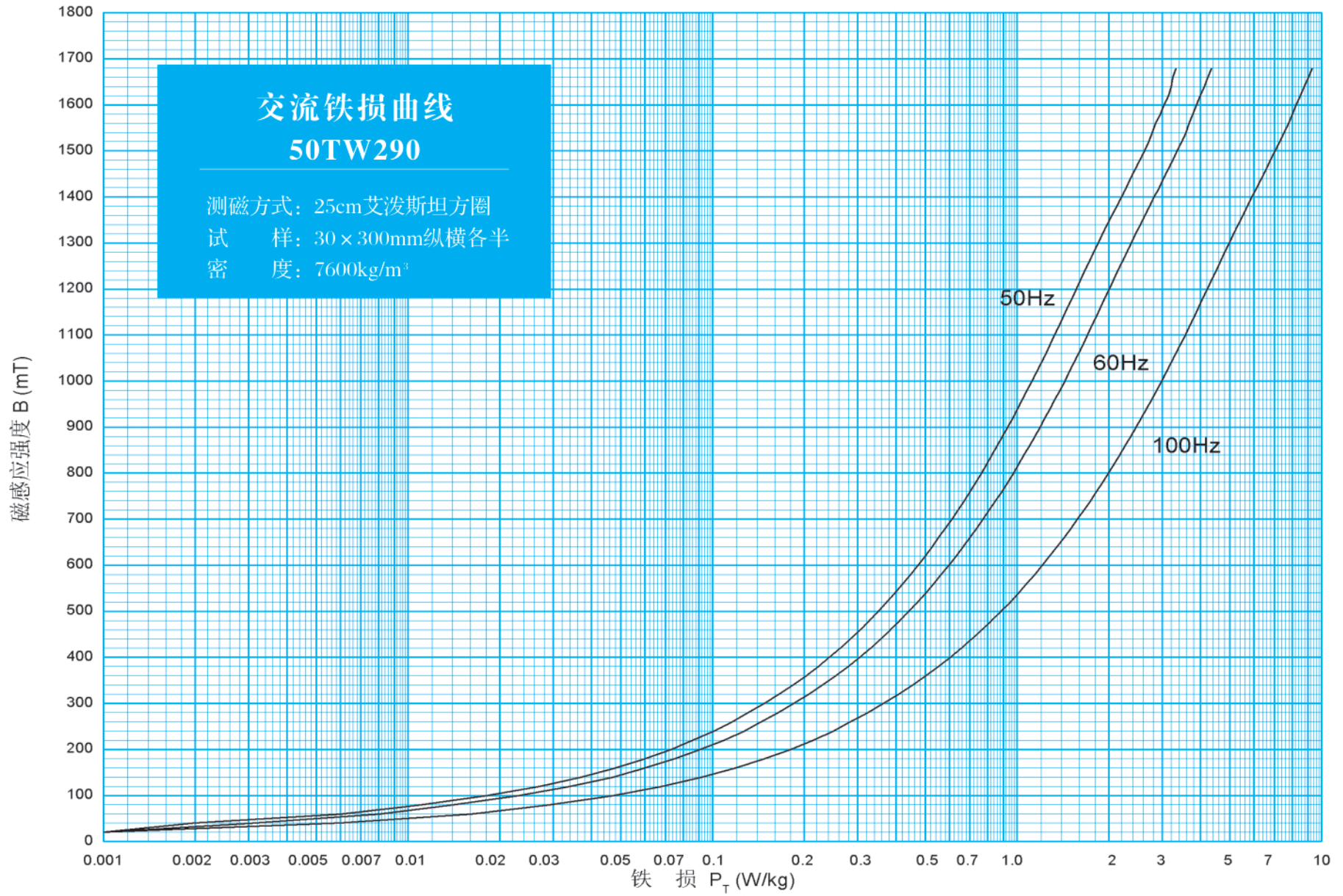




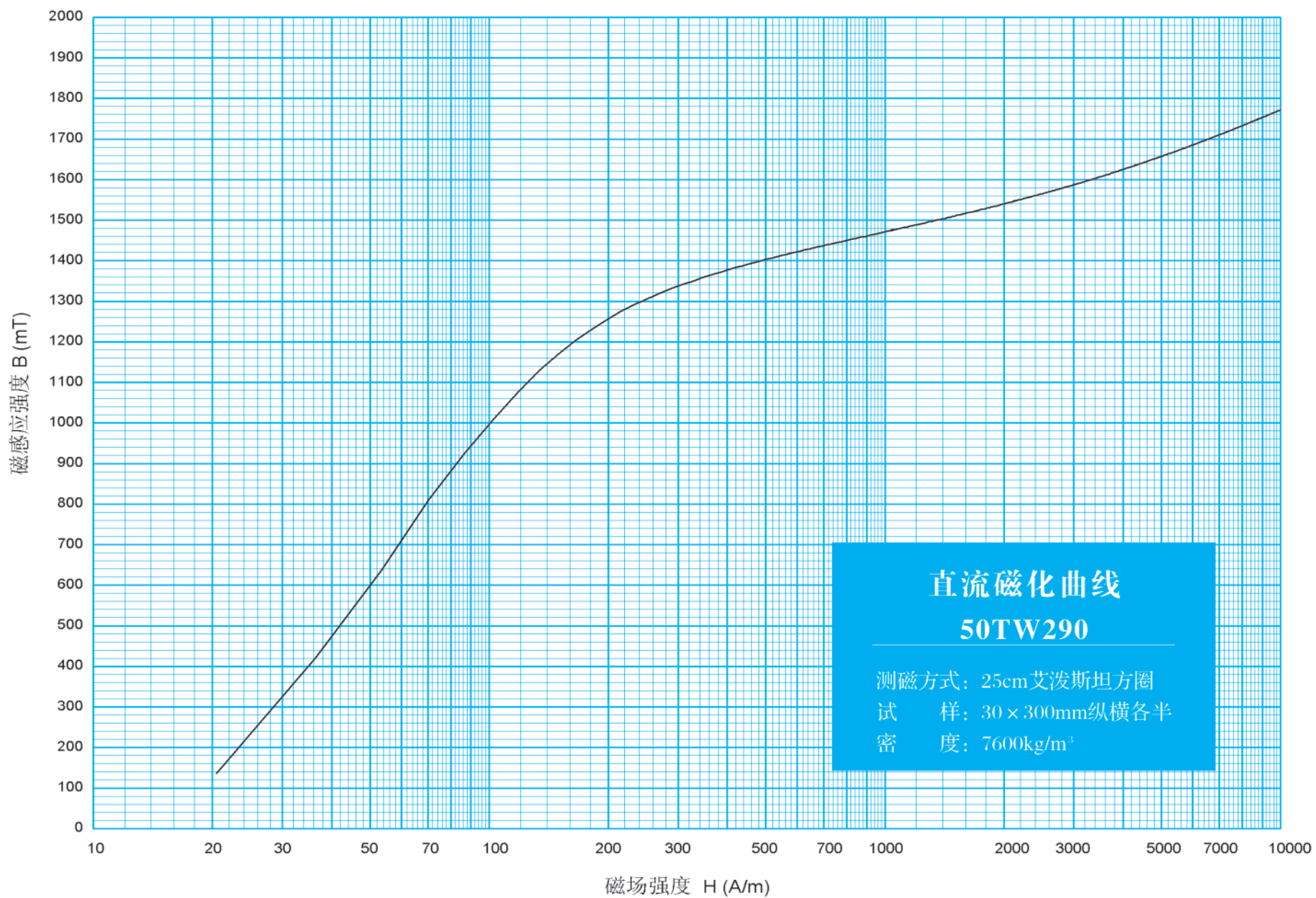
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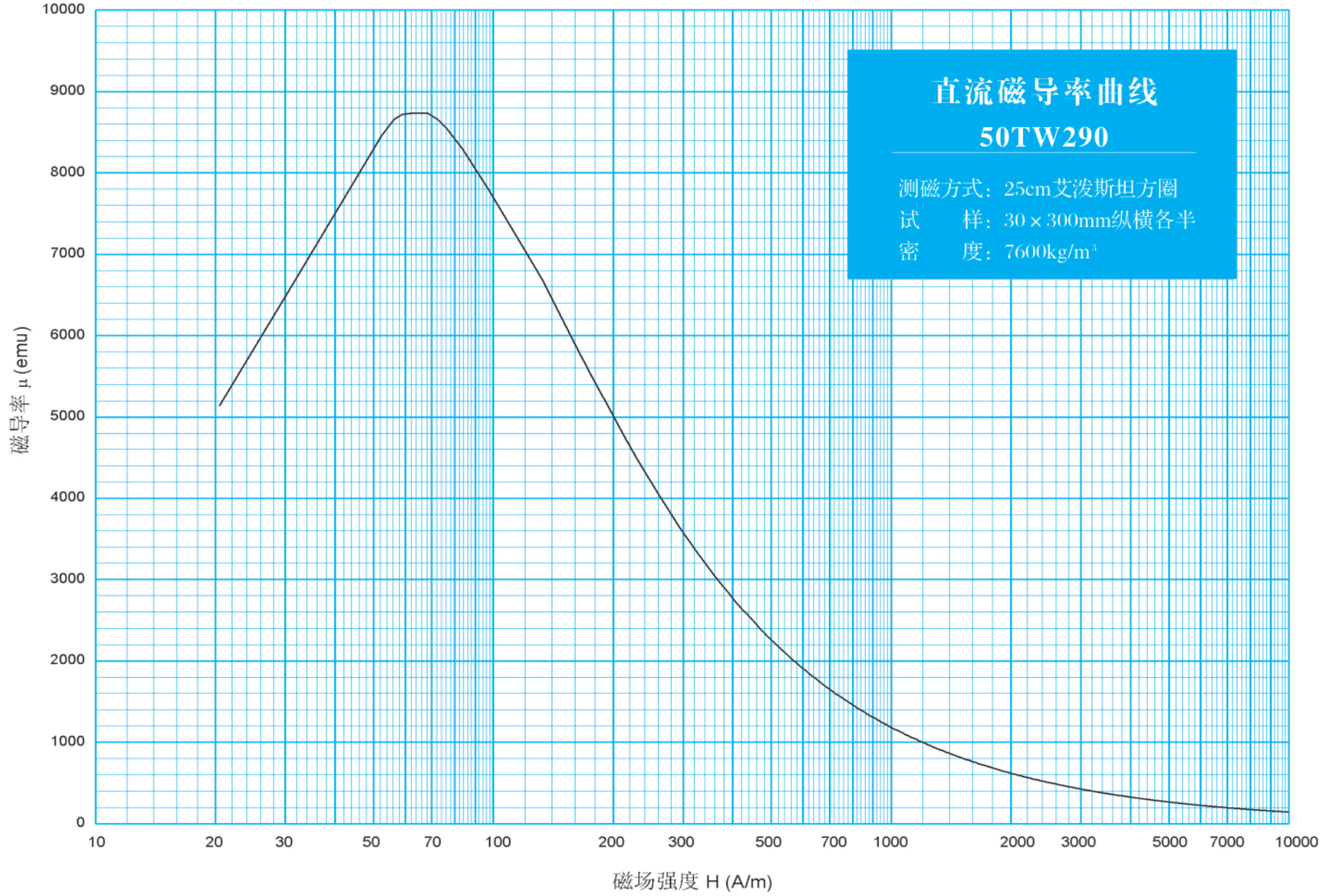


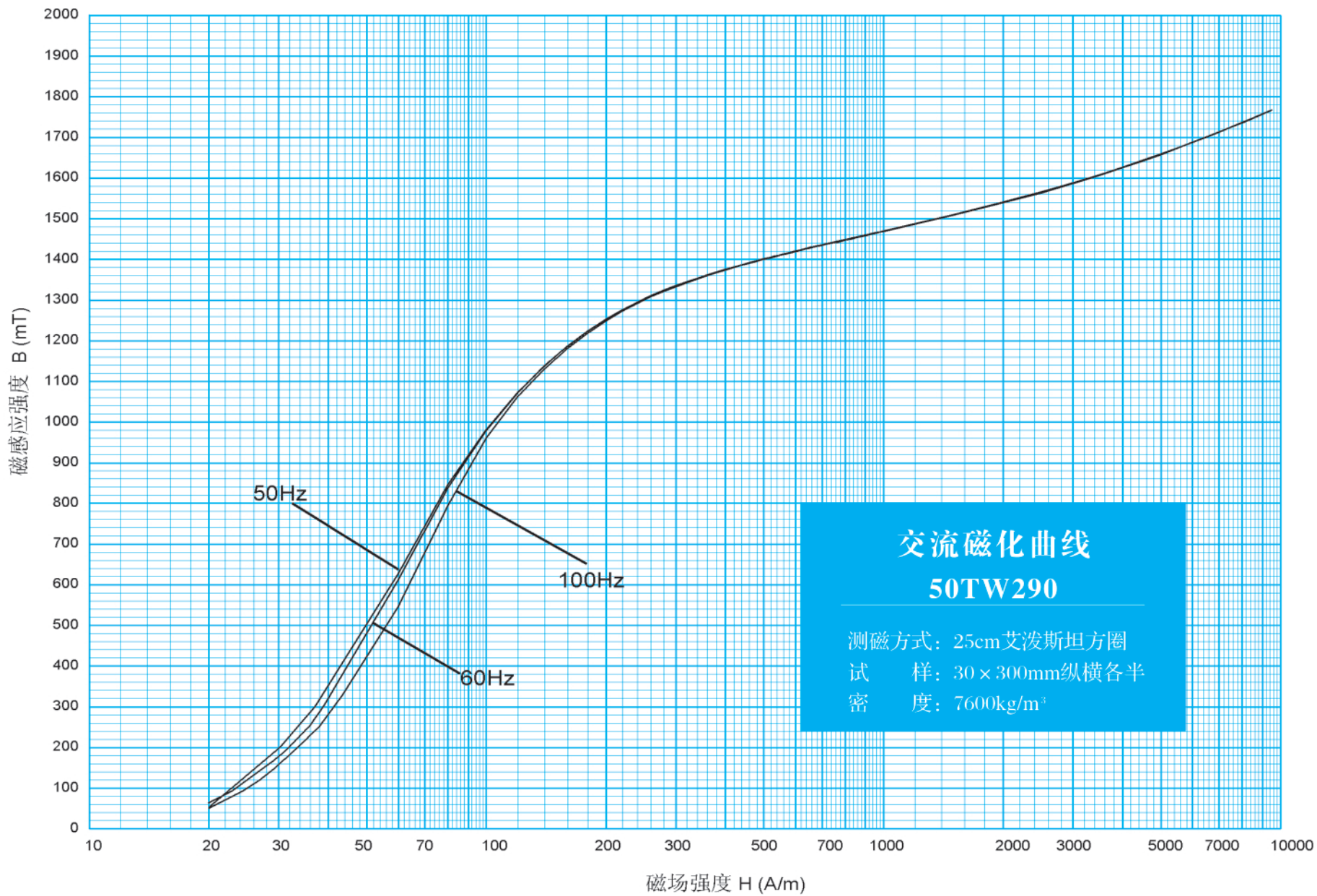




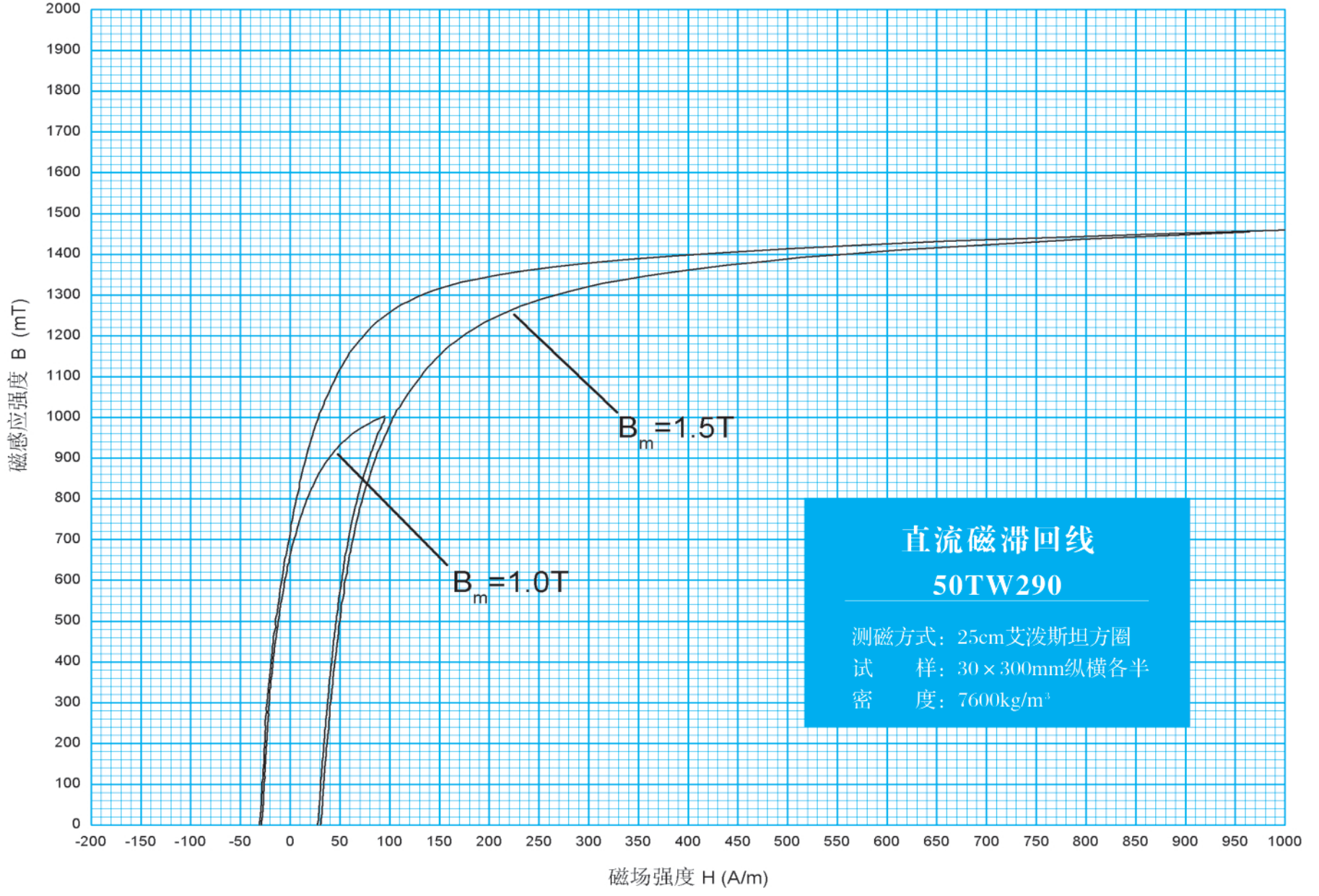
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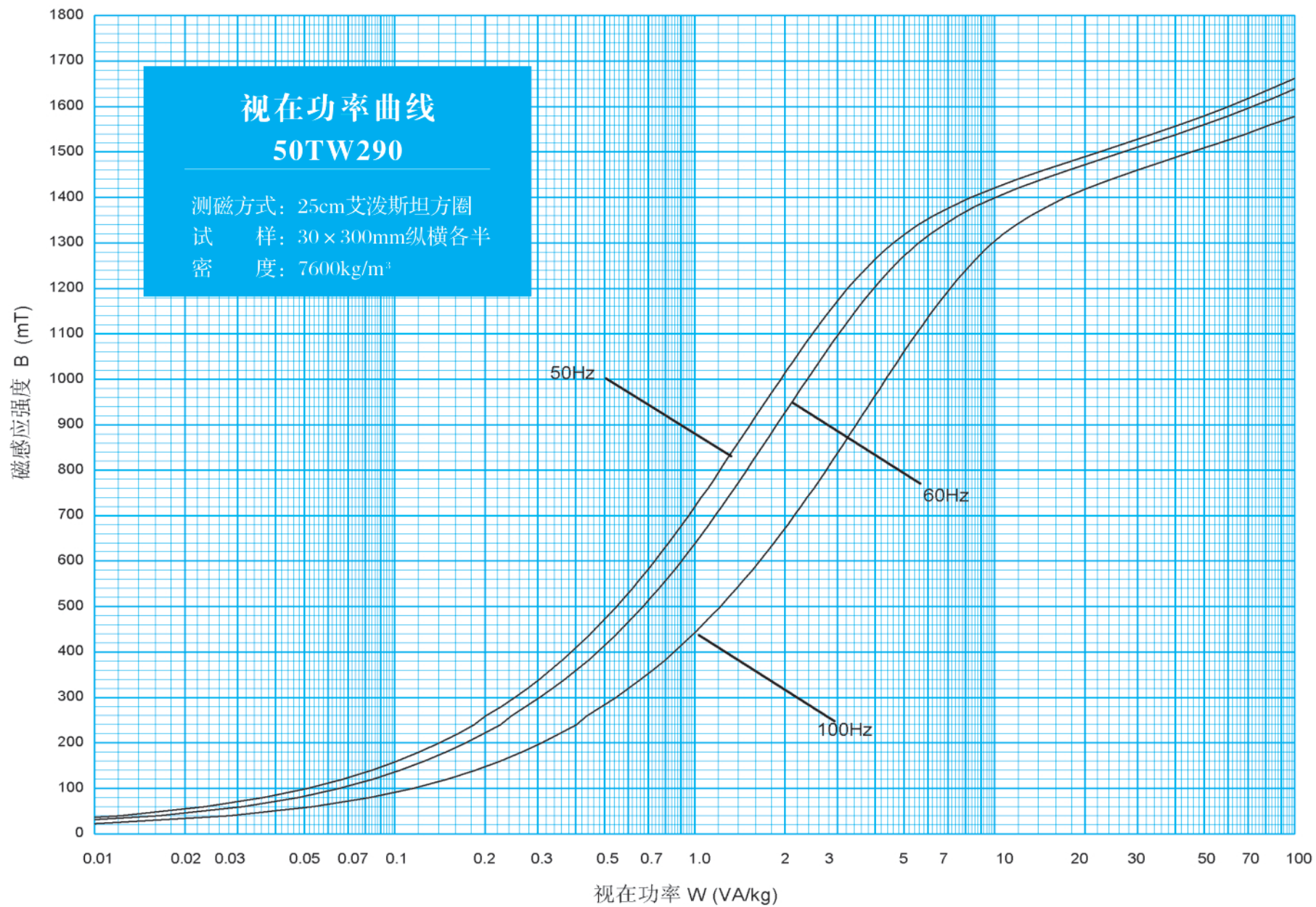


