NIPPON STEEL

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無方向性電磁鋼帯 NON-ORIENTED ELECTRICAL STEEL SHEETS
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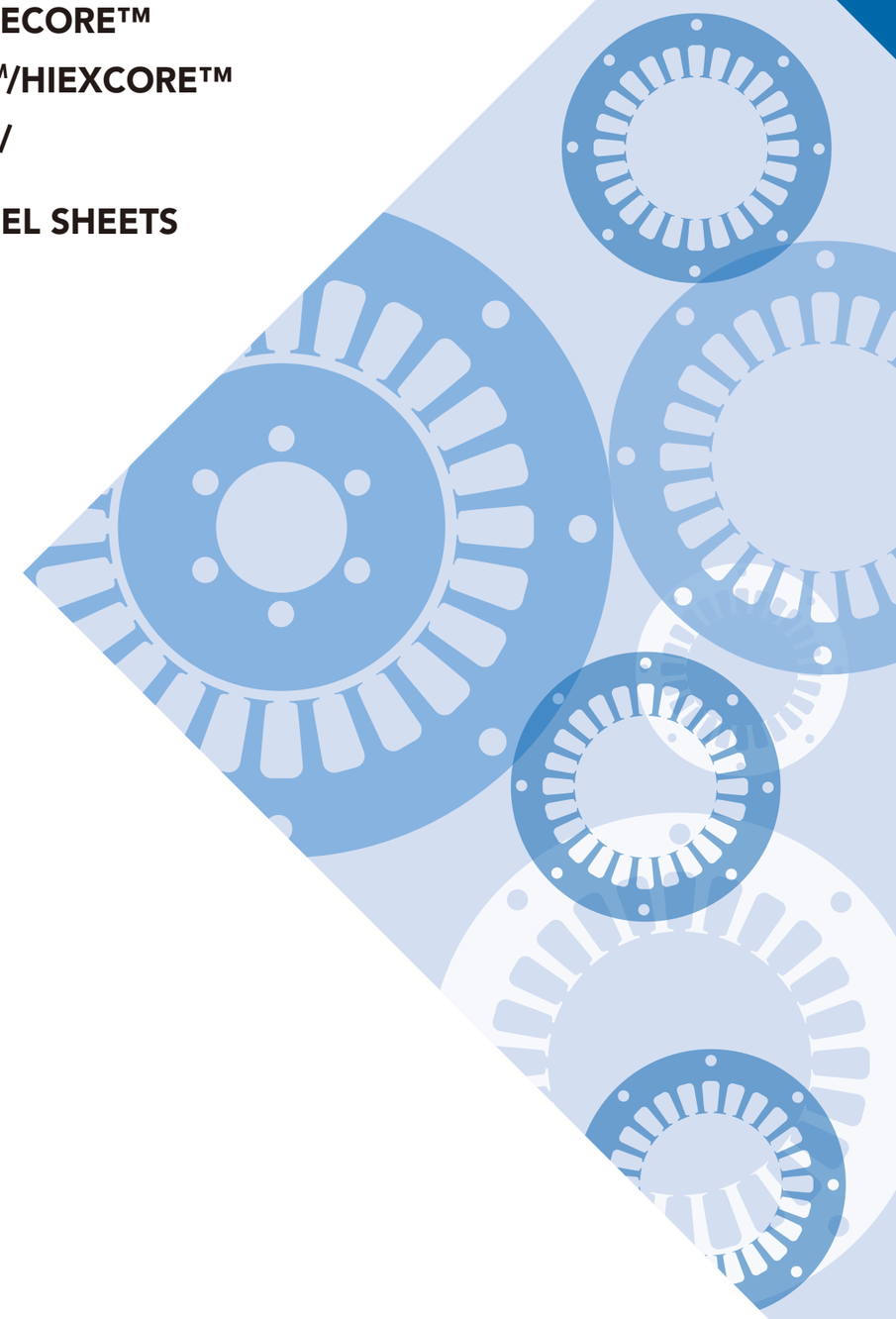
NIPPON STEEL CORPORATION

NIPPON STEEL

薄 板

Steel Sheet

ハイライトコア®/HILITECORE™
ホームコア®/HOMECORE™
ハイエックスコア™/HIEXCORE™
無方向性電磁鋼帯/ NON-ORIENTED ELECTRICAL STEEL SHEETS



日本製鉄株式会社

ハイライトコア®
HILITECORE™

ホームコア®
HOMECORE™

ハイエックスコア™
HIEXCORE™

無方向性電磁鋼帯
NON-ORIENTED ELECTRICAL STEEL SHEETS

NIPPON STEEL

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特長

Characteristics

- ハイライトコア®/ HILITECORE™
- ホームコア®/ HOMECORE™
- ハイエックスコア™/ HIEXCORE™

1 特性のバラツキが少ない
Greater uniformity

最新鋭の設備と優れた技術により製造されるため，磁気特性およびその他諸特性のバラツキは，極めて少なく安心してご使用いただけます。

HILITECORE, HOMECORE and HIEXCORE offer superb magnetic and other properties with only minimal deviation. This has been made possible by NIPPON STEEL's advanced production equipment and technology.

2 磁化特性が優れている
Superior magnetic induction

低磁場より高磁場まで広い範囲において高い透磁率を有しております。

HILITECORE, HOMECORE and HIEXCORE can maintain high permeability over an extensive range, from low to high, of magnetic fields.

3 占積率が高い
Better lamination factor

冷間圧延で製造するため，形状が優美であるばかりでなく表面も非常に平滑であり，極めて高い占積率を有しております。

Being cold-rolled, HILITECORE, HOMECORE and HIEXCORE have remarkably good lamination factors.

4 優れた絶縁皮膜が施されている
Improved surface insulation

表面には絶縁性，密着性，耐熱性，耐食性，耐油性，加工性に優れた絶縁皮膜が施されております。

These electrical steel sheets have an improved surface coating, which features better insulation, workability, and resistance to heat, rust and oil.

5 加工性が良い
Dimensional accuracy

絶縁皮膜は強固に密着していますので，打抜き・切断が容易で加工性に優れています。また，寸法精度が高いので，高速の連続打抜き作業に適しています。

HILITECORE, HOMECORE and HIEXCORE are supplied as strip in coil and have high dimensional accuracy. They can also be supplied slit to any width to facilitate the high-speed, high-efficiency punching operations of customers.