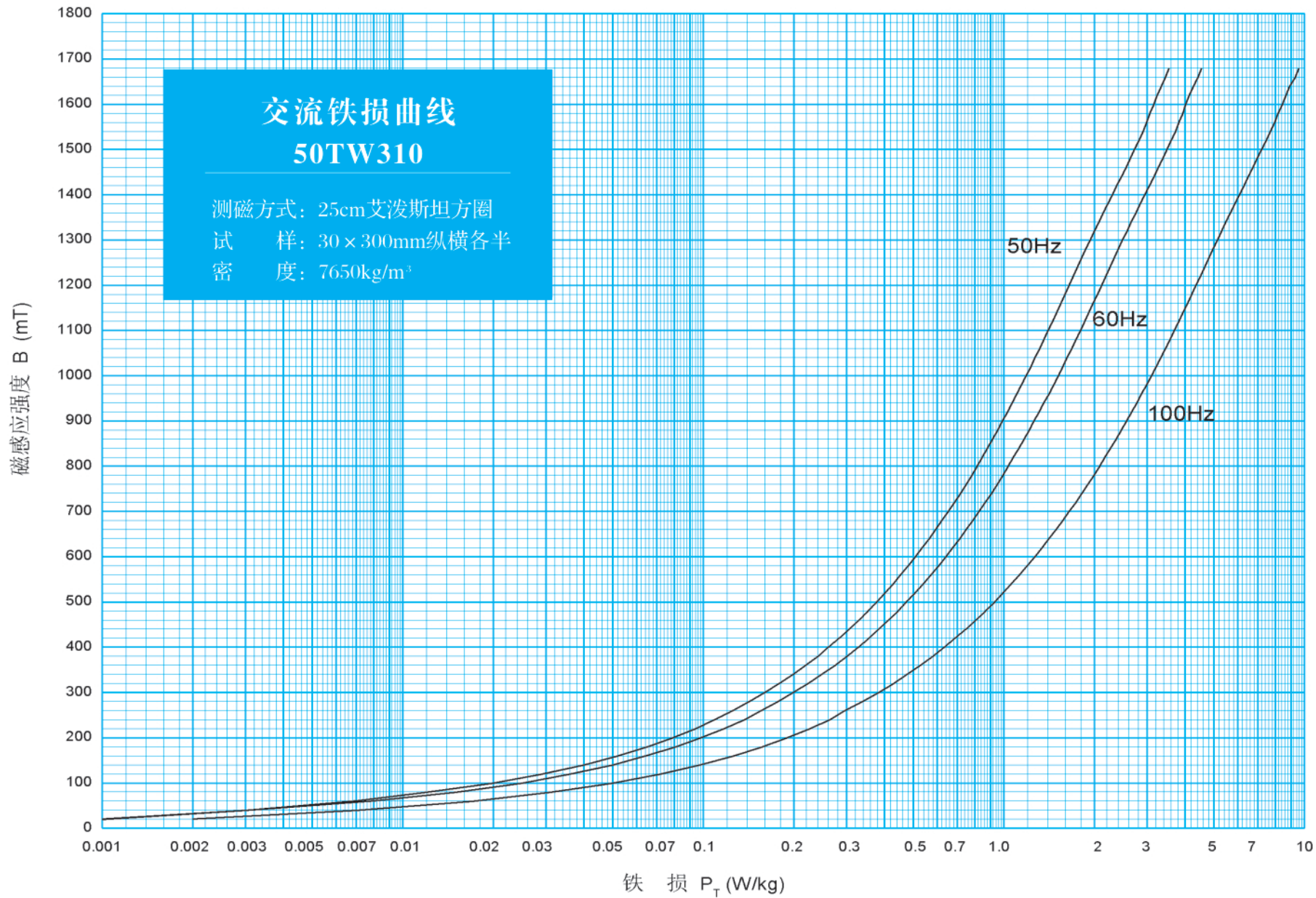




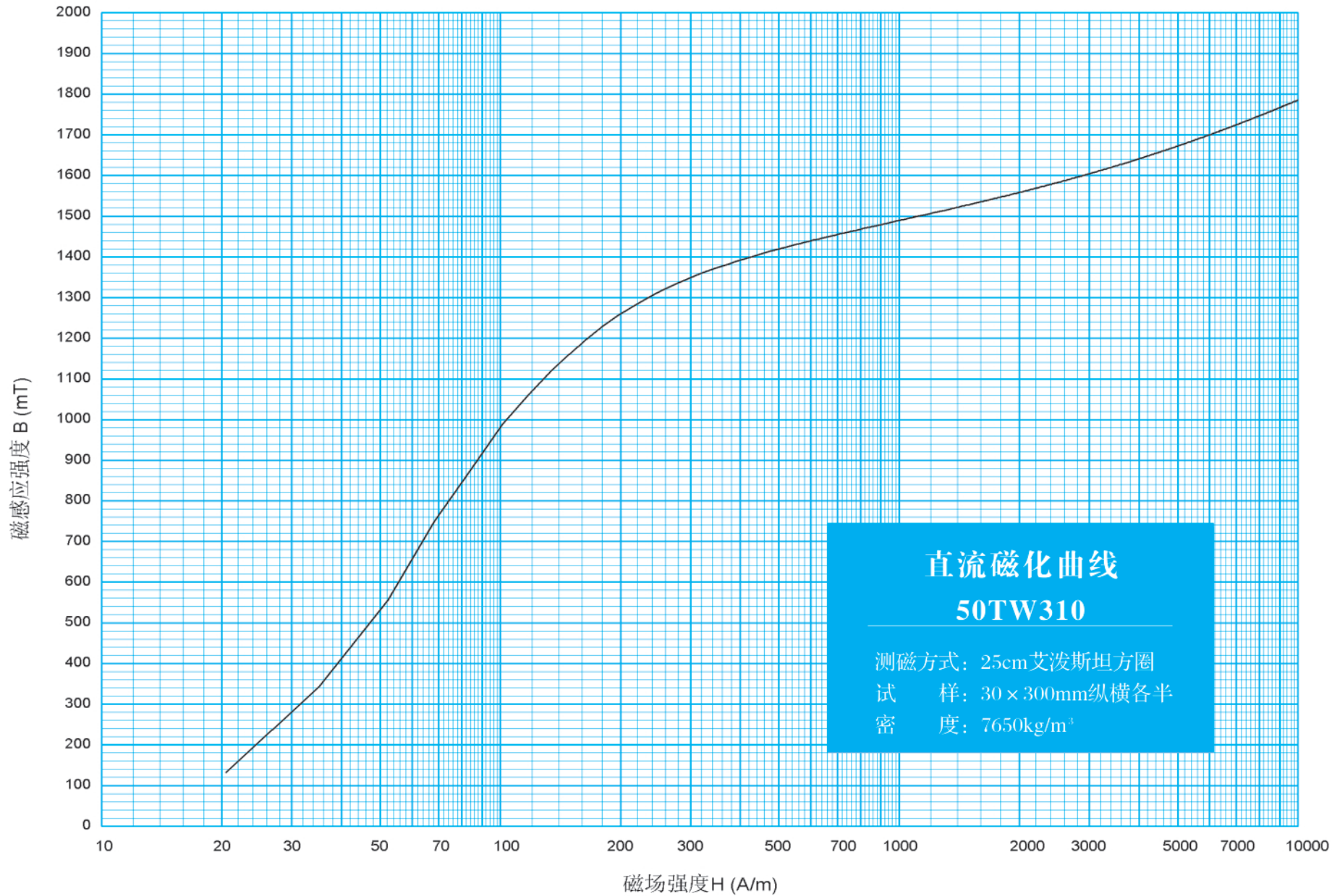




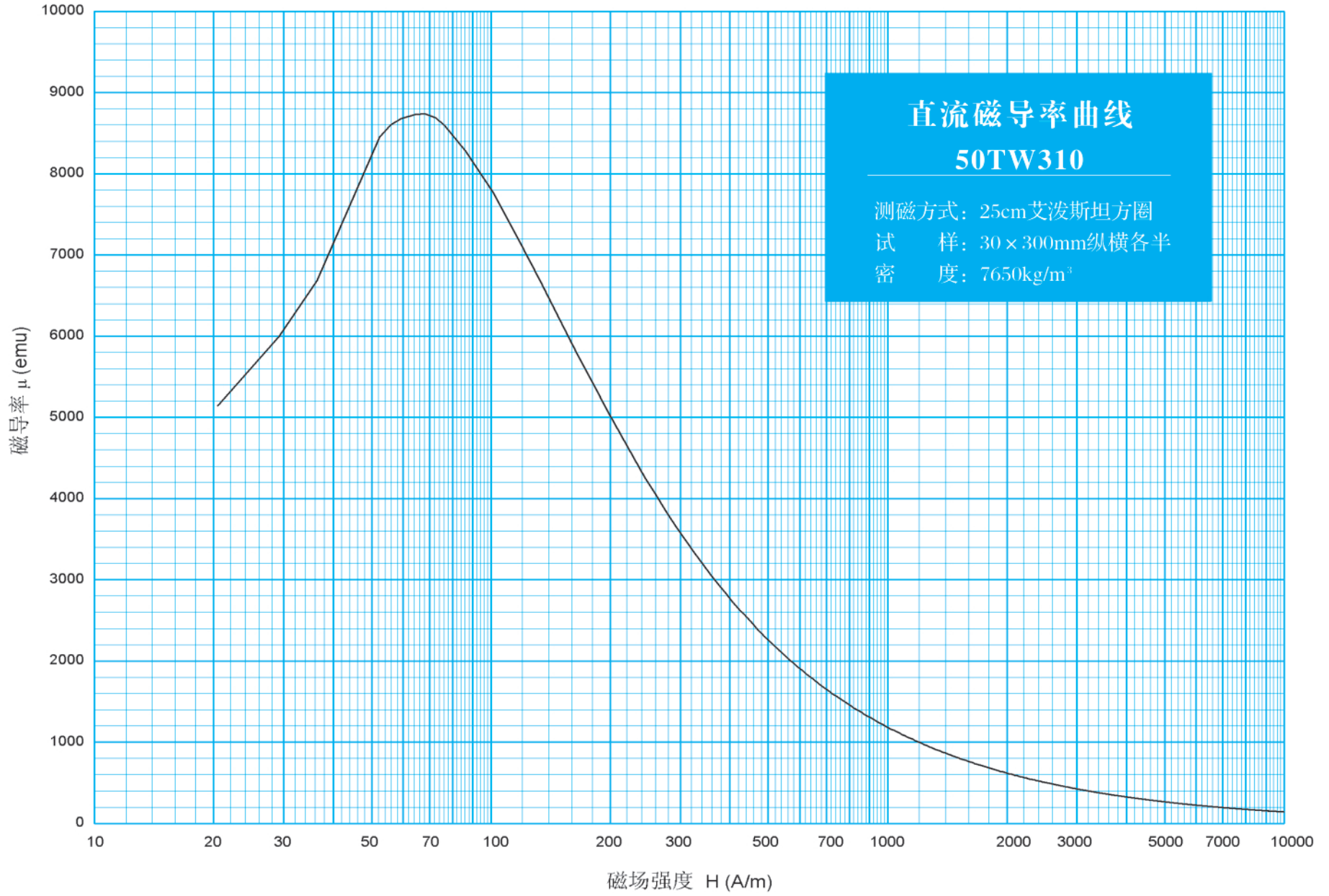




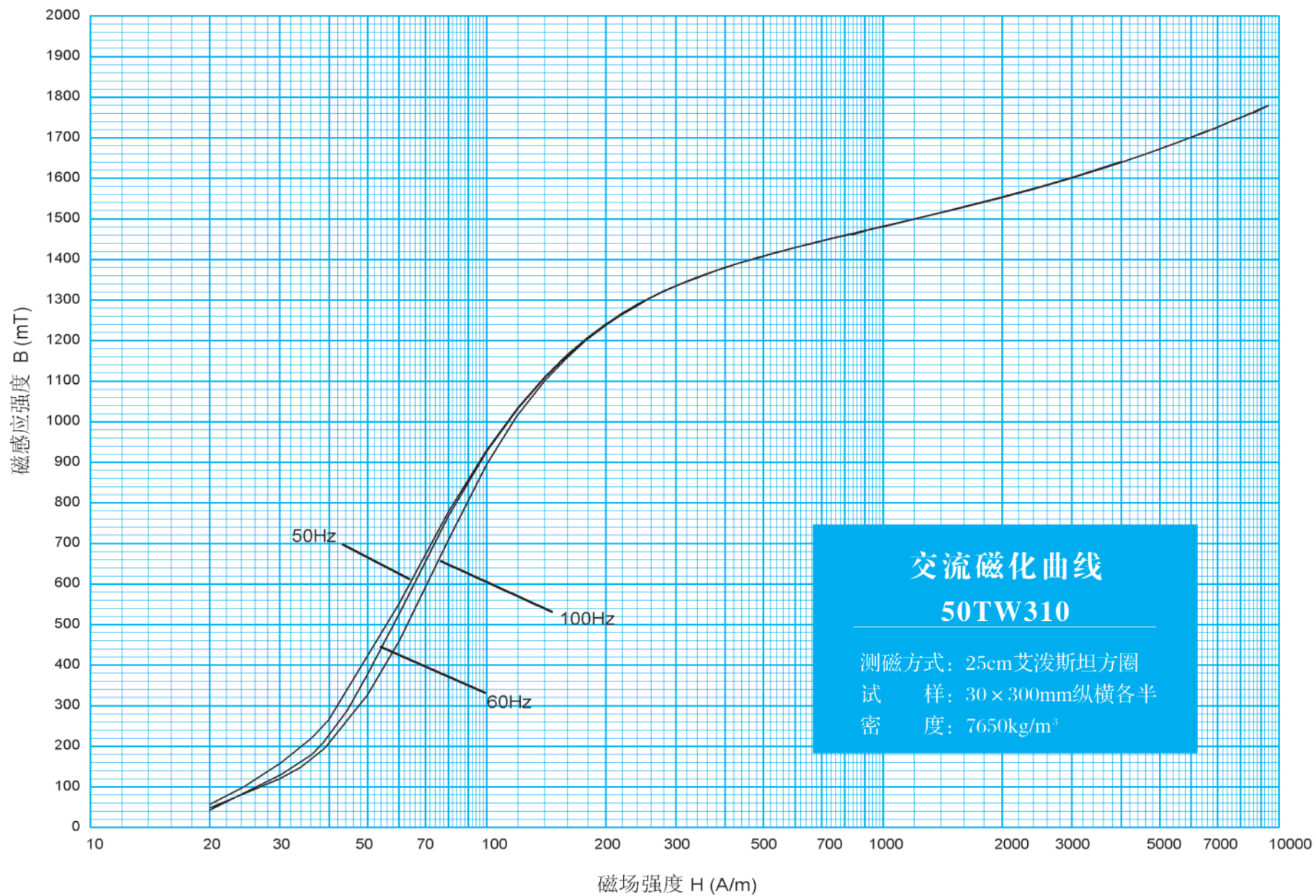
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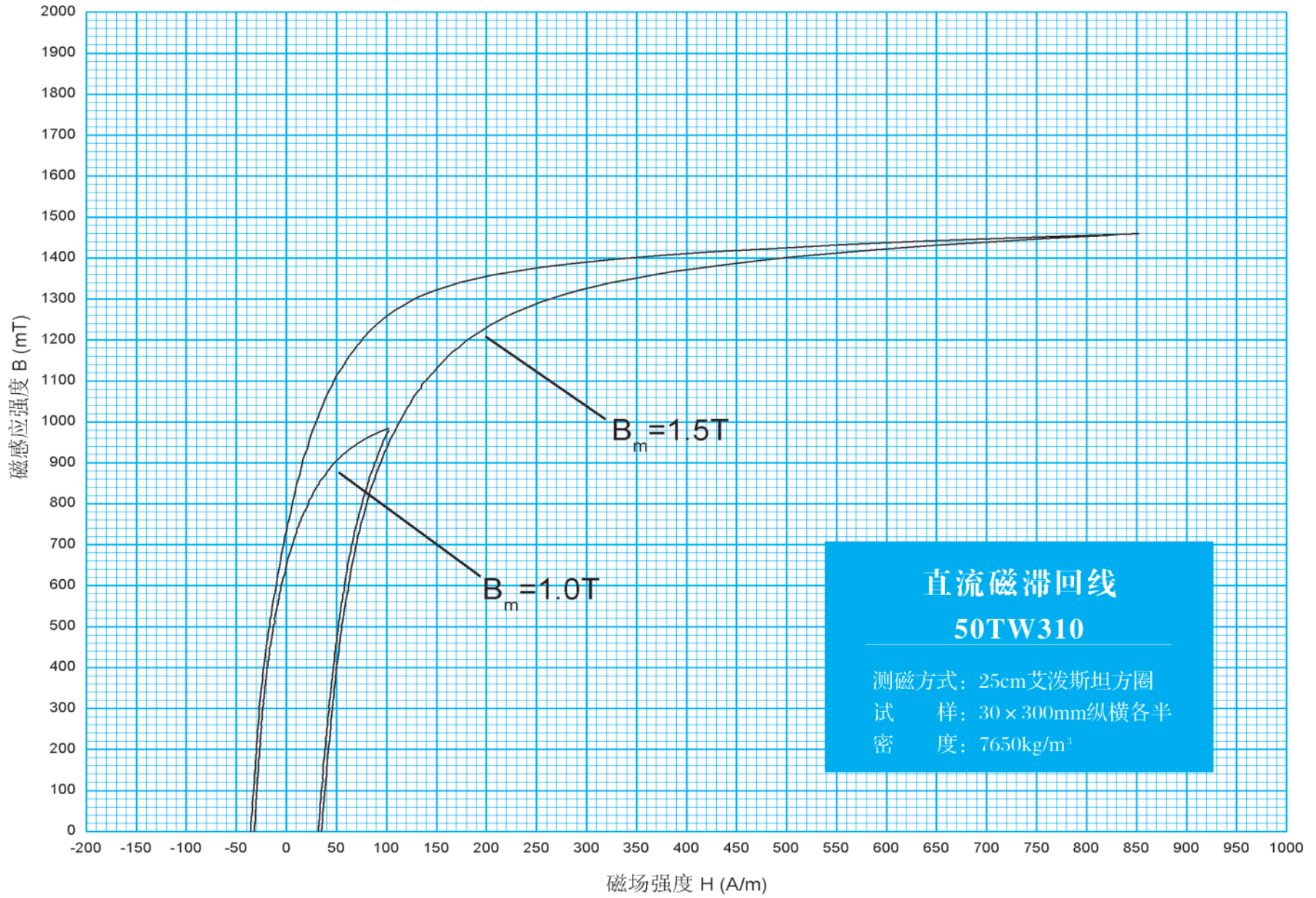