種類および規格値

Specifications

■磁気的性質，占積率および繰返し曲げ回数
Magnetic Properties, Lamination Factors and Number of bends

種類 / Type			密度 kg/dm³ Assumed Density	鉄損 W/kg Iron Loss	磁束密度 T Induction	占積率 % Lamination factor	繰返し曲げ回数 Number of bends
名称 Product	記号 Grade	呼称厚さ mm Thickness		W15/50	B50		C
ハイライトコア HILITECORE	35H210	0.35	7.60	≦2.10	≧1.62	≧95.0	≧2
	35H230		7.60	≦2.30	≧1.62	≧95.0	≧2
	35H250		7.60	≦2.50	≧1.62	≧95.0	≧2
	35H270		7.65	≦2.70	≧1.64	≧95.0	≧2
	35H300		7.65	≦3.00	≧1.64	≧95.0	≧3
	35H360		7.65	≦3.60	≧1.64	≧95.0	≧3
	35H440		7.70	≦4.40	≧1.65	≧95.0	≧3
	50H230	0.50	7.60	≦2.30	≧1.62	≧96.0	≧2
	50H250		7.60	≦2.50	≧1.62	≧96.0	≧2
	50H270		7.60	≦2.70	≧1.62	≧96.0	≧2
	50H290		7.60	≦2.90	≧1.62	≧96.0	≧2
	50H310		7.65	≦3.10	≧1.62	≧96.0	≧3
	50H350		7.65	≦3.50	≧1.65	≧96.0	≧5
	50H400		7.65	≦4.00	≧1.65	≧96.0	≧5
	50H470		7.70	≦4.70	≧1.65	≧96.0	≧10
	50H600		7.75	≦6.00	≧1.66	≧96.0	≧10
ホームコア HOMECORE	50H700		7.80	≦7.00	≧1.70	≧96.0	≧10
	50H800		7.80	≦8.00	≧1.72	≧96.0	≧10
	50H1000		7.85	≦10.00	≧1.72	≧96.0	≧10
	50H1300		7.85	≦13.00	≧1.72	≧96.0	≧10

（注） 試験は，JIS C 2550:2000 により行います。鉄損，磁束密度の試験は圧延方向の試験片を半分，圧延と直角方向の試験片を半分用いて行います。占積率，繰返し曲げ試験は，JIS C 2550:2000 により行います。C は圧延方向に直角の試験片を示します。

Note:Tests are conducted in accordance with JIS C 2550:2000. Iron Loss and Induction are measured by using as-sheared specimens one half longitudinal and one half transverse to the rolling direction. Tests for Lamination factor and bending are in accordance with JIS C 2550:2000. C:specimens taken transverse to the rolling direction

■寸法および横曲がりの許容差 / Size and Form Tolerances

幅 mm Width	呼称厚さ mm Thickness	厚さの許容差 % Thickness Tolerance	幅方向の厚さ偏差 mm Thickness Deviation in Crosswise Direction	幅の許容差 mm Width Tolerance	横曲がり mm（長さ 2m につき） Camber
30 を超え 150 以下 Over 30 to 150	0.35	± 8	≦0.02	+0.2 0	≦1.0
150 を超え 300 以下 Over 150 to 300				+0.3 0	
300 を超え 600 以下 Over 300 to 600				+0.5 0	
600 を超え 1000 以下 Over 600 to 1000	0.50			+1.0 0	
1000 を超え 1250 以下 Over 1000 to 1250			≦0.03	+1.5 0	

■磁気的性質および占積率
Magnetic Properties and Lamination Factors

種類 / Type			密度 kg/dm³ Assumed Density	鉄損 W/kg Iron Loss	磁束密度 T Induction	占積率 % Lamination factor
名称 Product	記号 Grade	呼称厚さ mm Thickness		W15/50	B50	
ハイエックスコア HIEXCORE	35HX230	0.35	7.65	≦2.30	≧1.66	≧95.0
	35HX250		7.65	≦2.50	≧1.67	≧95.0
	35HX300		7.70	≦3.00	≧1.69	≧95.0
	50HX290	0.50	7.65	≦2.90	≧1.67	≧96.0
	50HX350		7.70	≦3.50	≧1.70	≧96.0
	50HX470		7.75	≦4.70	≧1.72	≧96.0
	50HX600		7.75	≦6.00	≧1.72	≧96.0

種類 / Type			密度 kg/dm³ Assumed Density	鉄損 W/kg Iron Loss	磁束密度 T Induction	占積率 % Lamination factor
名称 Product	記号 Grade	呼称厚さ mm Thickness		W10/400	B50	
薄手 ハイエックスコア THINNER GAUGE HIEXCORE	15HX1000	0.15	7.60	≦10.0	≧1.60	≧90.0
	20HX1200	0.20	7.60	≦12.0	≧1.61	≧93.0
	20HX1300		7.65	≦13.0	≧1.62	≧93.0
	25HX1400	0.25	7.65	≦14.0	≧1.62	≧94.0
	25HX1500		7.65	≦15.0	≧1.62	≧94.0
	27HX1500	0.27	7.65	≦15.0	≧1.62	≧94.5
	27HX1800		7.70	≦18.0	≧1.66	≧94.5
	30HX1600	0.30	7.65	≦16.0	≧1.62	≧94.5
	30HX1800		7.65	≦18.0	≧1.66	≧94.5

（注） 試験は，JIS C 2550:2000 により行います。鉄損，磁束密度の試験は圧延方向の試験片を半分，圧延と直角方向の試験片を半分用いて行います。占積率試験は，JIS C 2550:2000 により行います。

Note:Tests are conducted in accordance with JIS C 2550:2000. Iron Loss and Induction are measured by using as-sheared specimens one half longitudinal and one half transverse to the rolling direction. Test for Lamination factor is in accordance with JIS C 2550:2000.

■寸法および横曲がりの許容差
Size and Form Tolerances

幅 mm Width	呼称厚さ mm Thickness	厚さの許容差 % Thickness Tolerance	幅方向の厚さ偏差 mm Thickness Deviation in Crosswise Direction	幅の許容差 mm Width Tolerance	横曲がり mm (長さ 2m につき) Camber
30 を超え 150 以下 Over 30 to 150	0.25	± 8	≦0.02	+0.2 0	≦1.0
150 を超え 300 以下 Over 150 to 300	0.27			+0.3 0	
300 を超え 600 以下 Over 300 to 600	0.30			+0.5 0	
600 を超え 1000 以下 Over 600 to 1000	0.35			+1.0 0	
1000 を超え 1250 以下 Over 1000 to 1250	0.50		≦0.03	+1.5 0	
150 以下 150 or under	0.15	± 10	≦0.02	+0.4 0	≦2.0
150 を超え 300 以下 Over 150 to 300				+0.5 0	
300 を超え 600 以下 Over 300 to 600	0.20			+0.7 0	≦1.0
600 を超えるもの Over 600				+1.0 0	

電気・磁気的性質の代表例
Typical Electrical and Magnetic Properties

種類 / Type 記号 Grade	呼称厚さ mm Thickness	密度 kg/dm³ Assumed Density	固有抵抗Ω・m (×10⁻⁸) Resistivity	鉄損 W/kg Iron Loss				磁束密度 T Induction	
				W10/50	W15/50	W10/60	W15/60	B25	B50
35H210	0.35	7.60	59	0.81	2.00	1.03	2.54	1.56	1.66
35H230		7.60	59	0.85	2.10	1.08	2.67	1.56	1.66
35H250		7.60	56	0.91	2.25	1.15	2.84	1.56	1.66
35H270		7.65	54	0.99	2.30	1.24	2.87	1.58	1.67
35H300		7.65	52	1.11	2.55	1.39	3.19	1.58	1.67
35H360		7.65	45	1.26	2.80	1.56	3.48	1.59	1.68
35H440		7.70	39	1.41	3.10	1.74	3.84	1.62	1.70
50H230	0.50	7.60	63	0.96	2.26	1.23	2.90	1.57	1.67
50H250		7.60	59	1.01	2.39	1.31	3.09	1.57	1.67
50H270		7.60	59	1.05	2.50	1.35	3.22	1.57	1.67
50H290		7.60	56	1.14	2.60	1.47	3.37	1.58	1.67
50H310		7.65	54	1.20	2.70	1.55	3.48	1.58	1.67
50H350		7.65	52	1.31	2.90	1.65	3.69	1.58	1.68
50H400		7.65	45	1.47	3.20	1.87	4.09	1.61	1.68
50H470		7.70	39	1.64	3.50	2.05	4.42	1.63	1.69
50H600		7.75	32	2.02	4.50	2.54	5.70	1.62	1.70
50H700		7.80	27	2.67	5.70	3.33	7.16	1.65	1.73
50H800		7.80	23	2.96	6.30	3.72	8.00	1.66	1.74
50H1000		7.85	17	3.30	7.00	4.17	8.94	1.68	1.76
50H1300		7.85	14	3.79	8.00	4.79	10.22	1.68	1.76

記号 Grade	呼称厚さ mm Thickness	密度 kg/dm³ Assumed Density	固有抵抗Ω・m (×10⁻⁸) Resistivity	鉄損 W/kg Iron Loss						磁束密度 T Induction	
				W10/50	W15/50	W10/60	W15/60	W10/400	W10/800	B25	B50
35HX230	0.35	7.65	54	0.91	2.12	1.14	2.66	16.1	48.4	1.60	1.69
35HX250		7.65	49	0.98	2.23	1.24	2.79	17.7	53.9	1.61	1.70
35HX300		7.70	44	1.09	2.41	1.36	3.02	18.4	55.1	1.64	1.72
50HX290	0.50	7.65	49	1.12	2.54	1.44	3.28	26.2	84.1	1.61	1.70
50HX350		7.70	37	1.39	3.06	1.77	3.90	29.2	93.7	1.66	1.74
50HX470		7.75	38	1.51	3.21	1.92	4.09	31.1	98.8	1.66	1.74
50HX600		7.75	32	1.70	3.62	2.16	4.63	35.9	116.5	1.67	1.75
15HX1000	0.15	7.60	63	0.80	1.98	0.98	2.42	9.4	23.9	1.51	1.61
20HX1200	0.20	7.60	61	0.82	1.97	1.01	2.43	10.8	29.0	1.53	1.63
20HX1300		7.65	55	0.98	2.39	1.20	2.92	12.1	31.5	1.54	1.64
25HX1400	0.25	7.65	56	0.87	2.16	1.07	2.66	12.4	34.7	1.56	1.66
25HX1500		7.65	54	0.87	2.02	1.08	2.51	12.8	35.6	1.59	1.68
27HX1500	0.27	7.65	54	0.90	2.06	1.11	2.55	13.7	38.8	1.59	1.68
27HX1800		7.70	44	1.12	2.45	1.38	3.02	15.5	45.0	1.63	1.72
30HX1600	0.30	7.65	56	0.91	2.14	1.13	2.66	14.2	41.7	1.58	1.67
30HX1800		7.65	54	0.93	2.11	1.15	2.62	14.7	43.0	1.58	1.68

（注）試験は圧延方向の試験片を半分，圧延と直角方向の試験片を半分用いて，JIS C 2550：2000 により行いました。固有抵抗は参考値です。
Note:Tests were conducted in accordance with JIS C 2550:2000, using as-sheared specimens one half longitudinal and one half transverse to the rolling direction.Resistivity is for reference.