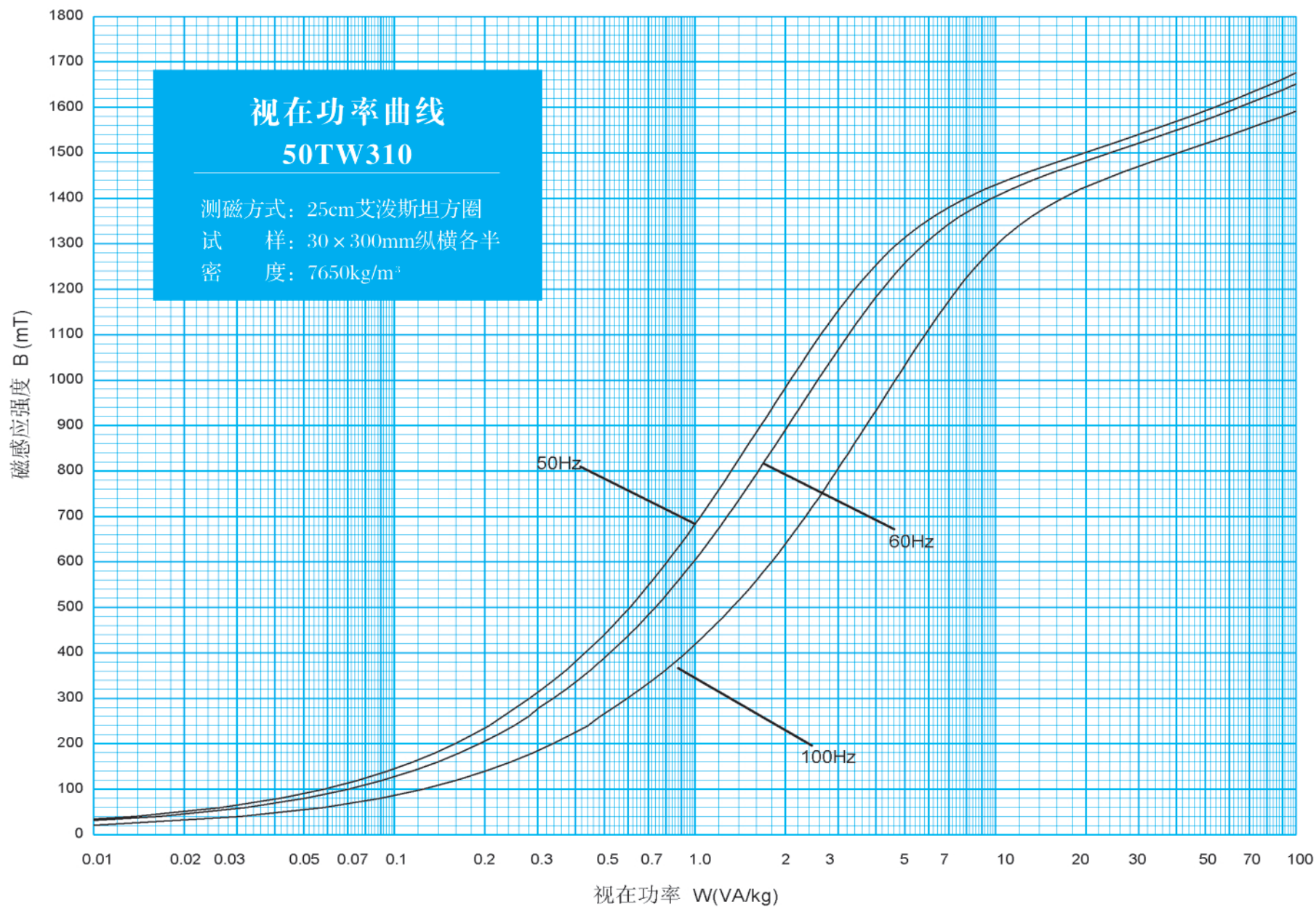




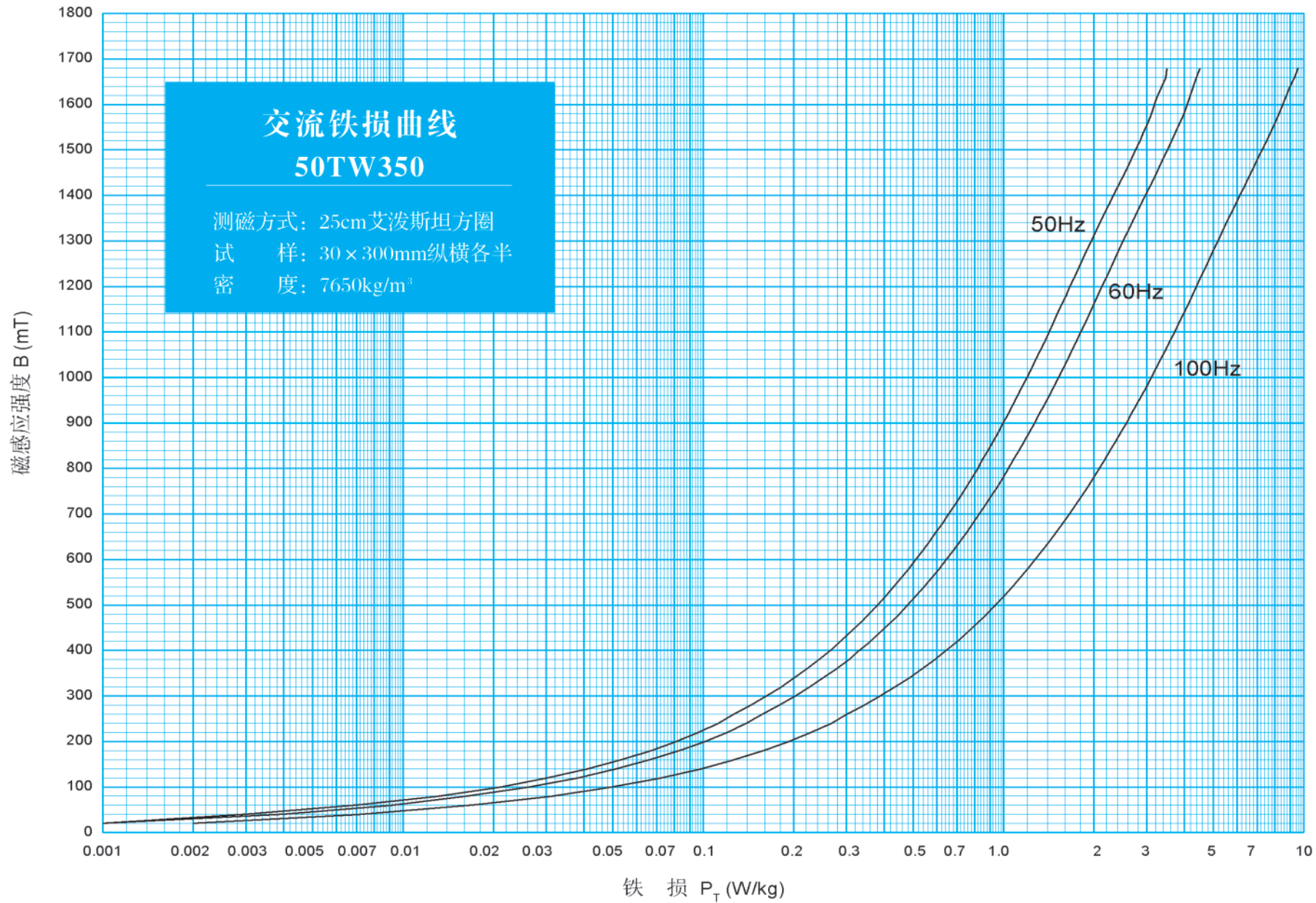
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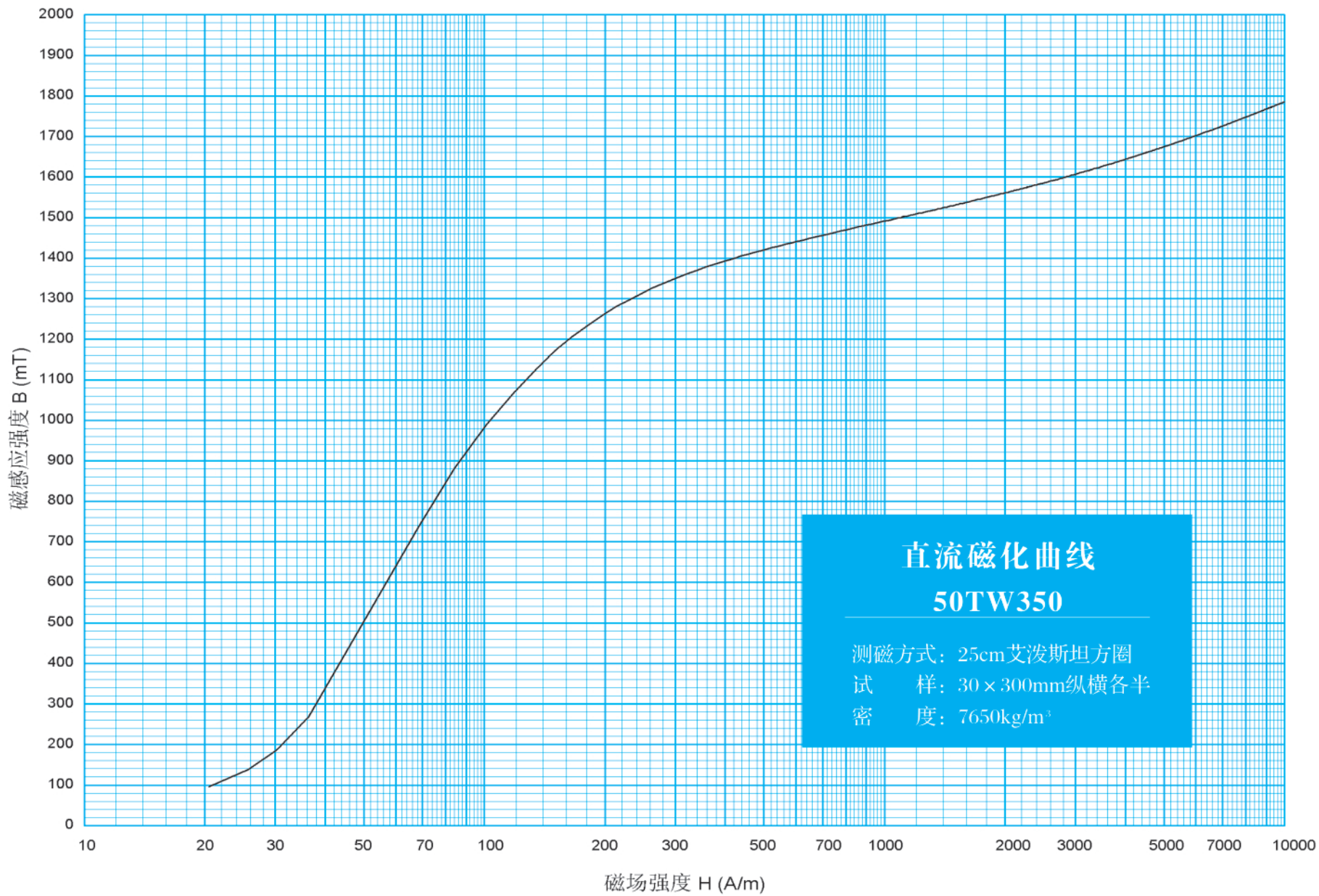


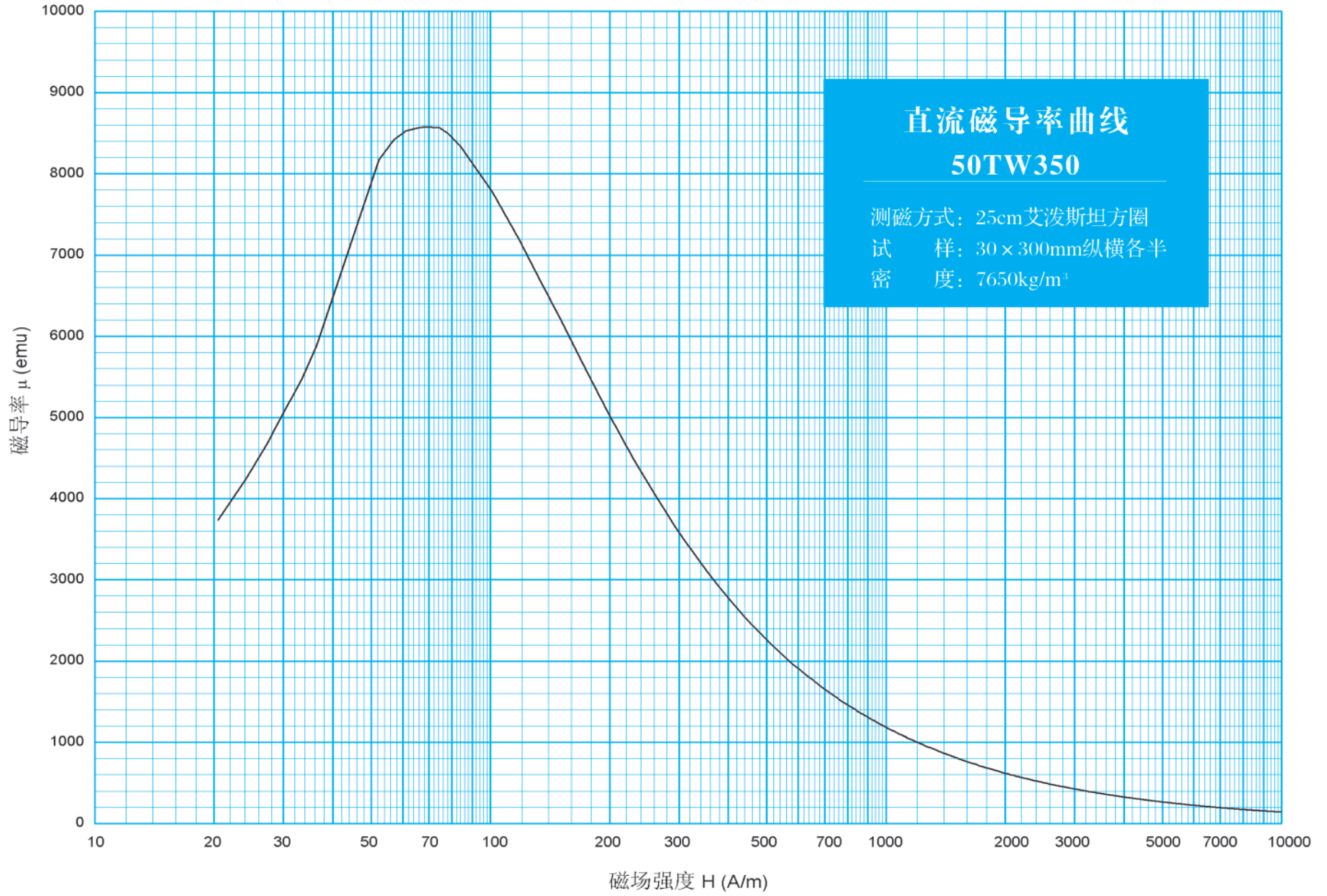




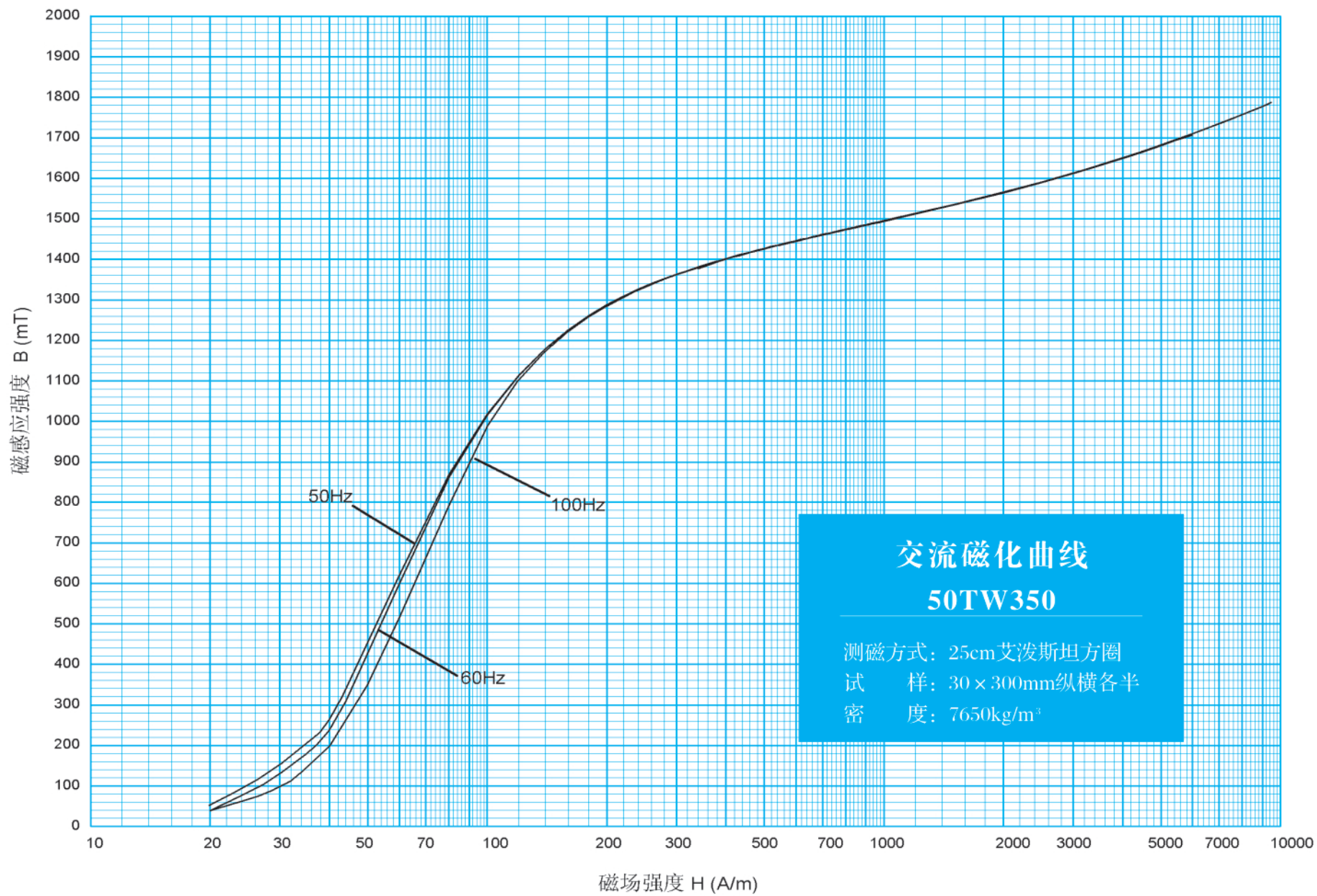


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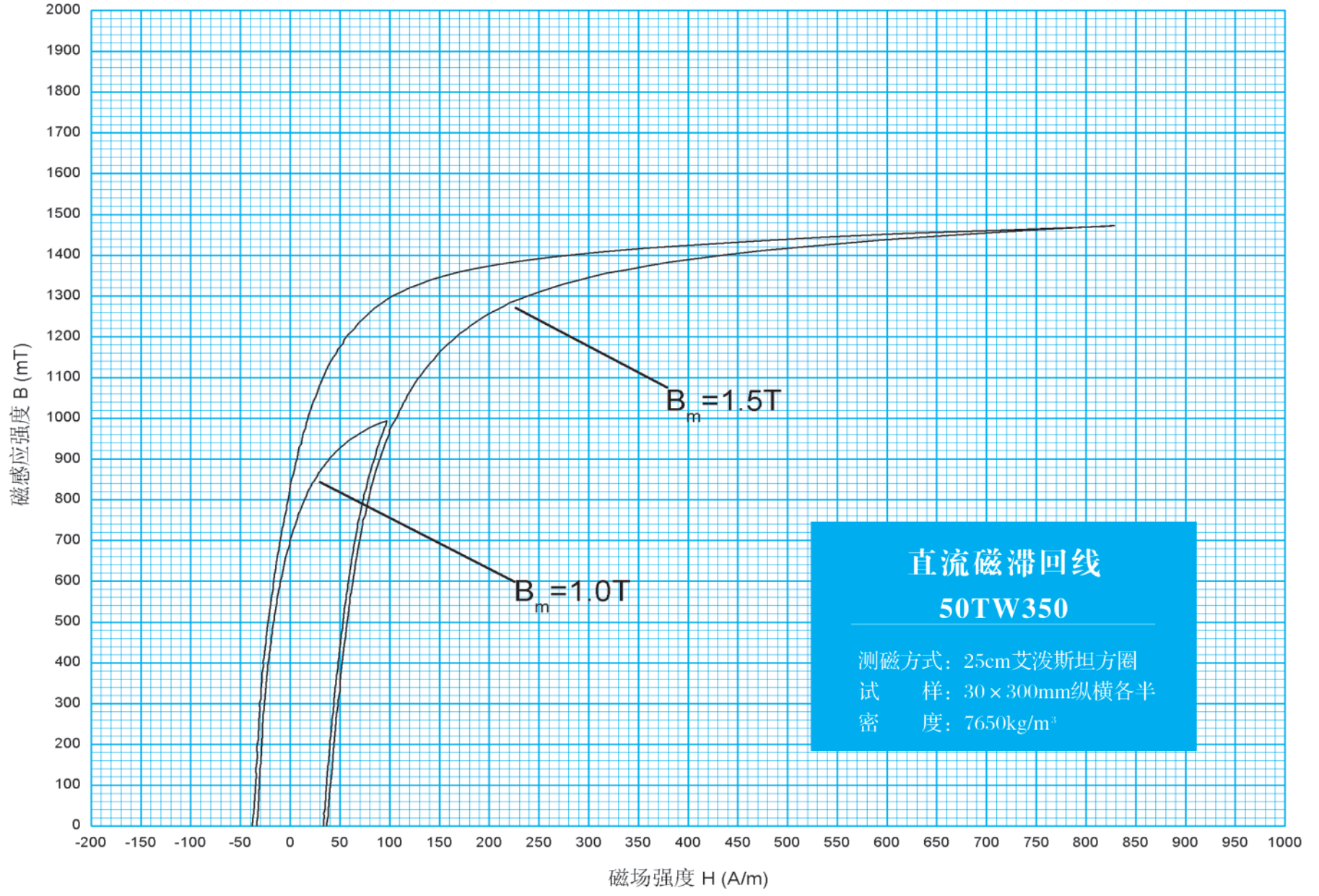