機械的性質, 占積率, 繰返し曲げ回数の代表例

Typical Mechanical Properties, Lamination Factor and Number of bends

種類 / Type 記号 Grade	呼称厚さ mm Thickness	引張強さ N/mm² Tensile Strength L	降伏点 N/mm² Yield Point L	伸び % Elongation L	かたさ Hv Hardness	繰返し曲げ回数 Number of bends C	占積率 % Lamination Factor
35H210	0.35	508	391	14	213	7	98.0
35H230		506	386	15	211	8	98.0
35H250		508	389	15	210	9	98.0
35H270		531	397	24	199	12	98.0
35H300		509	371	24	197	20	98.0
35H360		481	343	29	175	27	98.0
35H440		451	320	31	165	25	98.0
50H230	0.50	546	420	18	206	6	98.5
50H250		519	395	17	205	6	98.5
50H270		522	396	18	205	6	98.5
50H290		518	393	17	201	11	98.5
50H310		517	374	24	192	12	98.5
50H350		521	380	27	184	14	98.5
50H400		482	344	31	164	24	98.5
50H470		449	314	33	150	27	98.5
50H600		418	292	34	130	27	98.5
50H700		391	282	35	117	22	98.5
50H800		382	294	35	114	28	98.5
50H1000		366	314	36	109	30	98.5
50H1300		358	316	36	104	32	98.5

（注）引張試験はJIS Z 2241:2011 により行いました。硬さの試験はJIS Z 2244:2009 により行いました。
占積率、繰返し曲げ試験は、JIS C 2550:2000 により行いました。
L は圧延方向に平行に採取した試験片を、C は圧延方向に直角の試験片を示します。

Note:Tensile tests were conducted in accordance with JIS Z 2241:2011.Hardness tests were conducted in accordance with JIS Z 2244:2009.Tests for the lamination factor and bending were conducted in accordance with JIS C 2550:2000.
L:specimens taken longitudinal to the rolling direction. C:specimens taken transverse to the rolling direction.

種類 / Type 記号 Grade	呼称厚さ mm Thickness	引張強さ N/mm² Tensile Strength L	降伏点 N/mm² Yield Point L	伸び % Elongation L	かたさ Hv Hardness	繰返し曲げ回数 Number of bends C	占積率 % Lamination Factor
35HX230	0.35	508	372	23	194	≧10	98.0
35HX250		480	335	22	182	≧10	98.0
35HX300		470	330	27	166	≧10	98.0
50HX290	0.50	472	328	25	185	≧10	98.5
50HX350		368	232	31	140	≧10	98.5
50HX470		403	272	33	135	≧10	98.5
50HX600		379	239	35	125	≧10	98.5
15HX1000	0.15	509	413	12	200	≧10	96.0
20HX1200	0.20	498	419	9	201	≧10	97.0
20HX1300		500	382	22	198	≧10	97.0
25HX1400	0.25	518	394	16	215	≧10	98.0
25HX1500		483	357	17	198	≧10	98.0
27HX1500	0.27	469	357	22	198	≧10	98.0
27HX1800		438	311	22	175	≧10	98.0
30HX1600	0.30	510	393	14	202	≧10	98.0
30HX1800		501	371	21	193	≧10	98.0

（注）引張試験はJIS Z 2241:2011 により行いました。硬さの試験はJIS Z 2244:2009 により行いました。
占積率、繰返し曲げ試験は、JIS C 2550:2000 により行いました。
L は圧延方向に平行に採取した試験片を、C は圧延方向に直角の試験片を示します。

Note:Tensile tests were conducted in accordance with JIS Z 2241:2011.Hardness tests were conducted in accordance with JIS Z 2244:2009.Tests for the lamination factor and bending were conducted in accordance with JIS C 2550:2000.
L:specimens taken longitudinal to the rolling direction. C:specimens taken transverse to the rolling direction.

絶縁皮膜

Surface Insulation

記号	R	G, XN, L, X1	G2, L2
組成	無機質	無機質をベースとして有機質を含んでいます。	無機質をベースとして有機質を含んでいます。鋼板表面に Hr.m.s.0.5μ m 以上の粗度を持っています。
層間抵抗	高い層間抵抗を有しています。	高い層間抵抗を有しています。	G，L より若干低い層間抵抗を有しています。
加工性	皮膜は鋼板に強固に密着しており切断，打抜きの際に剥離することなく加工性に優れています。 溶接性は極めて良好です。	特に打抜性に優れています。また皮膜は強固に密着しており切断，打抜きの際に剥離することなく加工性に優れています。溶接性も良好です。	特に打抜性，溶接性に優れています。また，皮膜は強固に密着しており，切断，打抜きの際に剥離することなく加工性に優れています。
占積率	皮膜が薄いため極めて高い占積率を有しています。	皮膜が薄いため極めて高い占積率を有しています。	皮膜が薄いため高い占積率を有しています。
耐熱性	非酸化性雰囲気中で 800℃程度までの歪取焼鈍に耐えます。	非酸化性雰囲気中で 800℃程度までの歪取焼鈍に耐えますが，特に雰囲気が酸化性にならないよう注意が必要です。	非酸化性雰囲気中で 800℃程度までの歪取焼鈍に耐えますが，特に雰囲気が酸化性にならないよう注意が必要です。
耐食性	高い防錆力を持ち，また，絶縁油・ワニス・機械油・冷凍ガスなどに浸されることはありません。	高い防錆力を持ち，また，絶縁油・ワニス・機械油・冷凍ガスなどに浸されることはありません。	高い防錆力を持ち，また，絶縁油・ワニス・機械油・冷凍ガスなどに浸されることはありません。

SYMBOL	R	G, XN, L, X1	G2, L2
Composition	Inorganic substance	Inorganic base substance including organic substance	Inorganic base substance including organic substance. Steeling sheet has surface roughness of Hr.m.s.0.5μm or more.
Interlaminar resistance	High interlaminar resistance	High interlaminar resistance	Interlaminar resistance slightly lower than G, L
Machinability	Surface insulation coating is so firmly bonded on to mother sheet that it will never peels off due to cutting and punching. High machinability and weldability	Extremely high punching quality. High machinability and weldability. Surface insulation coating is so firmly bonded on to mother sheet that it will never peels off due to cutting and punching.	Extremely high punching quality and weldability. High machinability because surface insulation coating is so firmly bonded on to mother sheet that it will never peels off due to cutting and punching.
Lamination factor	Extremely high Lamination factor due to thin lamination of insulation coating	Extremely high Lamination factor due to thin lamination of insulation coating	High Lamination factor due to thin lamination of insulation coating
Heat resistance	Up to about 800℃ at which stress-relief annealing is provided in non-oxidizing atmosphere.	Up to about 800℃ at which stress-relief annealing is provided in non-oxidizing atmosphere, but care should be taken not to allow the atmosphere to become oxidizing.	Up to about 800℃ at which stress-relief annealing is provided in non-oxidizing atmosphere, but care should be taken not to allow the atmosphere to become oxidizing.
Corrosion resistance	High corrosion resistance against insulation oil, varnish, machine oil, refrigerant gas	High corrosion resistance against insulation oil, varnish, machine oil, refrigerant gas	High corrosion resistance against insulation oil, varnish, machine oil, refrigerant gas

応力除去焼きなまし（歪取焼鈍）

ハイライトコア，ホームコア，ハイエックスコア

電磁鋼板は，打抜き，切断，曲げなどの加工による機械的歪で磁気的特性が劣化します。歪取焼鈍は，この歪を取り，本来の性質を回復させるために行うものです。鋼板または積層したコアの状態で歪取焼鈍を行う場合の注意事項は次の通りです。

1. 過度の酸化を防ぐこと

外気侵入による酸化を防ぐためカバーは気密なものを使用し，かつ裾部は乾燥した砂で十分におおうなどの措置が必要です。さらに，カバー内の空気を非酸化性の雰囲気におきかえて加熱する必要があります。雰囲気としては水素 10% 以下，窒素 90% 以上の非爆発性の混合ガスか，純度の高い窒素がよく，また，露点は 0℃以下に管理されることをお奨めいたします。

2. 焼鈍温度および保持時間

焼鈍温度は通常，材料温度で，720 ~ 750℃あれば十分ですが，鋼板の各部が一様に焼鈍されるように，焼鈍温度，時間，雰囲気を調整されることをお奨めいたします。

3. 冷却時間

急激な冷却は材料に歪を与えますのでよくありません。
冷却時間は焼鈍する電磁鋼板の量によって異なりますが，数トン程度では，1時間当たり 25℃未満の冷却速度で 350℃まで冷却すれば，冷却時に生ずる歪を避けることができます。重量が大きくなれば，さらにゆっくり冷却するほうが良い結果が得られます。

Annealing By Customers

HILITECORE, HOMECORE and HIEXCORE

Stresses are introduced into electrical steel sheets whenever they are punched, sheared or bended.
These stresses have an adverse effect on the magnetic properties. Stress-relief annealing is necessary in order to relief these stresses and restore the original magnetic properties.
The following are some precautions to be observed when electrical steel sheets are subjected to stress-relief annealing.

1. AVOID EXCESSIVE OXIDIZATION

Oxidization seriously impairs the magnetic properties, particularly at high inductions. In batch-type annealing, excessive oxidization and potential damage caused by impurities present in the annealing atmosphere may be avoided by using an annealing cover, which can be sealed with dry sand. It is most important for the cover to properly seal off the charge. Any air inside the annealing cover should be flushed out and replaced with a non-oxidizing atmosphere. A non-explosive atmosphere composed of ≦10% hydrogen &≧90% nitrogen, or high-purity nitrogen gas are recommended, and the dew point of the atmosphere should be maintained at less than 0℃ (32° F).

2. ANNEALING TEMPERATURE AND HOLDING TIME

The usual practice of annealing is to raise the temperature of the charge to a level ranging from 720℃ (1,328° F) to 750℃ (1,382° F), and to maintain this temperature range long enough to permit uniform heat penetration.
Temperature, holding time and atmosphere must be well controlled.

3. COOLING TIME

To avoid distortion of laminations and cores, it is required that the charges should be cooled slowly to a temperature of about 350℃ (662° F) at a rate not exceeding 25℃ (45° F) per hour, especially for charges weighing only a few tons.
For heavier charges, better results will be obtained by a slower rate of cooling.

特性曲線

Property Curves

次ページ以下に特性曲線の一例を示します。
全ての製品の磁気的性質は，25cmエプスタイン法を用いて，JIS C 2550:2000により，測定しました。
直流磁化特性については、磁化力 10,000A/m 超は、透磁率計を用いて測定しました。
試験片は，半分を圧延方向と平行に，残り半分を圧延方向と直角にそれぞれ採取して，歪取焼鈍を施さずに使用しました。

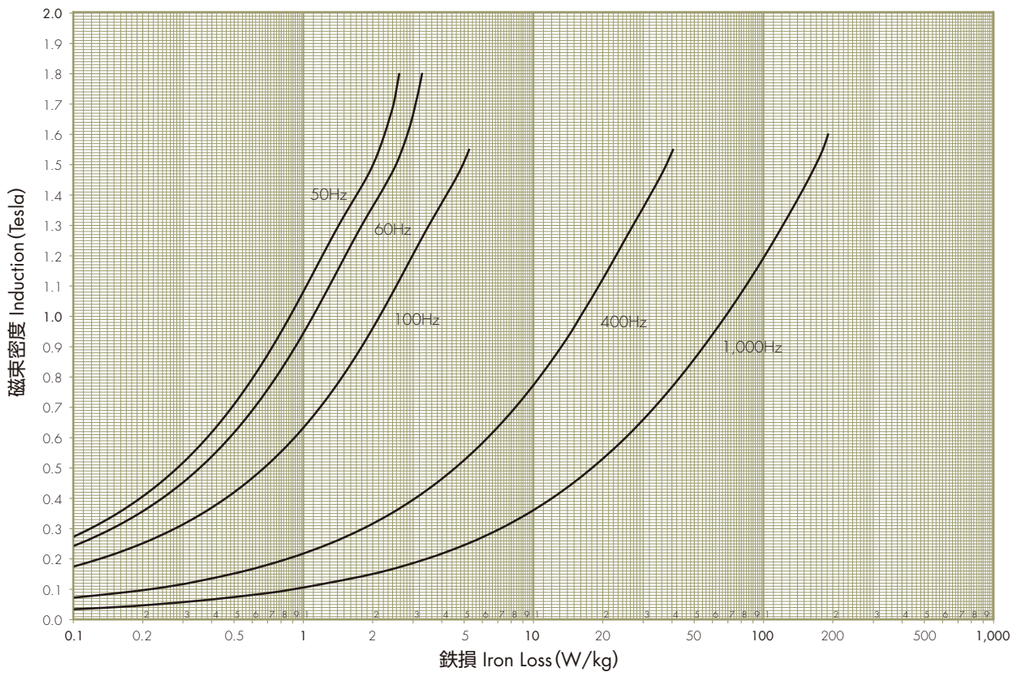
Example of property curves are shown on the following pages.
The magnetic properties of all products were measured with a 25-cm Epstein frame and in accordance with JIS C 2550:2000.
The DC magnetization properties were measured with a permeameter method when the magnetizing force exceeded 10,000 A/m.
Used specimens were taken one half longitudinal and one half transverse to the rolling direction without stress-relief annealing.