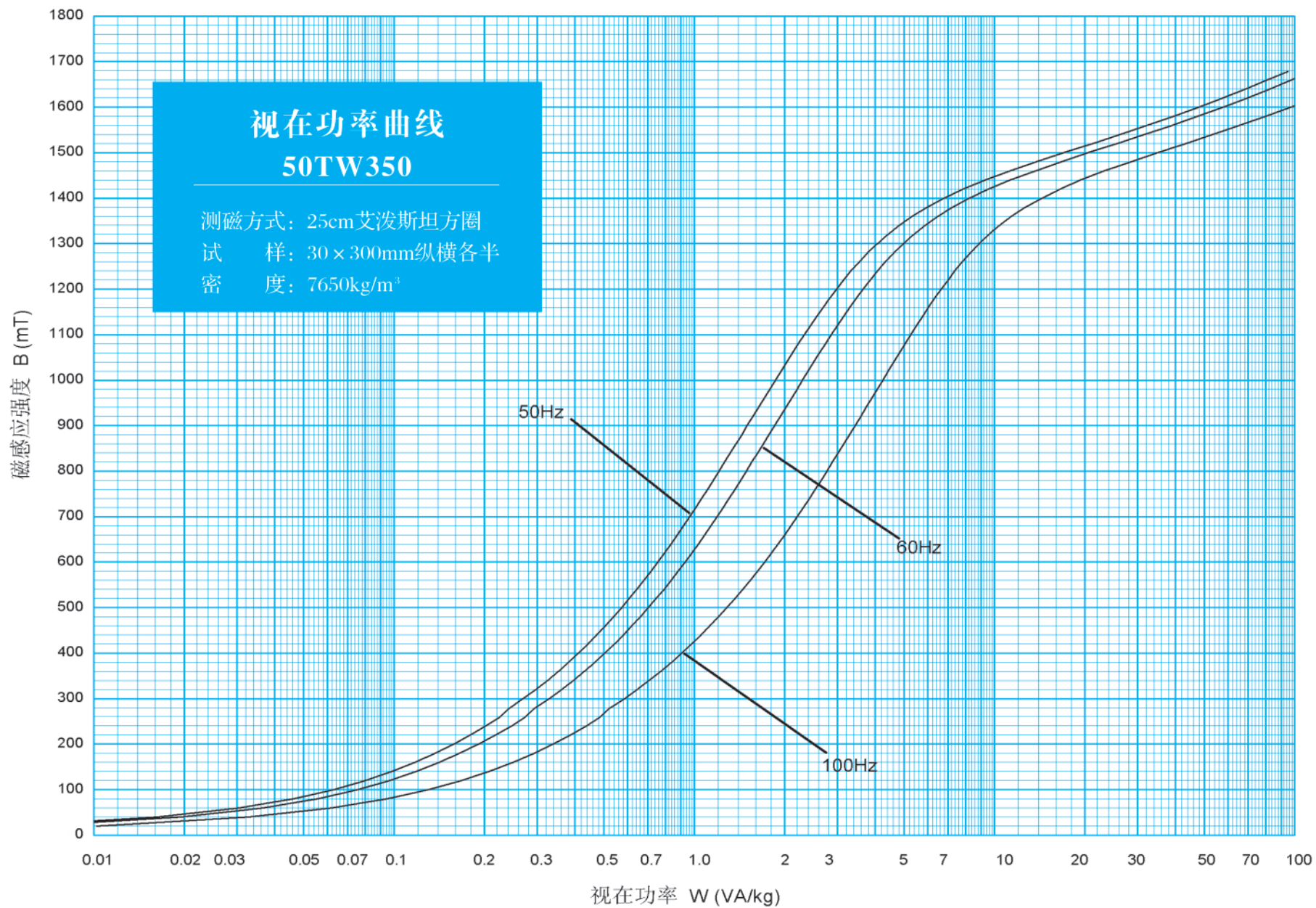


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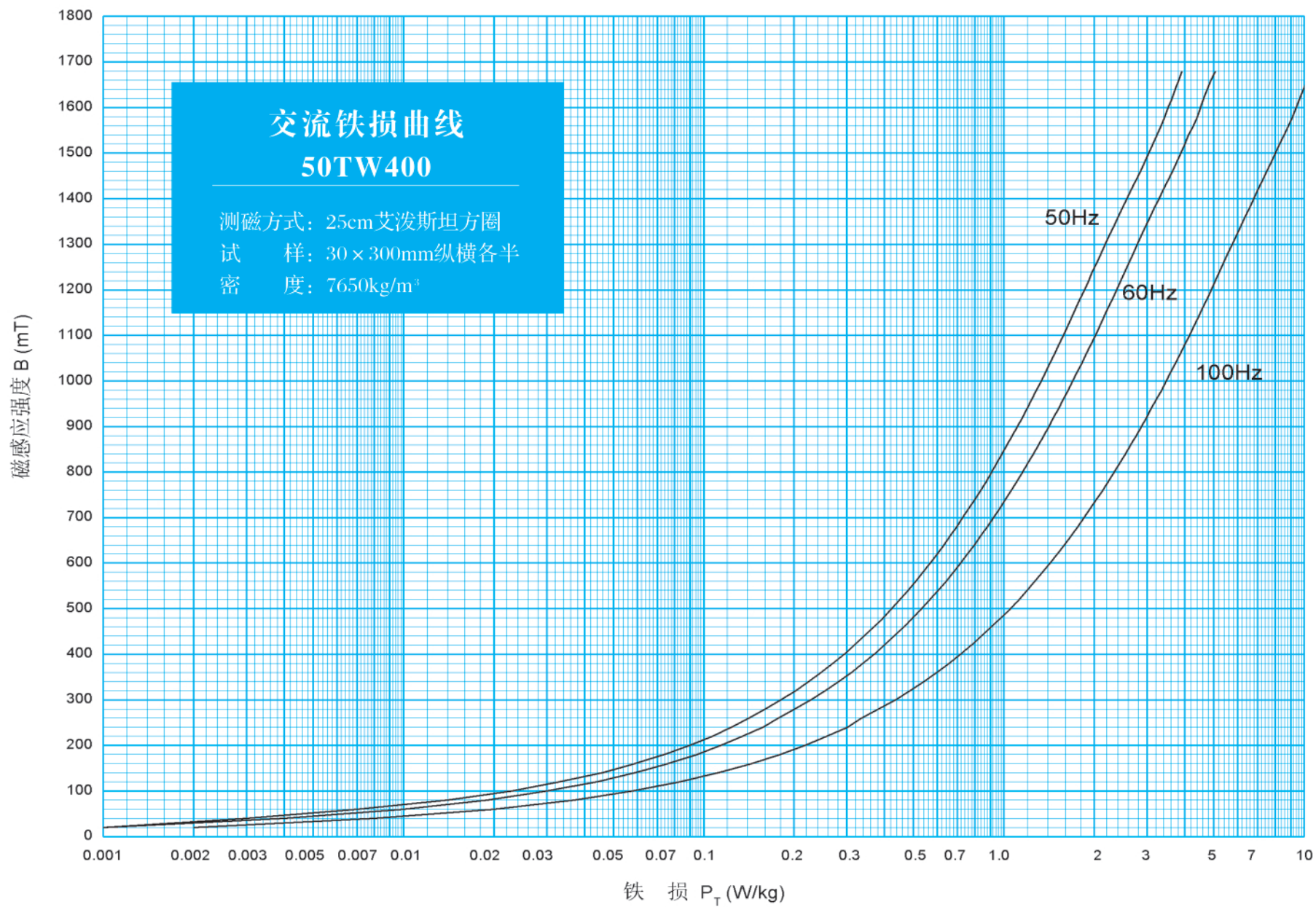




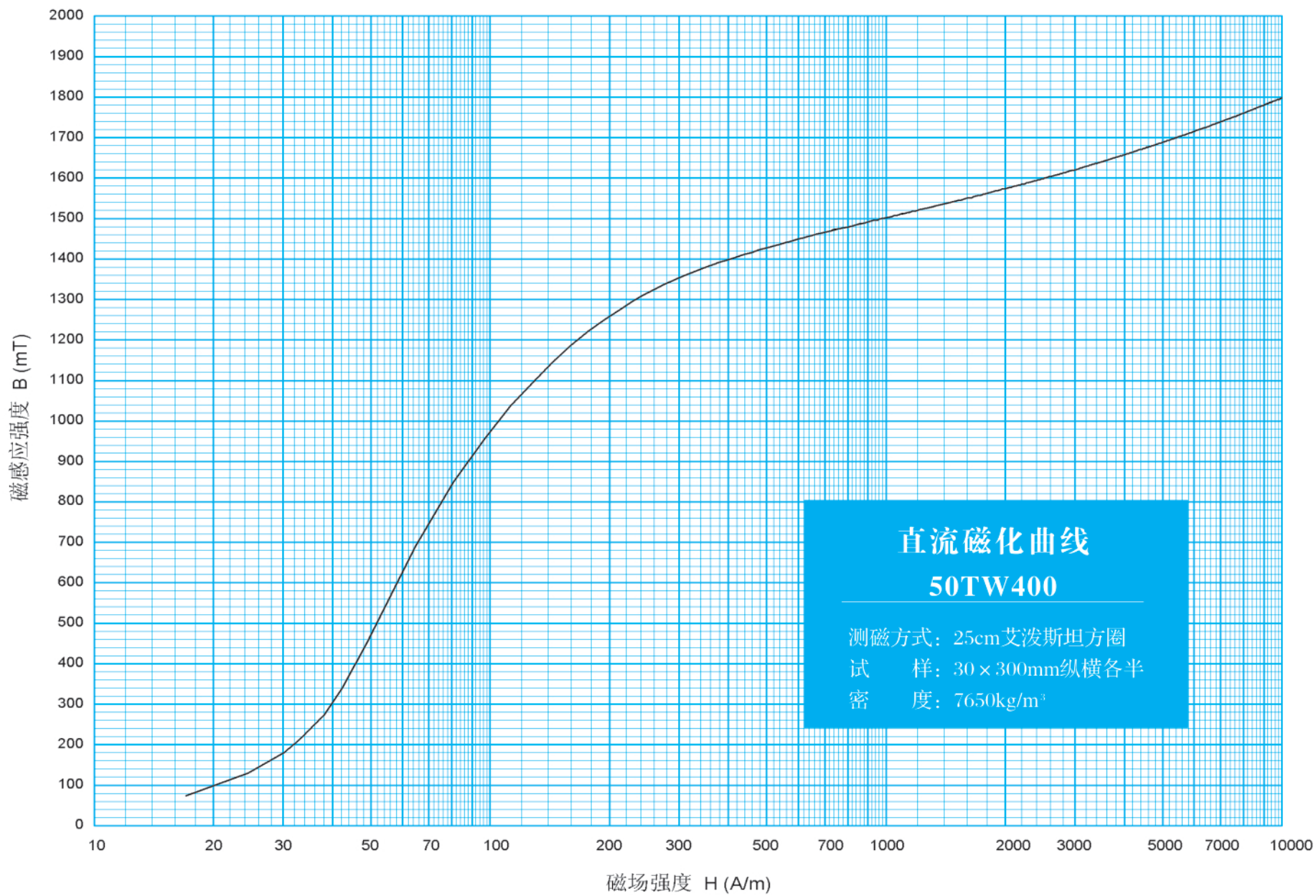


## 交流铁损曲线 50TW400

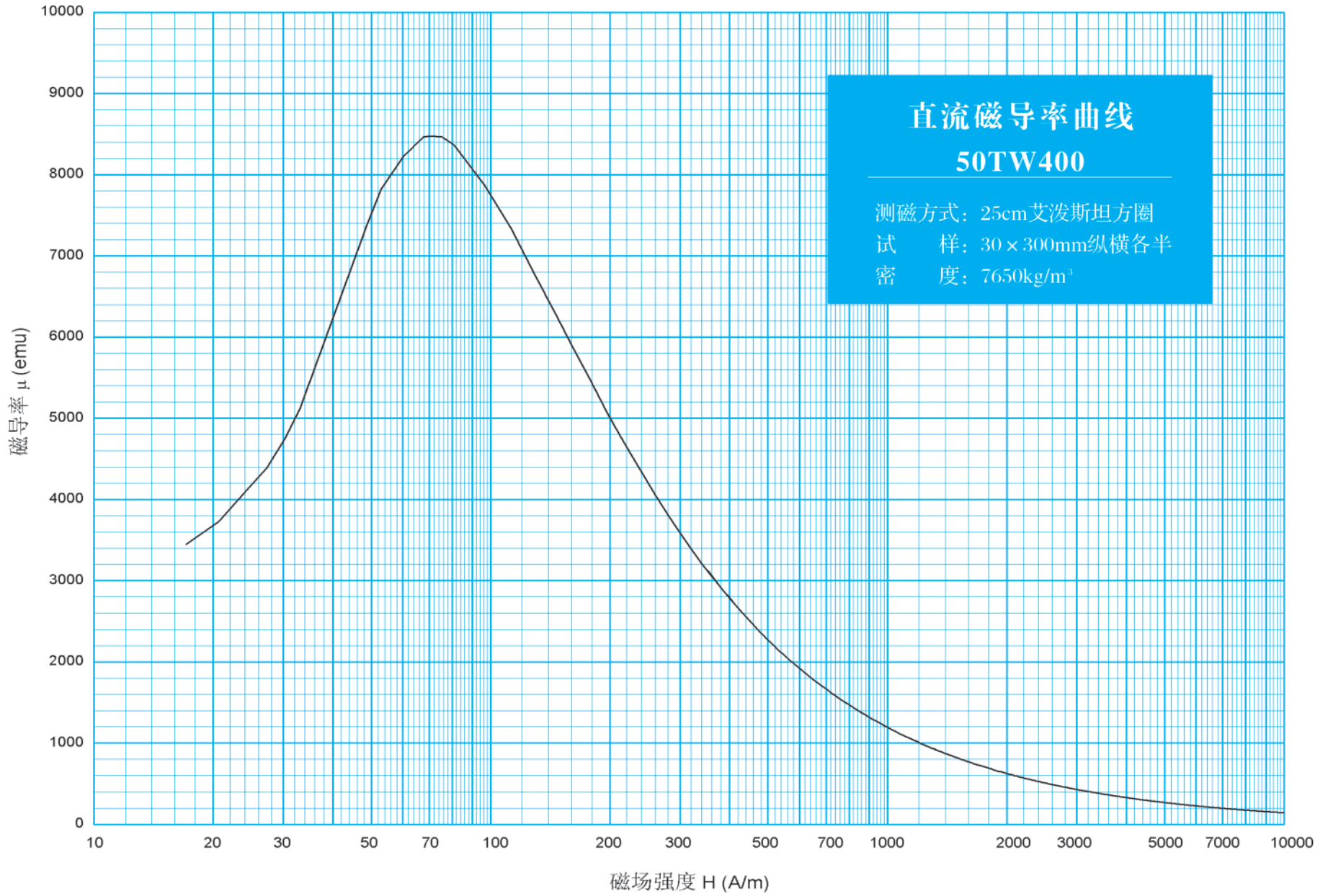
测磁方式：25cm艾泼斯坦方圈  
试样：30×30mm纵横各半  
密度：7650kg/m<sup>3</sup>