■特性曲線目次

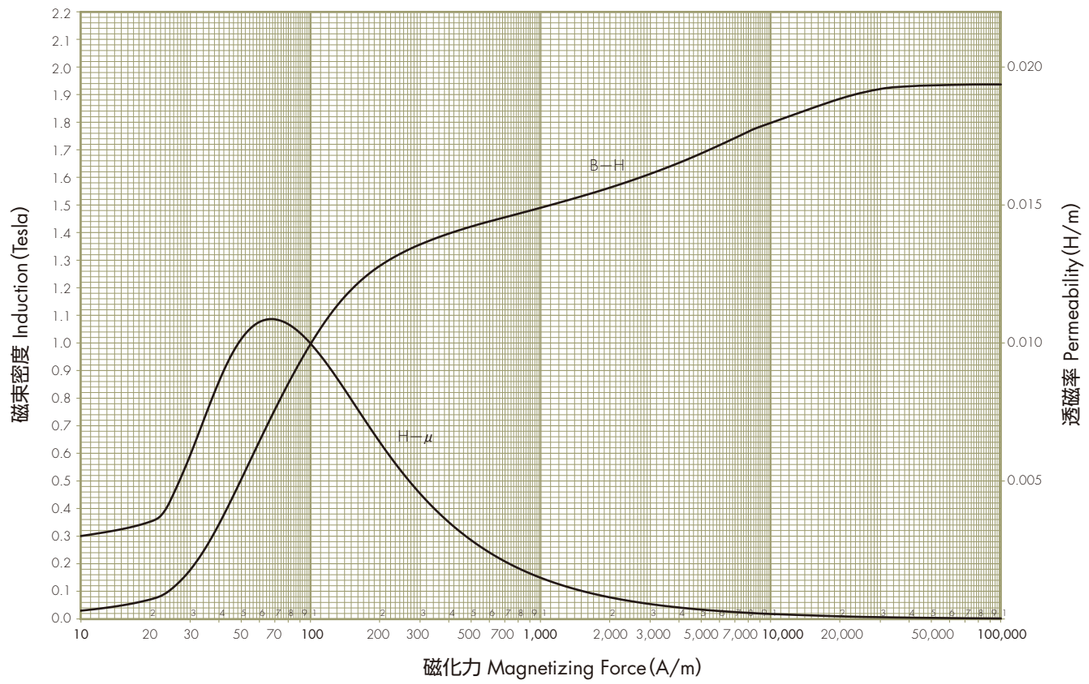
	1	2	3	4
	鉄損曲線 Iron Loss Curve	交流周波数特性 Frequency Dependance	直流磁化曲線 DC Magnetization Curve 直流透磁率曲線 DC Permeability Curve	直流ヒステリシス曲線 DC Hysteresis Curve
35H210	14	14	15	15
35H230	16	16	17	17
35H250	18	18	19	19
35H270	20	20	21	21
35H300	22	22	23	23
35H360	24	24	25	25
35H440	26	26	27	27
50H230	28	28	29	29
50H250	30	30	31	31
50H270	32	32	33	33
50H290	34	34	35	35
50H310	36	36	37	37
50H350	38	38	39	39
50H400	40	40	41	41
50H470	42	42	43	43
50H600	44	44	45	45
50H700	46	46	47	47
50H800	48	48	49	49
50H1000	50	50	51	51
50H1300	52	52	53	53
35HX230	54	54	55	55
35HX250	56	56	57	57
35HX300	58	58	59	59
50HX290	60	60	61	61
50HX350	62	62	63	63
50HX470	64	64	65	65
50HX600	66	66	67	67
15HX1000	68	68	69	69
20HX1200	70	70	71	71
20HX1300	72	72	73	73
25HX1400	74	74	75	75
27HX1500	76	76	77	77
27HX1800	78	78	79	79
30HX1600	80	80	81	81
30HX1800	82	82	83	83