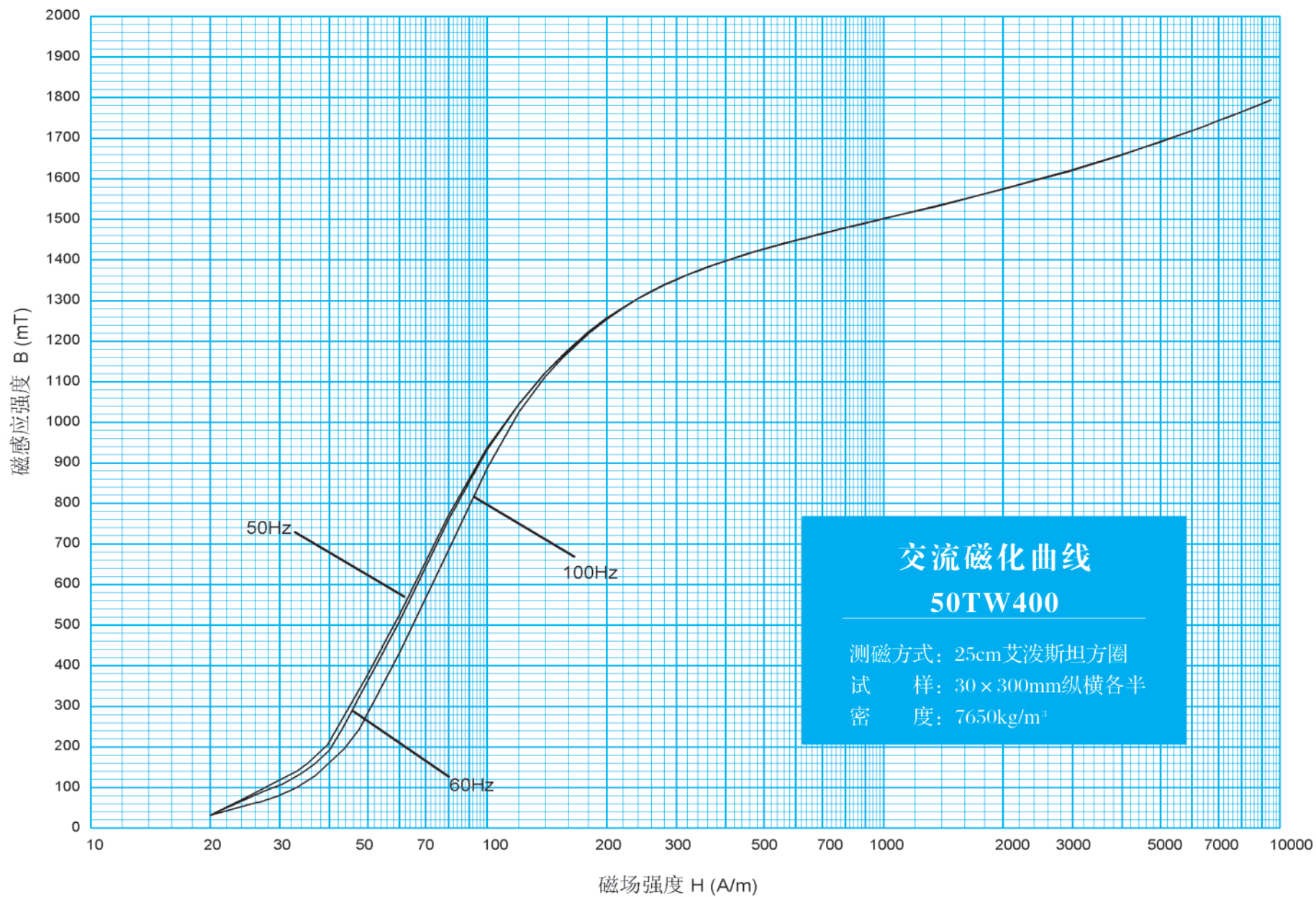


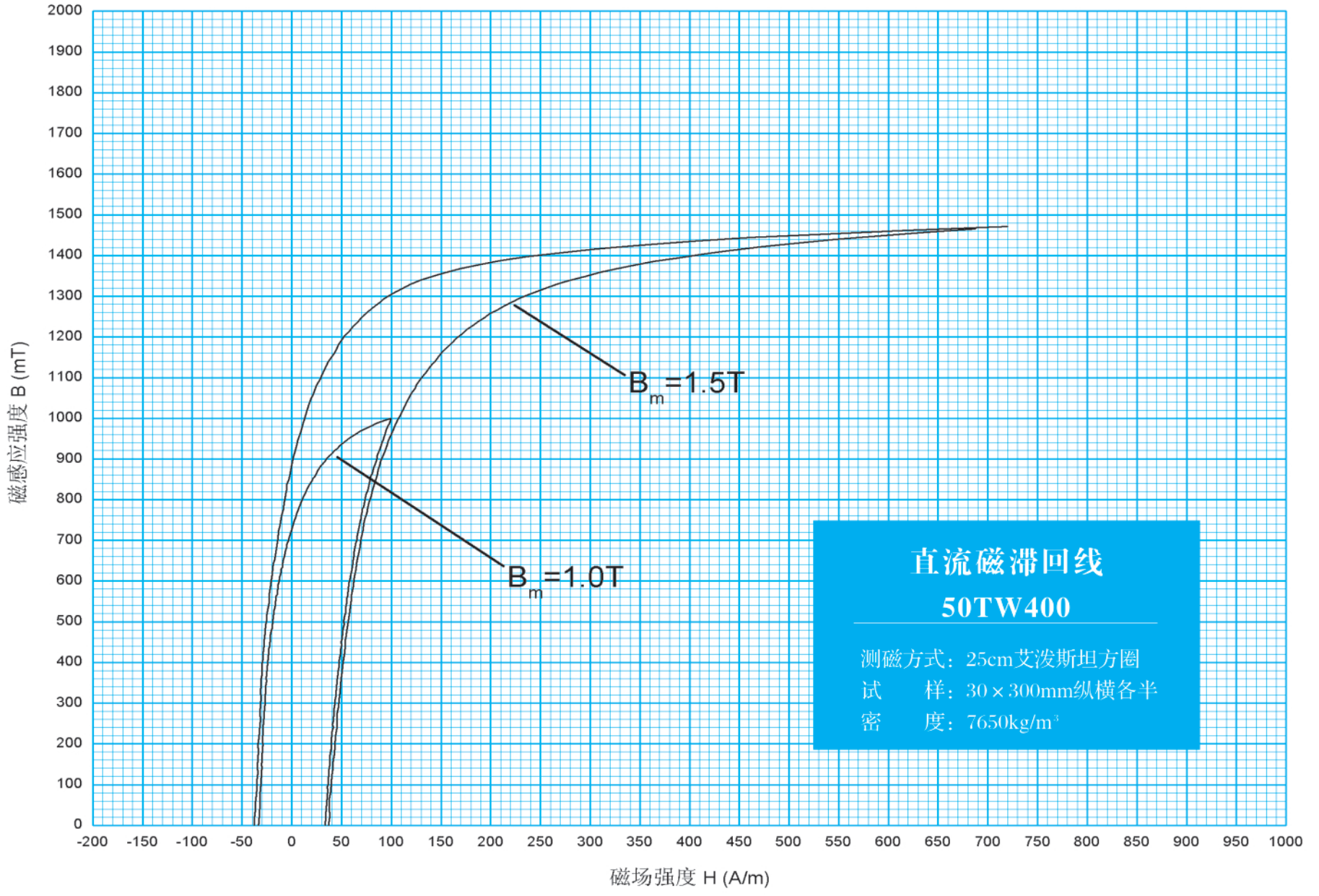
50TW400

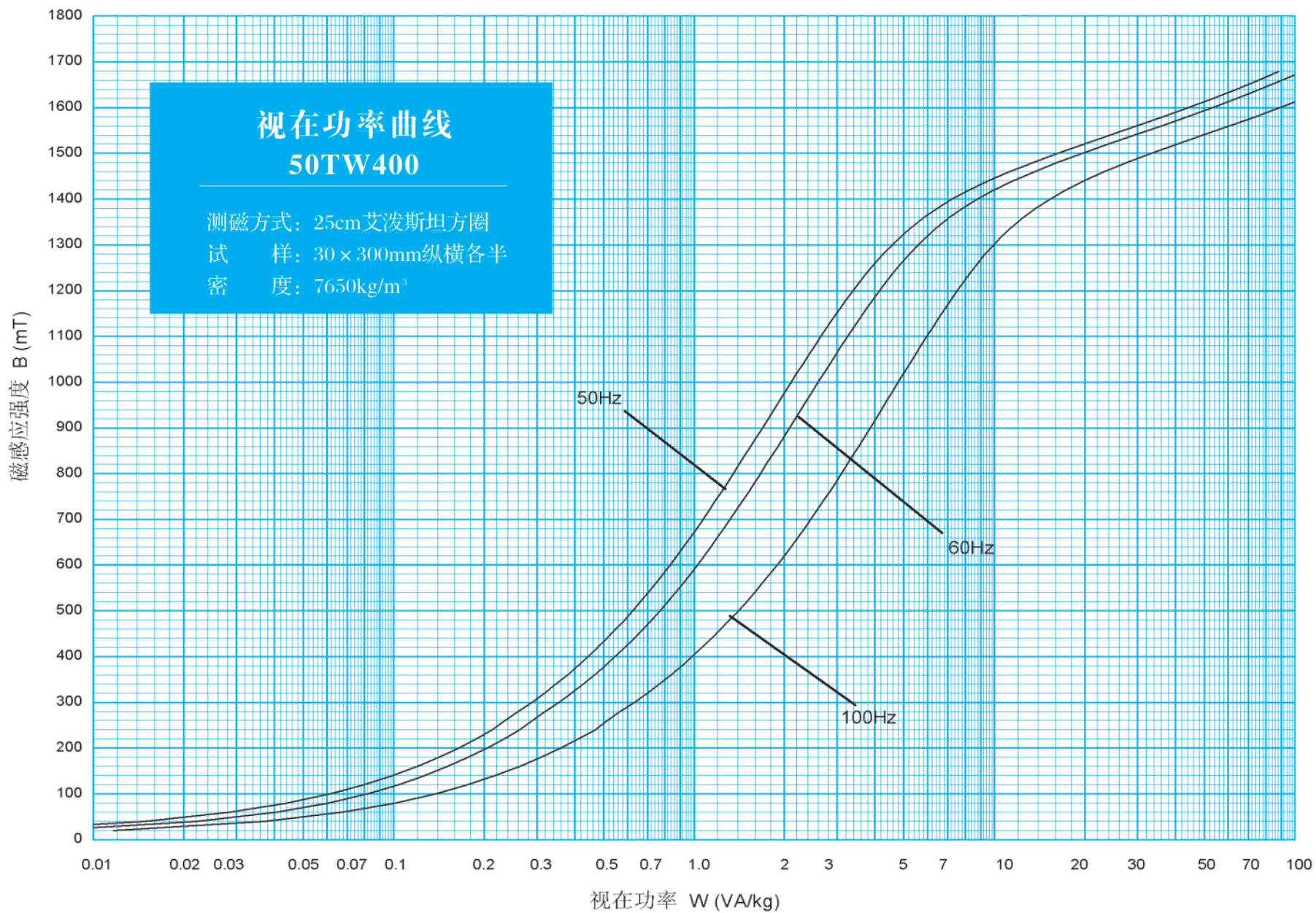




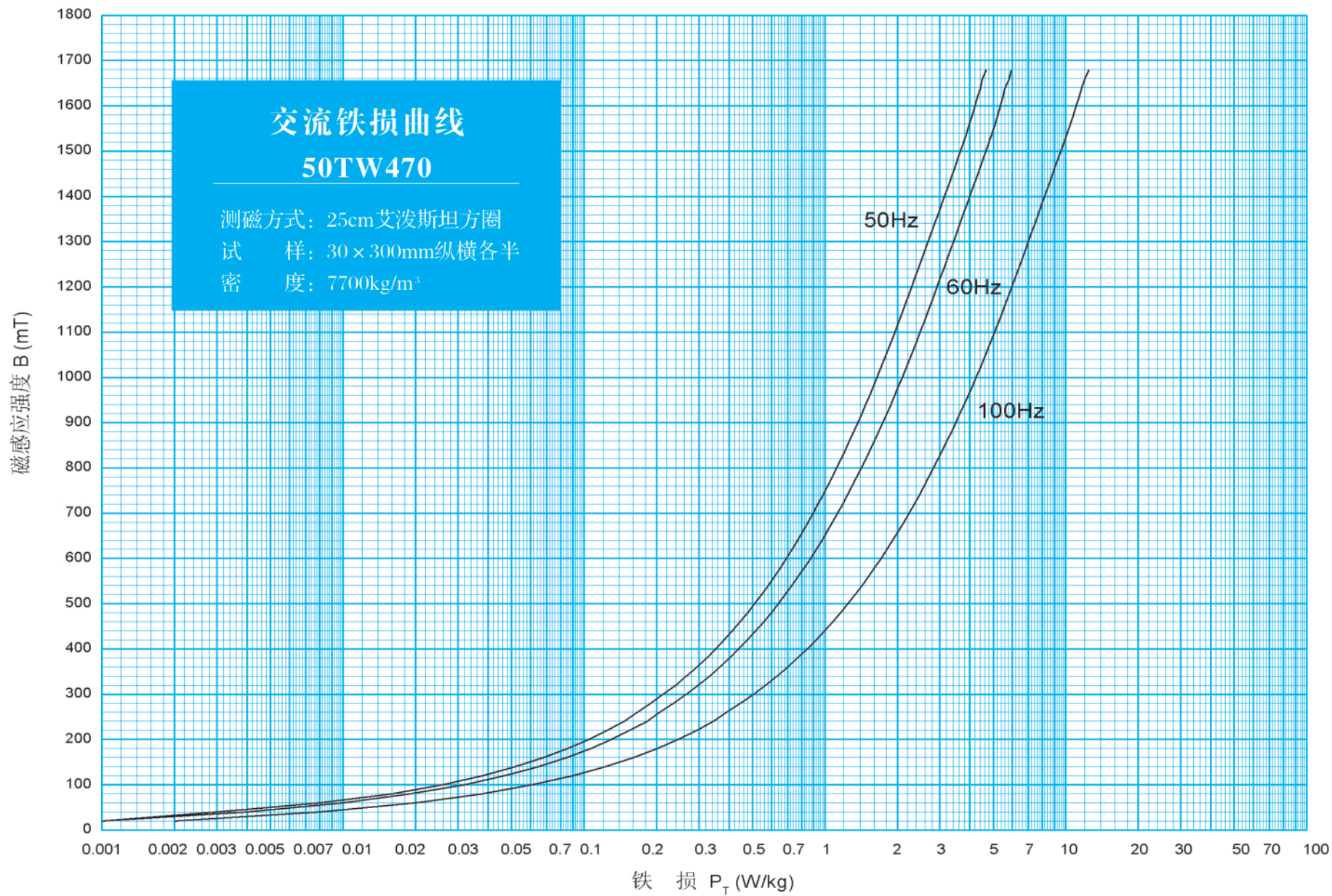




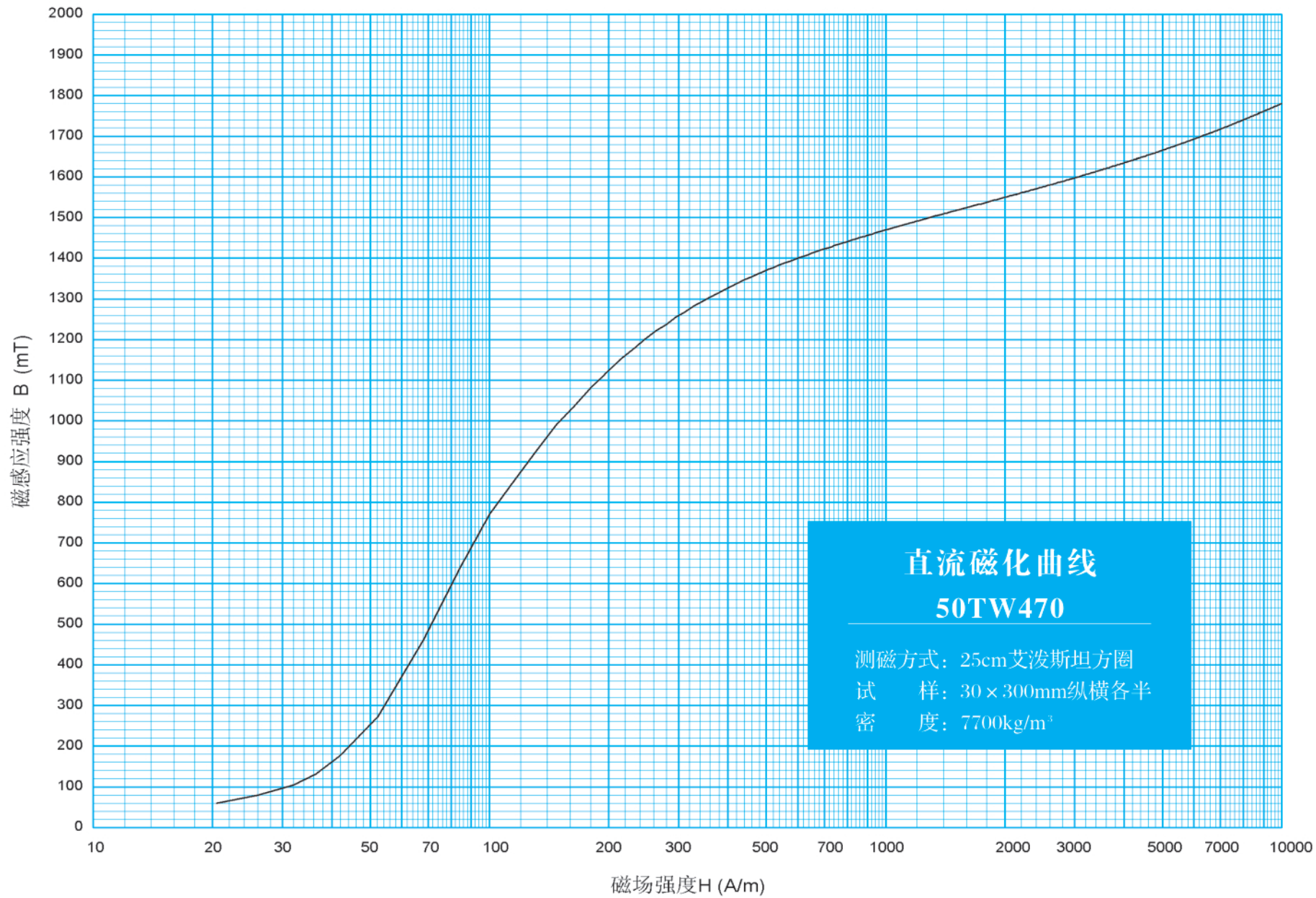


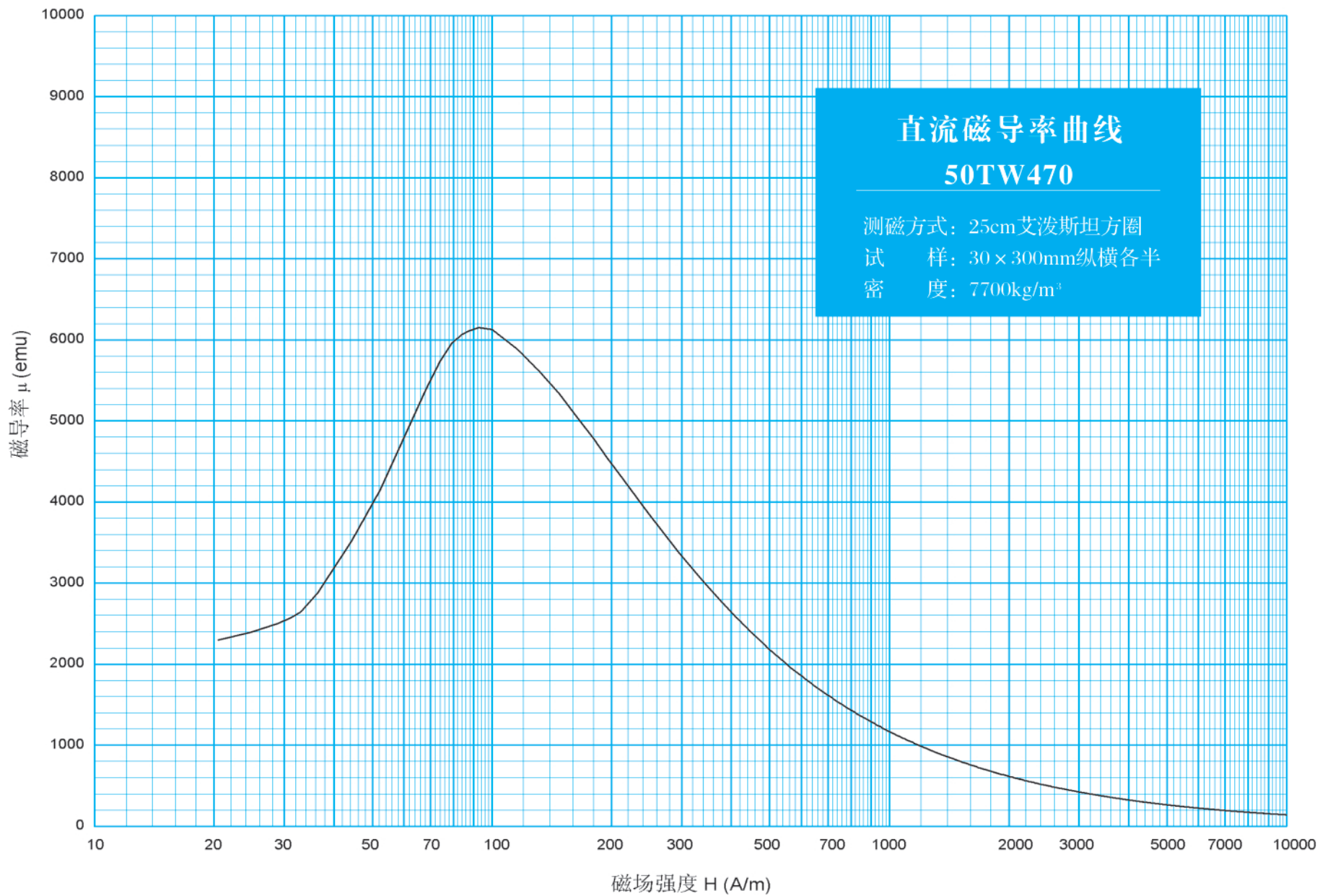


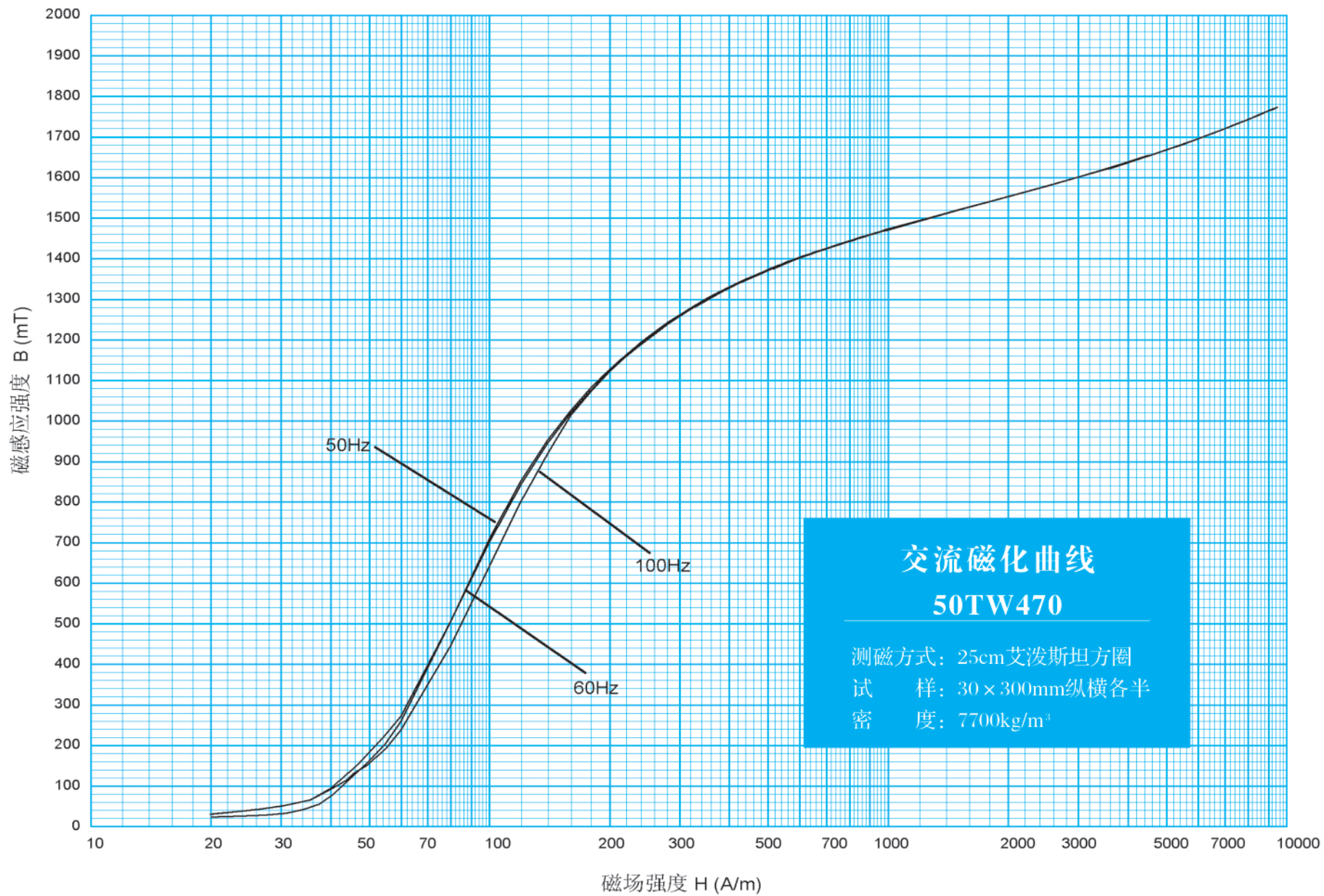




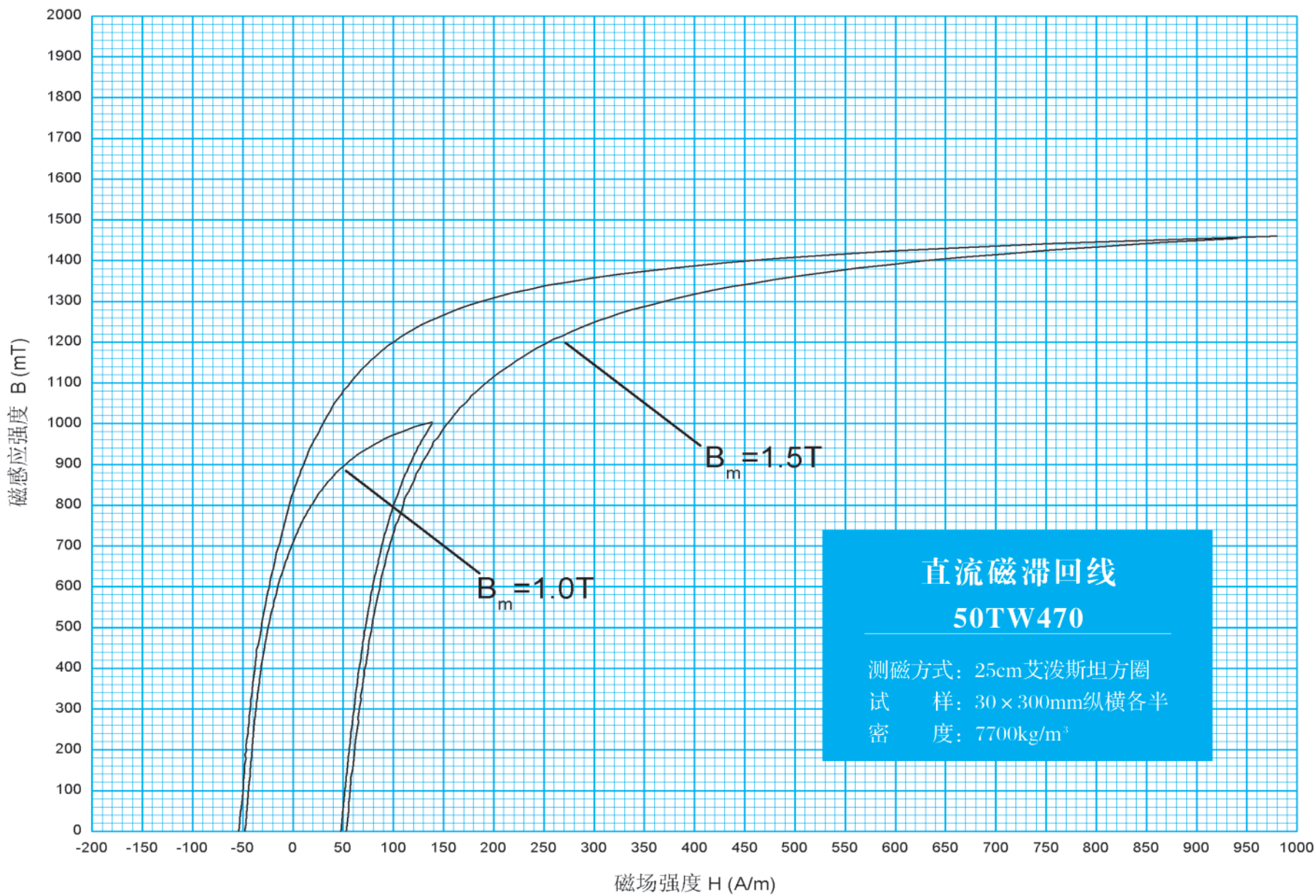
50TW470

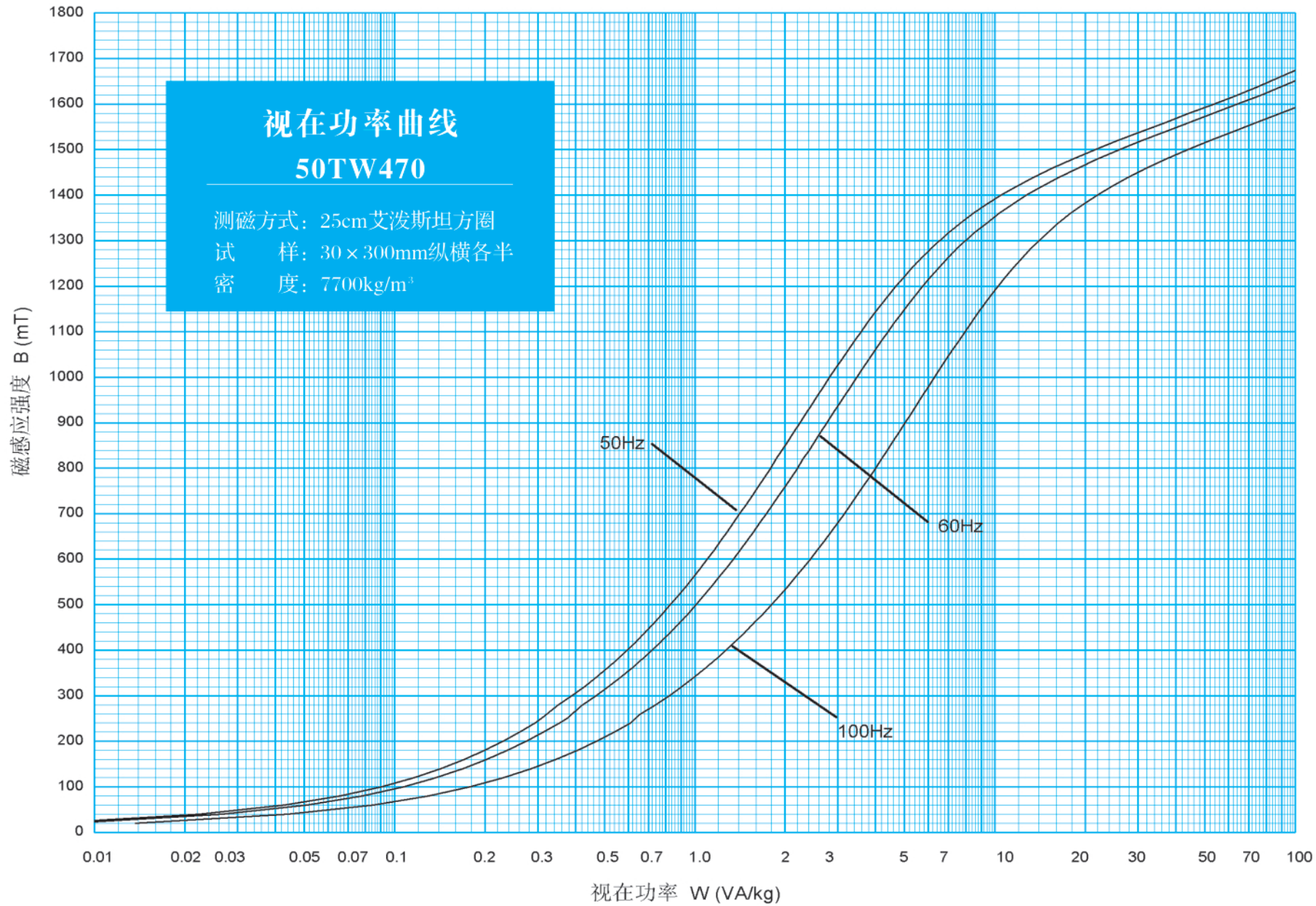


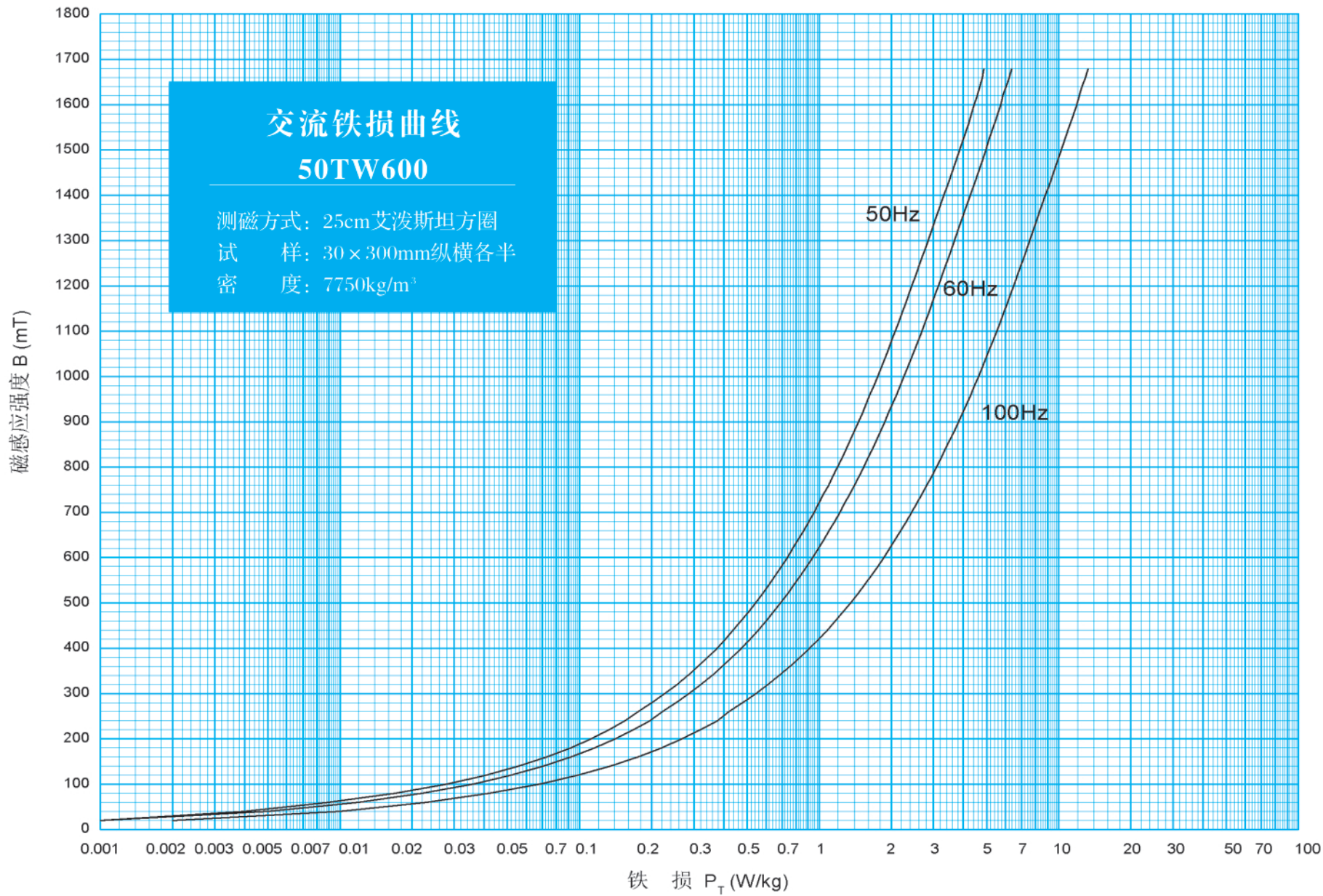


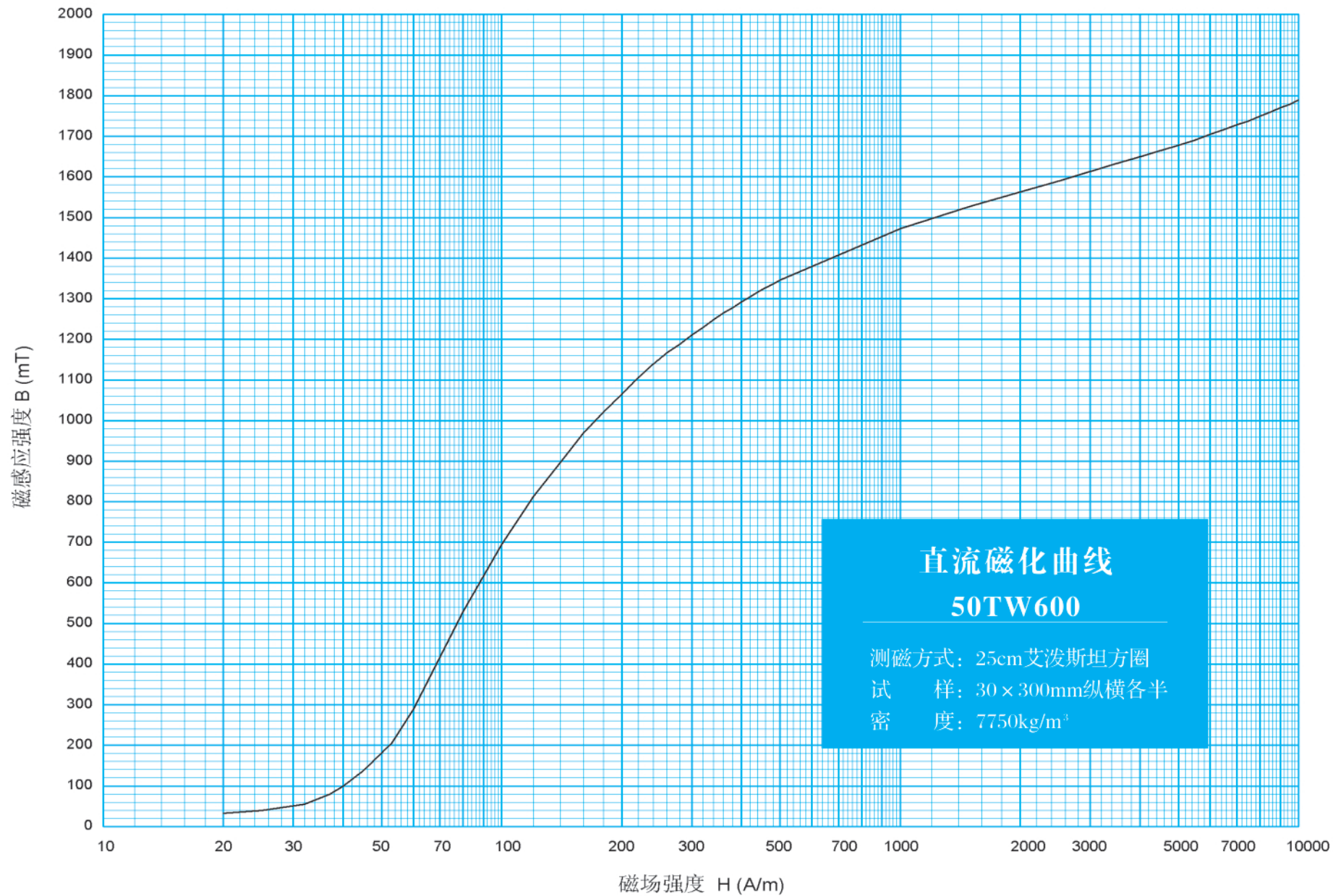




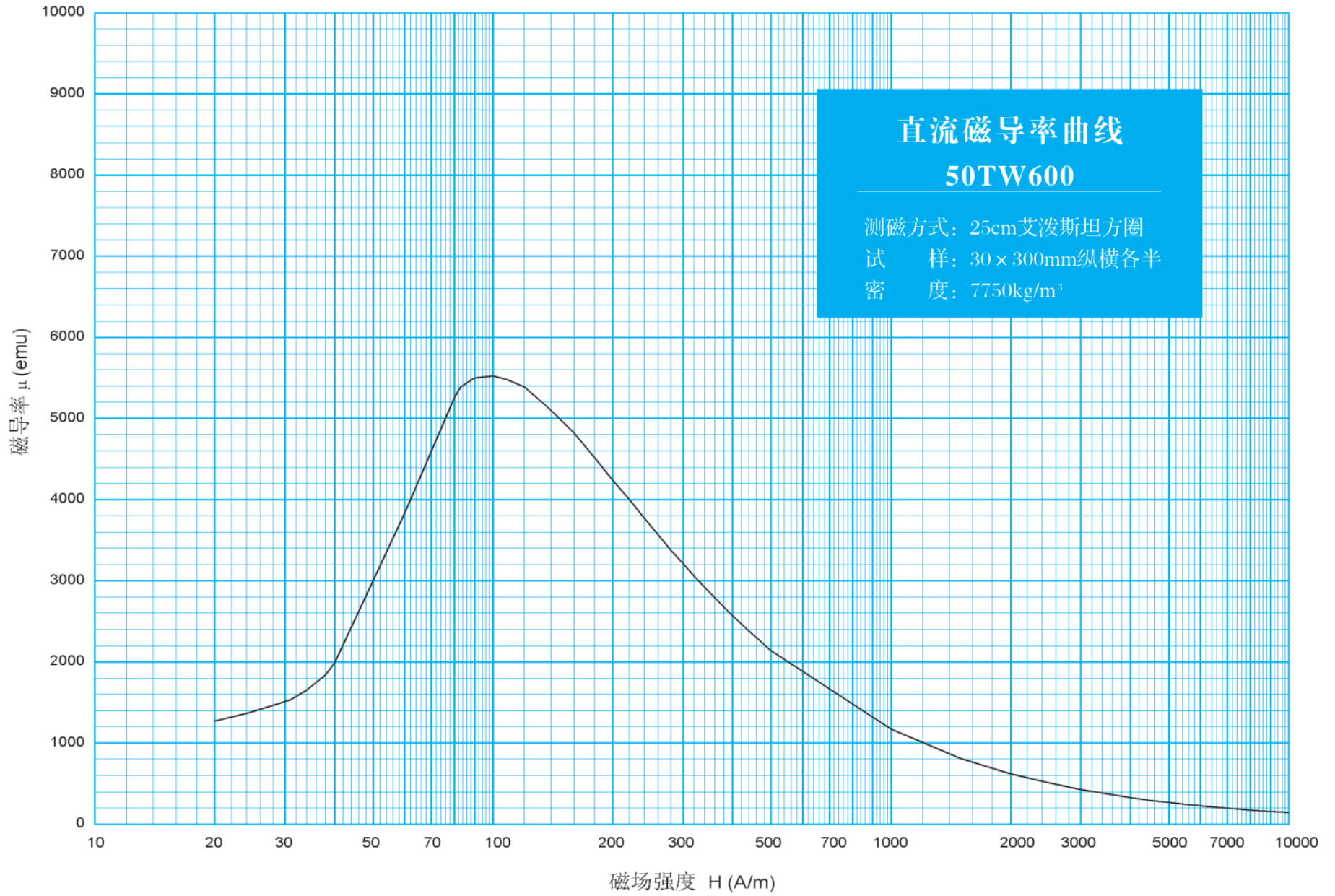


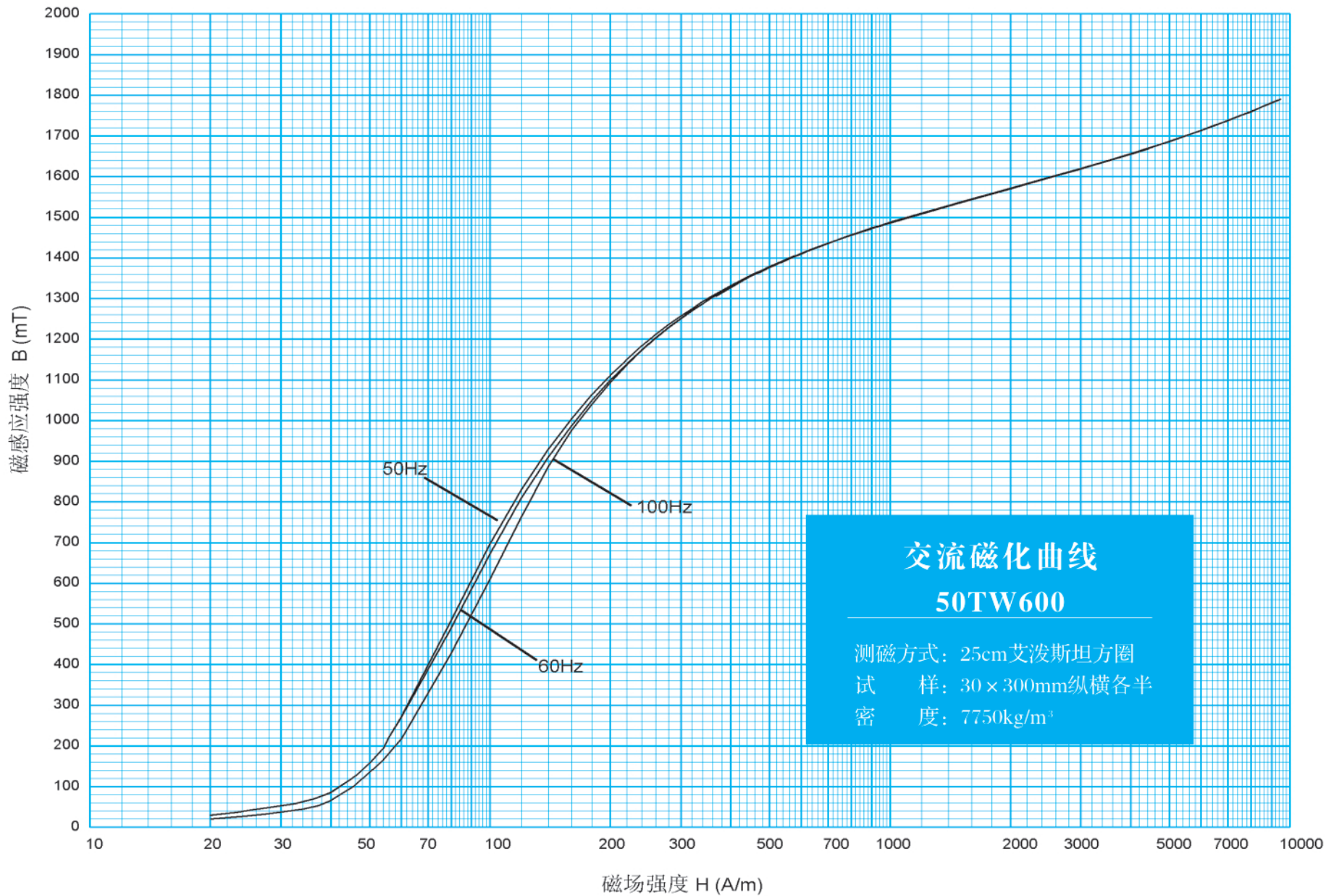


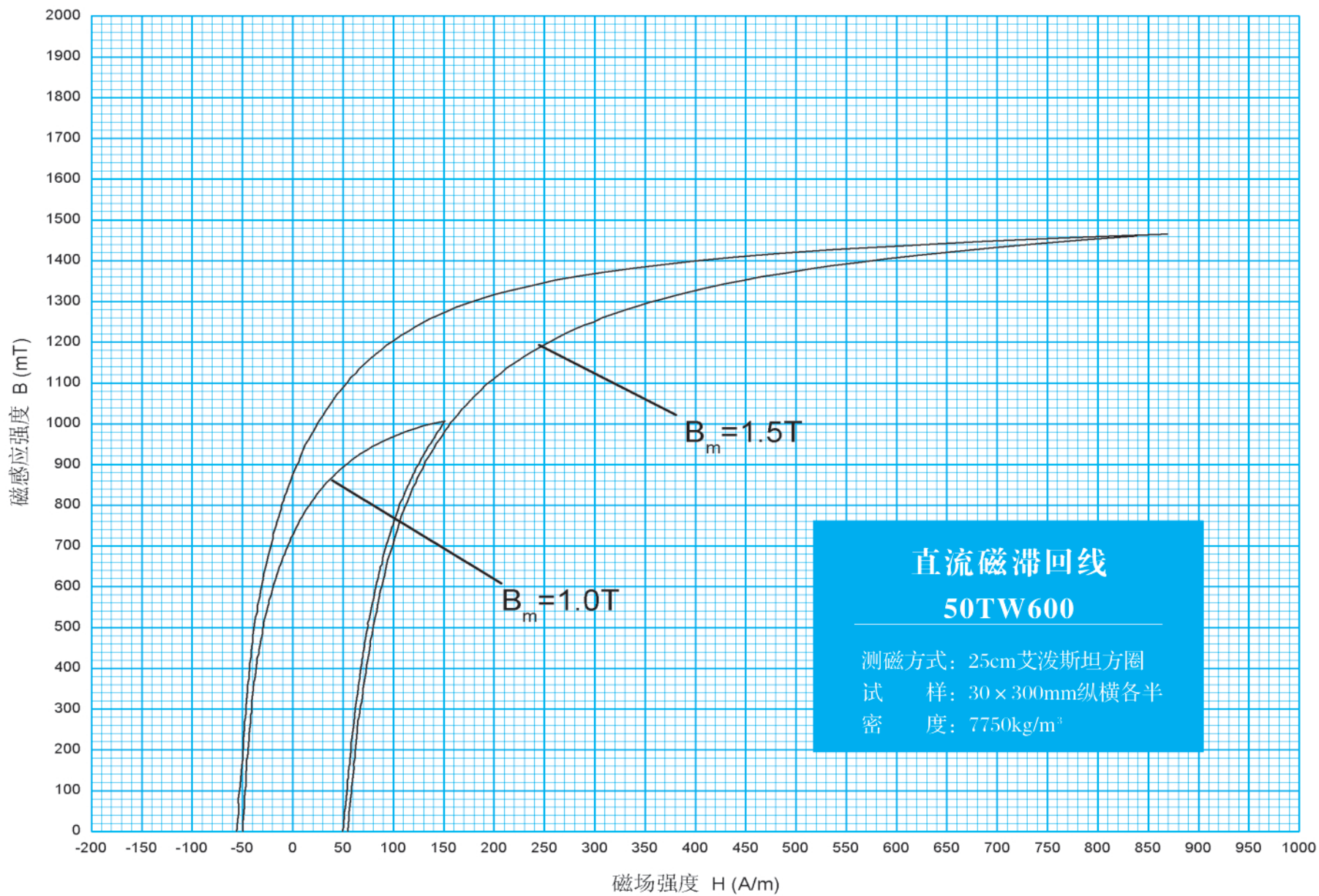


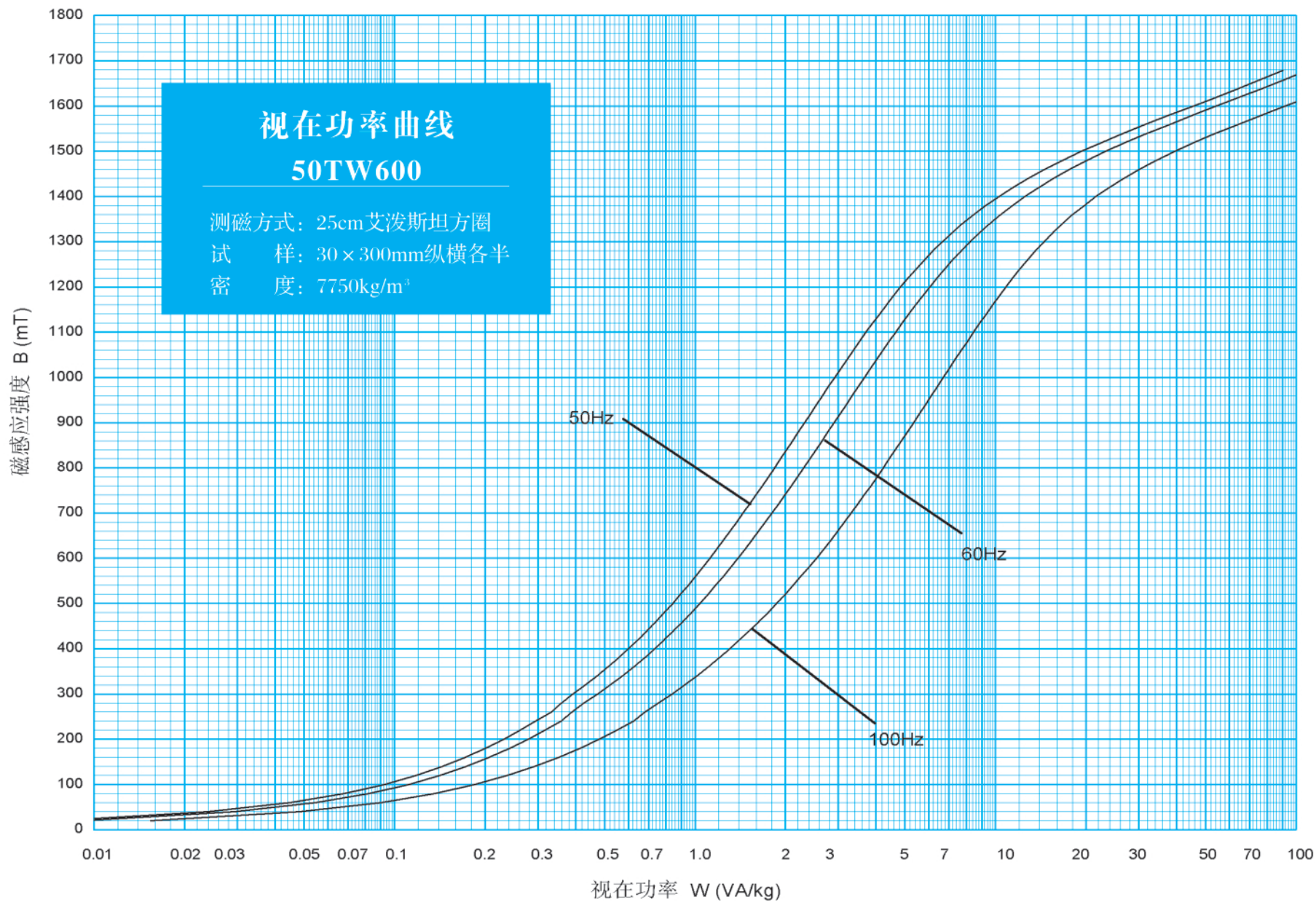




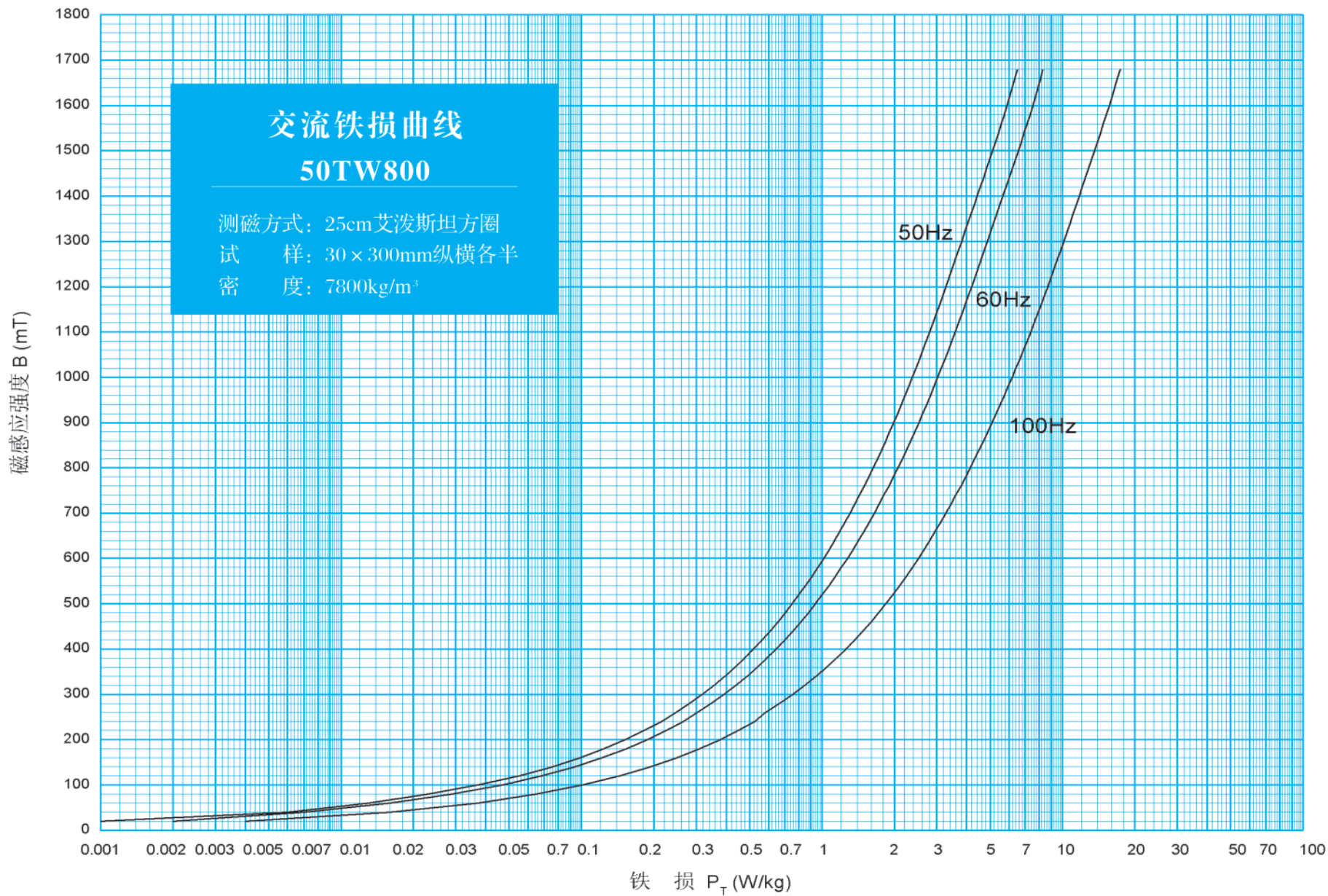


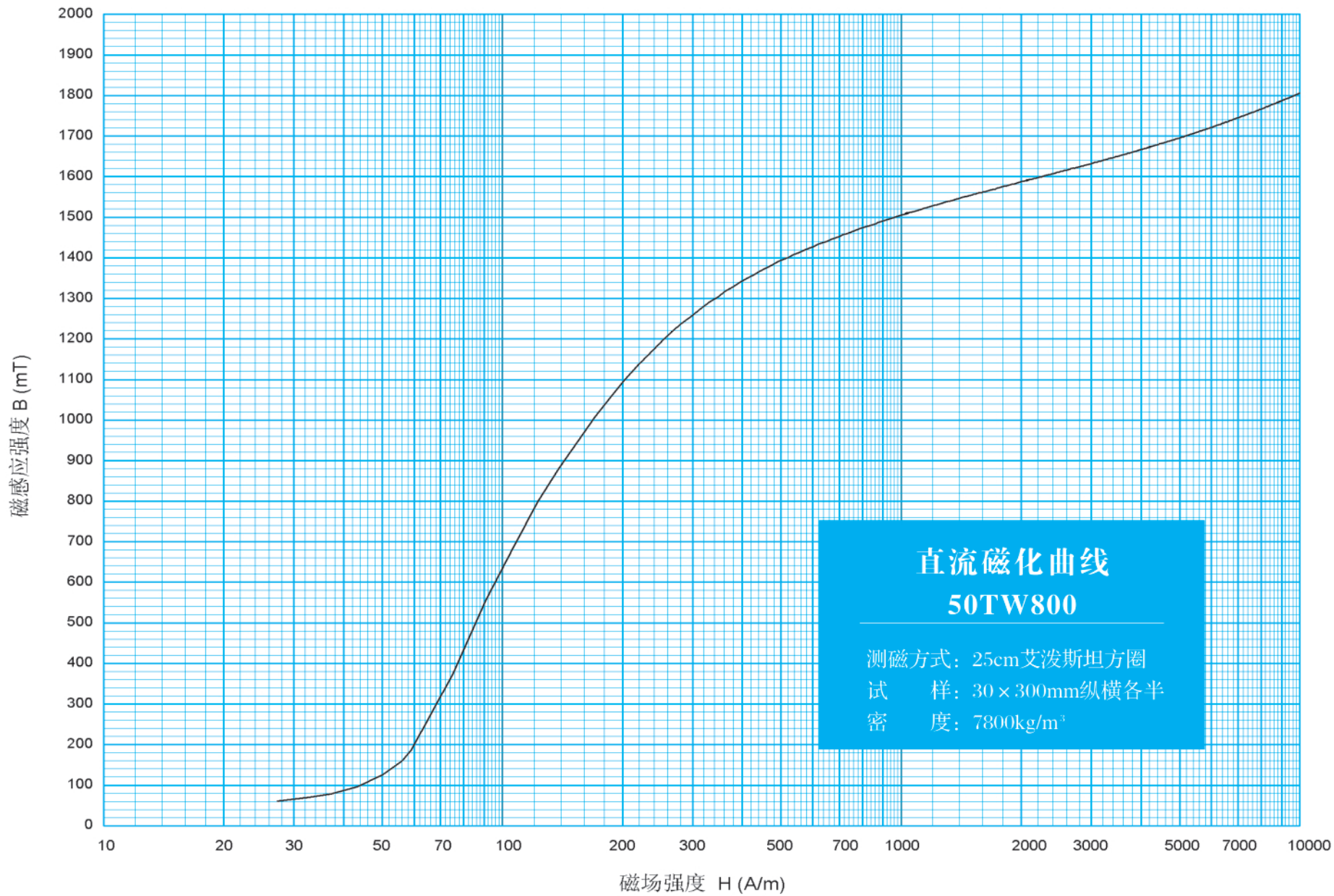


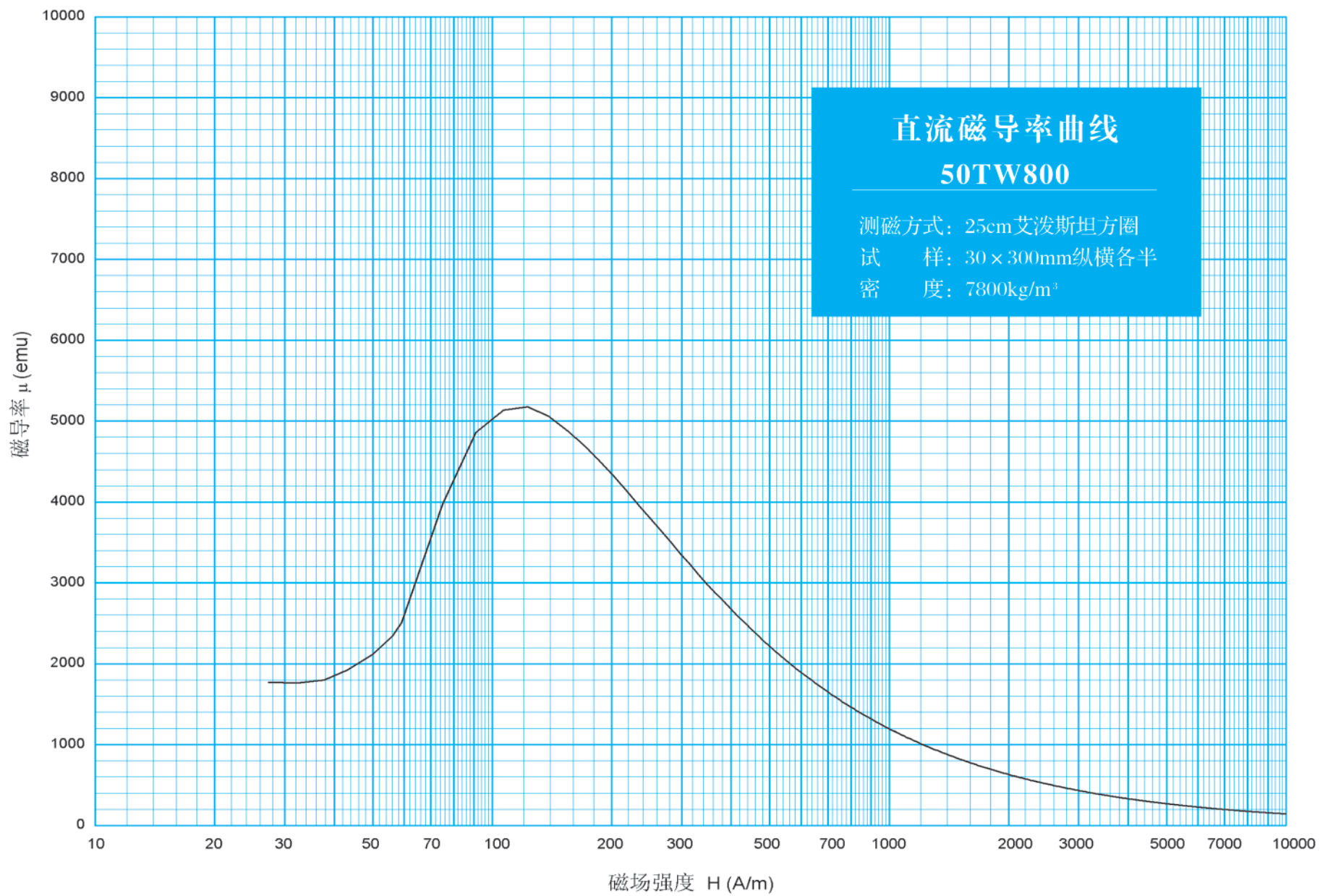


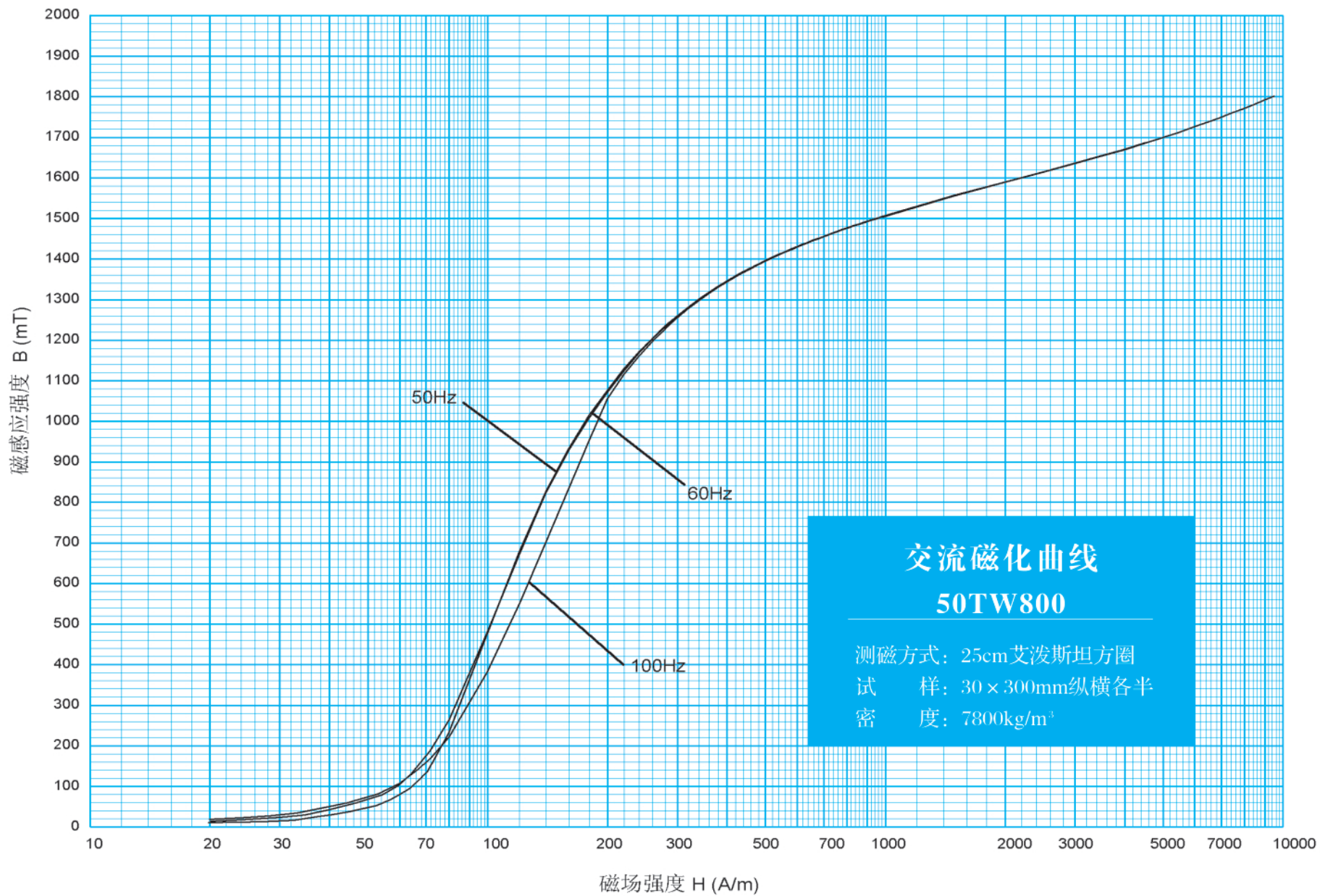




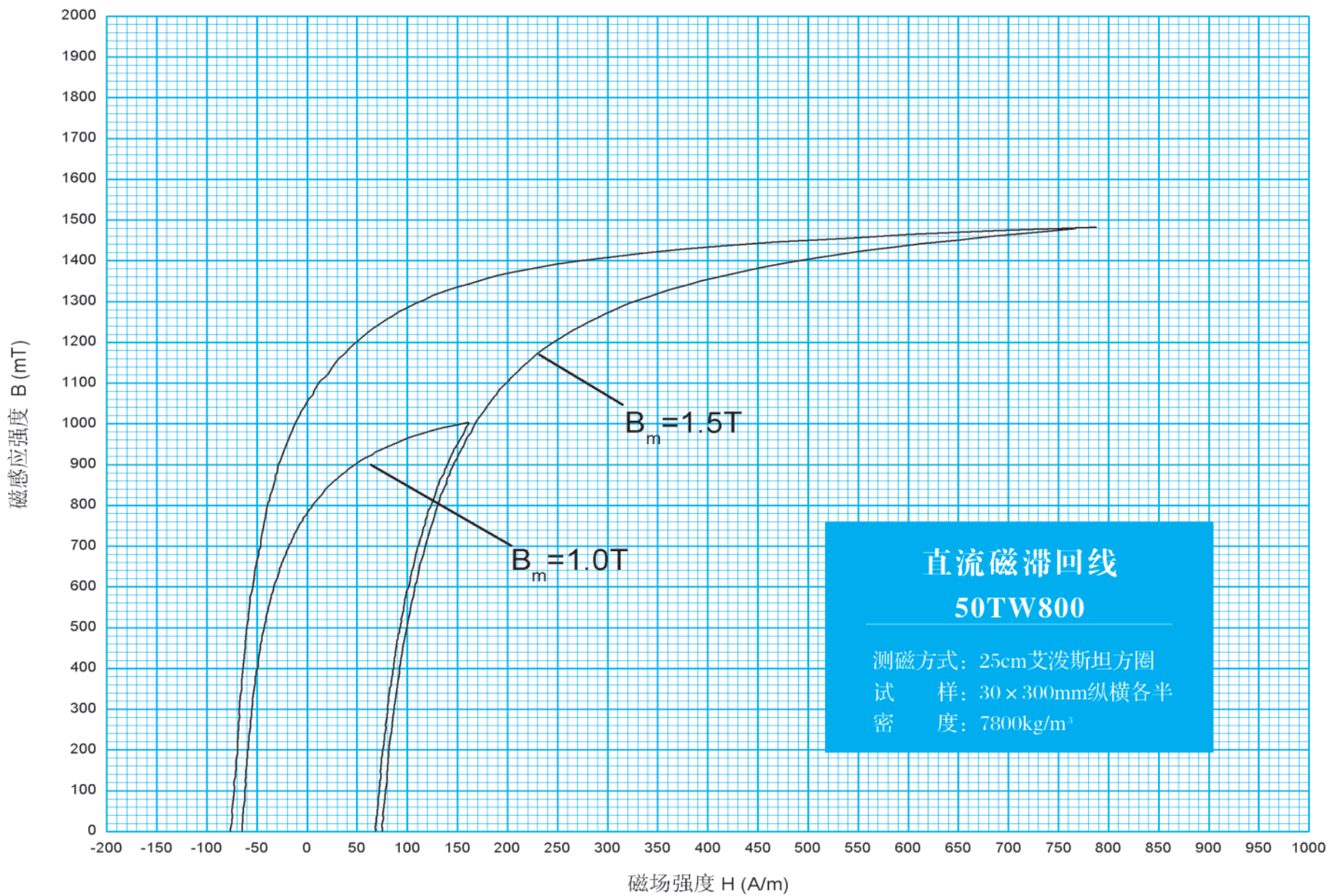


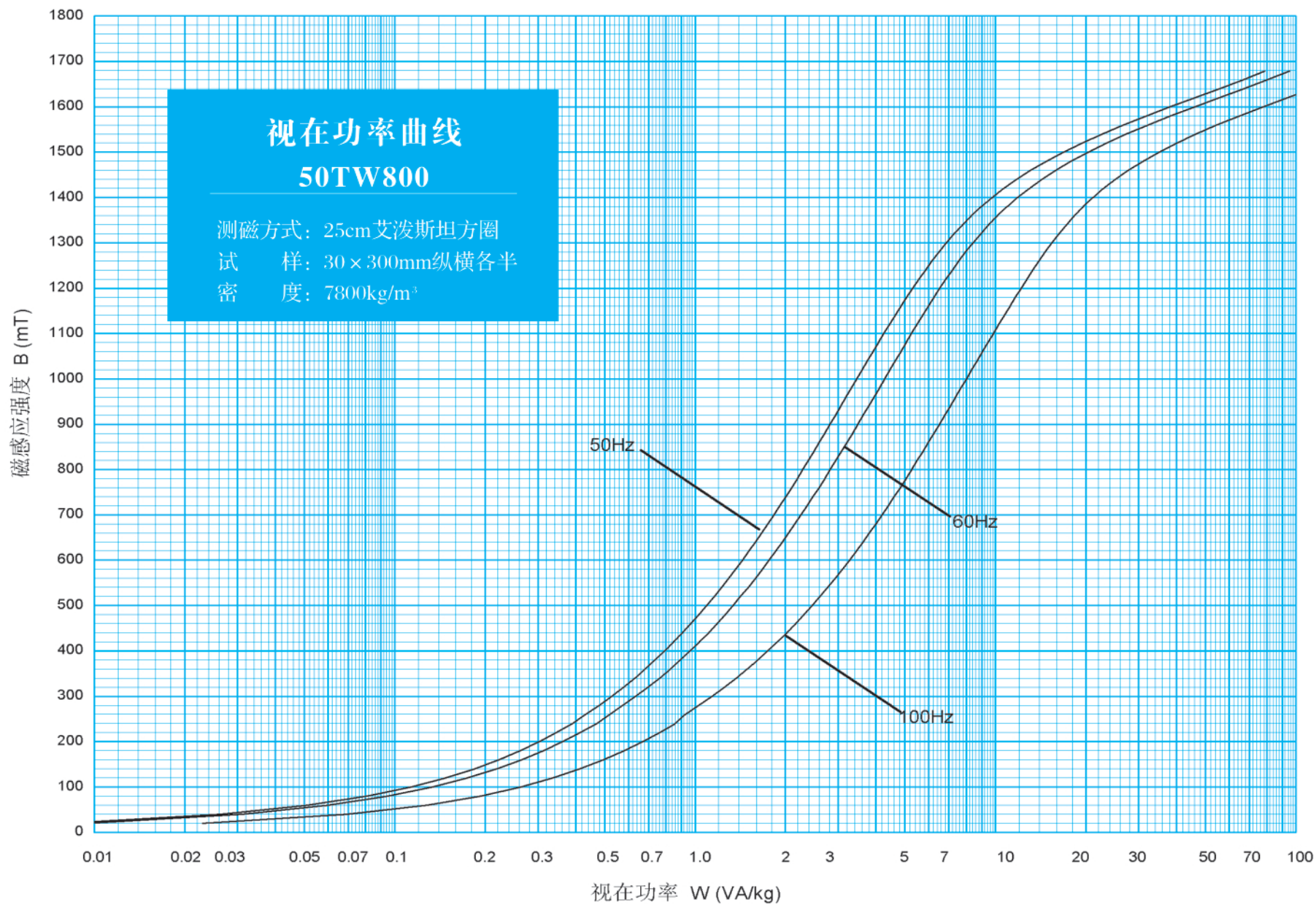












## 国内外冷轧无取向磁性钢带(片)标准对照表(铁损)

Product Grade Reference Tables of Cold-rolled Non-Oriented Electrical Steel Sheets(Core loss)

厚度 mm	太钢企业标准 Q/7B3039-2005		中国 GB/T2521-1996		国际电工委员会 IEC404-8-4-87		日本 JIS C2552-86		美国 ASTM A677M-89		欧盟标准 EN10106		前苏联 ГОСТ21427.2-83	