35H210

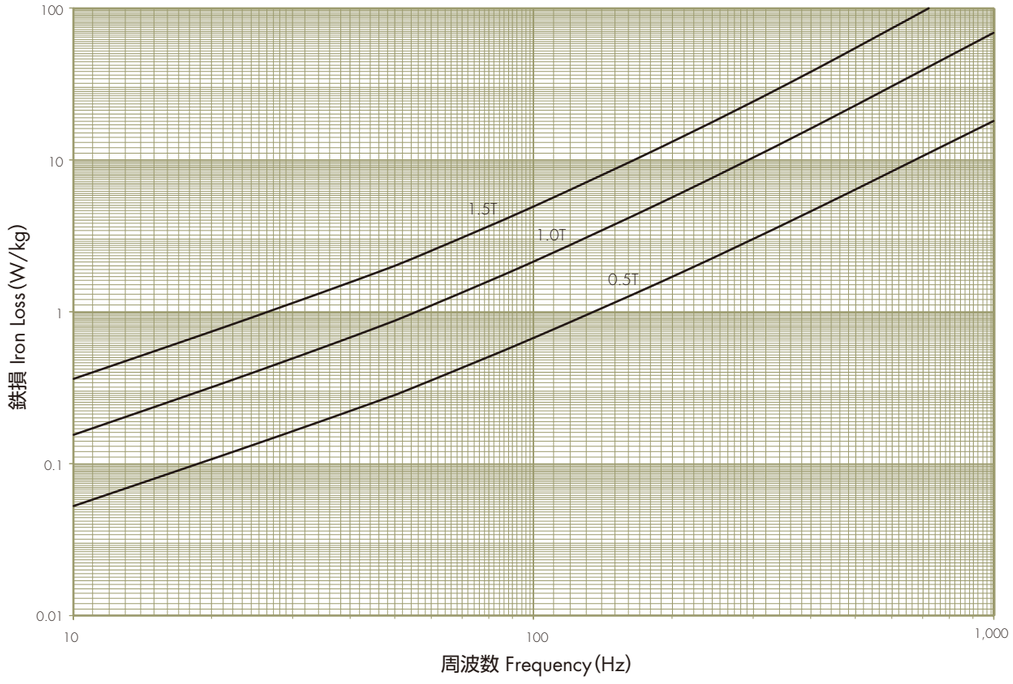
鉄損曲線 Iron Loss Curve



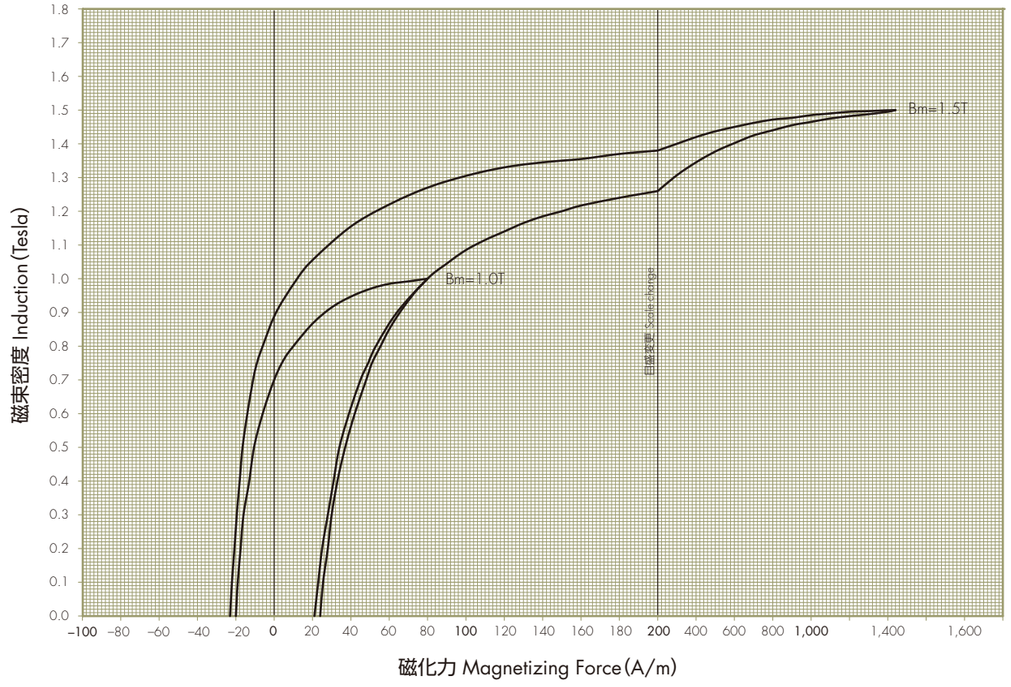
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