	牌号	P1.5/50 W/kg	牌号	P1.5/50 W/kg	牌号	P1.5/50 W/kg	牌号	P1.5/50 W/kg	牌号	P1.5/50 W/kg	牌号	P1.5/50 W/kg	牌号	P1.5/50 W/kg
0.35	35TW230	2.30	35W230	2.30	250-35-A5	2.50	35A230	2.30	36F320M	2.53	M235-35A	2.35		
	35TW250	2.50	35W250	2.50	270-35-A5	2.70	35A250	2.50	36F348M	2.76	M250-35A	2.50	2413	2.50
	35TW270	2.70	35W270	2.70	300-35-A5	3.00	35A270	2.70	36F370M	2.93	M270-35A	2.70	2412	2.70
	35TW300	3.00	35W300	3.00	330-35-A5	3.30	35A300	3.00	36F419M	3.32	M300-35A	3.00	2411	3.00
	35TW330	3.30	35W330	3.30			35A360	3.60			M330-35A	3.30		
0.50	50TW230	2.30	50W230	2.30			50A230	2.30	47F370M	2.93				
	50TW250	2.50	50W250	2.50			50A250	2.50	47F384M	3.04	M250-50A	2.50		
	50TW270	2.70	50W270	2.70	270-50-A5	2.70	50A270	2.70	47F403M	3.23	M270-50A	2.70	2414	2.70
	50TW290	2.90	50W290	2.90	290-50-A5	2.90	50A290	2.90	47F452M	3.57	M290-50A	2.90	2413	2.90
	50TW310	3.10	50W310	3.10	310-50-A5	3.10	50A310	3.10	47F507M	4.01	M310-50A	3.10	2412	3.10
	50TW330	3.30	50W330	3.30	330-50-A5	3.30			47F617M	4.89	M330-50A	3.30		
	50TW350	3.50	50W350	3.50	350-50-A5	3.50	50A350	3.50	47F672M	5.32	M350-50A	3.50	2411	3.60
	50TW400	4.00	50W400	4.00	400-50-A5	4.00	50A400	4.00		6.93	M400-50A	4.00	2312	4.00
	50TW470	4.70	50W470	4.70	470-50-A5	4.70	50A470	4.70	47F332M	7.86	M470-50A	4.70	2311	4.40
	50TW540	5.40	50W540	5.40	530-50-A5	5.30			47F992M		M530-50A	5.30	2212	5.00
	50TW600	6.00	50W600	6.00	600-50-A5	6.00	50A600	6.00			M600-50A	6.00	2112	6.00
	50TW700	7.00	50W700	7.00	700-50-A5	7.00	50A700	7.00			M700-50A	7.00	2012	6.50
	50TW800	8.00	50W800	8.00	800-50-A5	8.00	50A800	8.00			M800-50A	8.00	2111	8.00
0.65	65TW310	3.10												
	65TW330	3.30												
	65TW350	3.50												
	65TW400	4.00												
	65TW470	4.70												
	65TW540	5.30												
	65TW600	6.00	65W600	6.00	600-65-A5	6.00			64F705M	5.59	M600-65A	6.00	2212	6.30
65TW700	7.00	65W700	7.00	700-65-A5	7.00			64F882M	6.98	M700-65A	7.00	2211	7.00	
65TW800	8.00	65W800	8.00	800-65-A5	8.00	65A800	8.00			M800-65A	8.00	2112	8.00	
65TW1000	10.00	65W1000	10.00	1000-65-A5	10.00	65A1000	10.00			M1000-65A	10.00	2111	10.00	

## 电磁单位换算表 Conversion Tables

磁场强度 H				
	Oe	A / m	(A / in.)	
奥斯特 (Oe)	1	$7.96 \times 10$	2.02	
安 / 米 (A / m)	$1.256 \times 10^{-2}$	1	$2.54 \times 10^{-2}$	
安 / 英寸 (A / in.)	$4.95 \times 10^{-1}$	$3.94 \times 10$	1	
磁感应强度 B				
	Gs	T	Wb / m <sup>2</sup>	Line / in. <sup>2</sup>
高斯 (Gs)	1	$10^{-4}$	$10^{-4}$	6.45
特斯拉 (T)	$10^4$	1	1	$6.45 \times 10^4$
韦伯 / 米 <sup>2</sup> (Wb / m <sup>2</sup> )	$10^4$	1	1	$6.45 \times 10^4$
磁通量 / 英寸 <sup>2</sup> (Line / in. <sup>2</sup> )	$1.55 \times 10^{-1}$	$1.55 \times 10^{-5}$	$1.55 \times 10^{-5}$	1
铁损 P <sub>T</sub>				
	W / kg		W / lb	
瓦特 / 公斤 (W / kg)	1		$4.54 \times 10^{-1}$	
瓦特 / 磅 (W / lb)	2.204		1	
不同频率下的铁损转换 Conversion of P <sub>1.5/50</sub> and P <sub>1.5/60</sub>				
	50 赫兹下的铁损值 P <sub>1.5/50</sub>		60 赫兹下的铁损值 P <sub>1.5/60</sub>	
50 赫兹下的铁损值 P <sub>1.5/50</sub>	1		× 0.76	
60 赫兹下的铁损值 P <sub>1.5/60</sub>	× 1.316		1	

## 国际单位 The International System of Units

	名称 Item	单位 Units	符号 Sign
基本单位 Basic Units of the System	长度 Length	米 meter	m
	质量 Mass	千克 kilogram	kg
	时间 Time	秒 second	s
	电流 Electric Current	安培 ampere	A
	热力学温度 Thermodynamic Temperature	开(尔文) kelvin degree	K
	光度 Luminous Intensity	坎(德拉) candela	cd
导出单位 Derived Units	面积 Area	平方米 square meter	m <sup>2</sup>
	体积 Volume	立方米 cubic meter	m <sup>3</sup>
	频率 Frequency	赫兹 hertz	Hz
	密度 Density	千克/立方米 kilogram per cubic meter	kg/m <sup>3</sup>
	功率 Power	瓦特 watt	W
	电压、电动势 Voltage, Potential Difference Electromotive Force	伏特 volt	V
	电场强度 Electric Field Strength	伏特/米 volt per meter	V/m
	电阻 Electric Resistance	欧姆 ohm	Ω
	磁通量 Magnetic Flux	韦伯 weber	Wb
	电感 Inductance	亨利 henry	H
磁感应强度、磁通密度 Magnetic Flux Density	特斯拉 tesla	T	
磁场强度 Magnetic Field Strength	安培/米 ampere per meter	A/m	