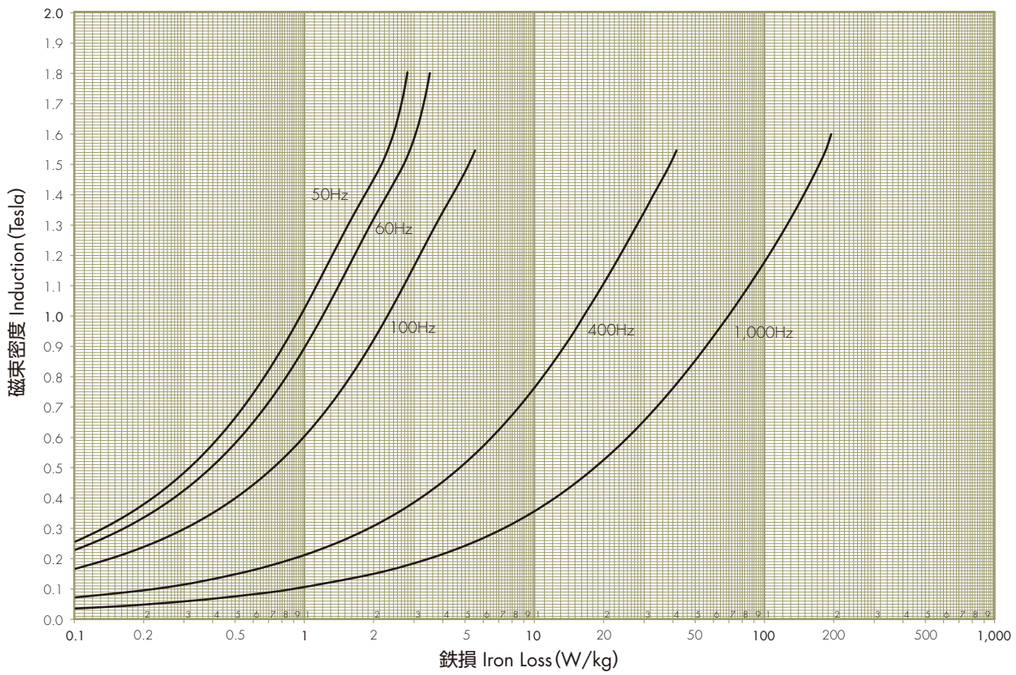


直流ヒステリシス曲線 DC Hysteresis Curve

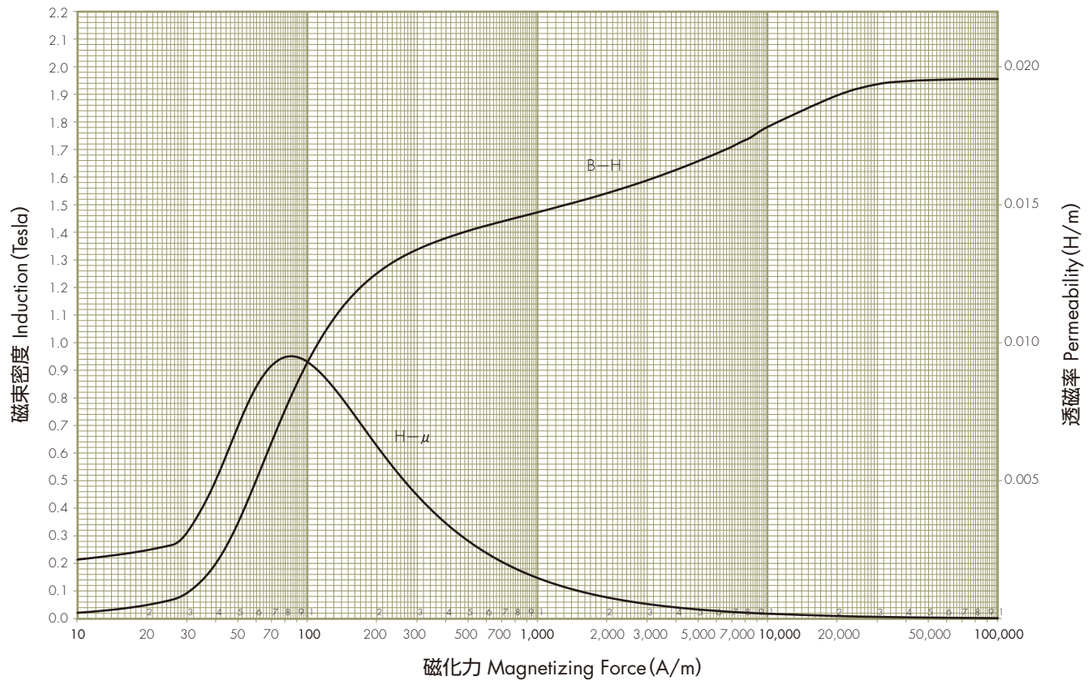


35H230

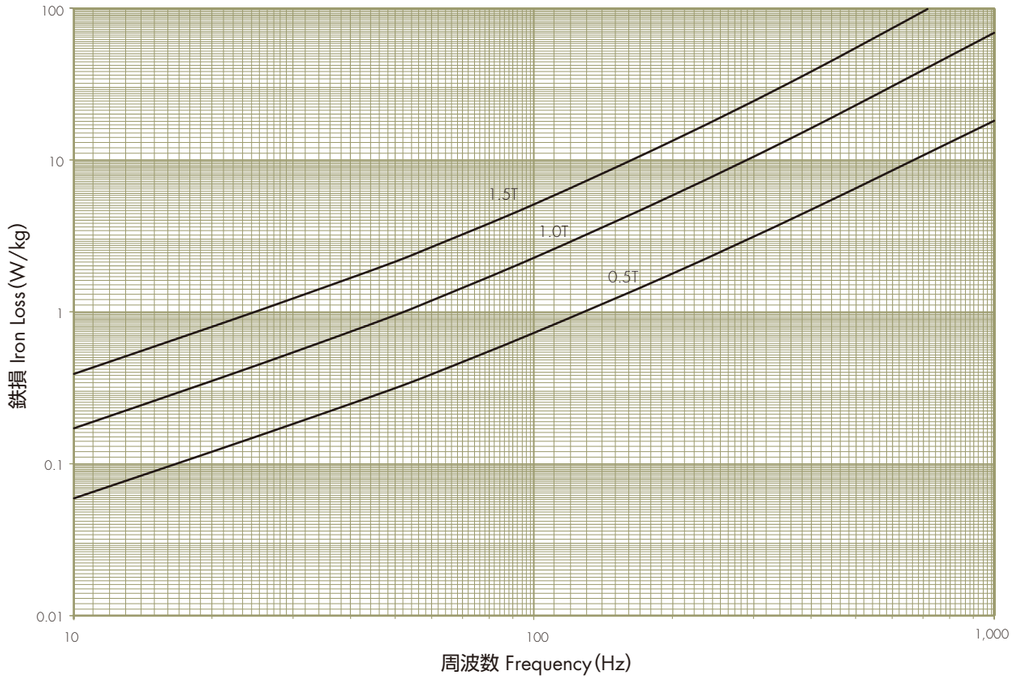
鉄損曲線 Iron Loss Curve



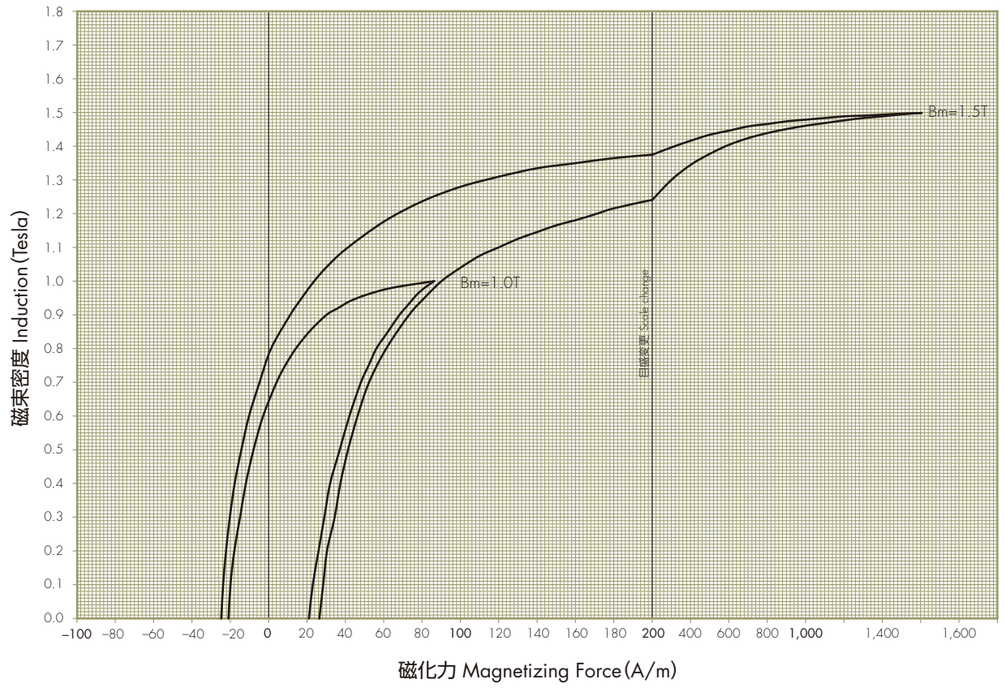
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

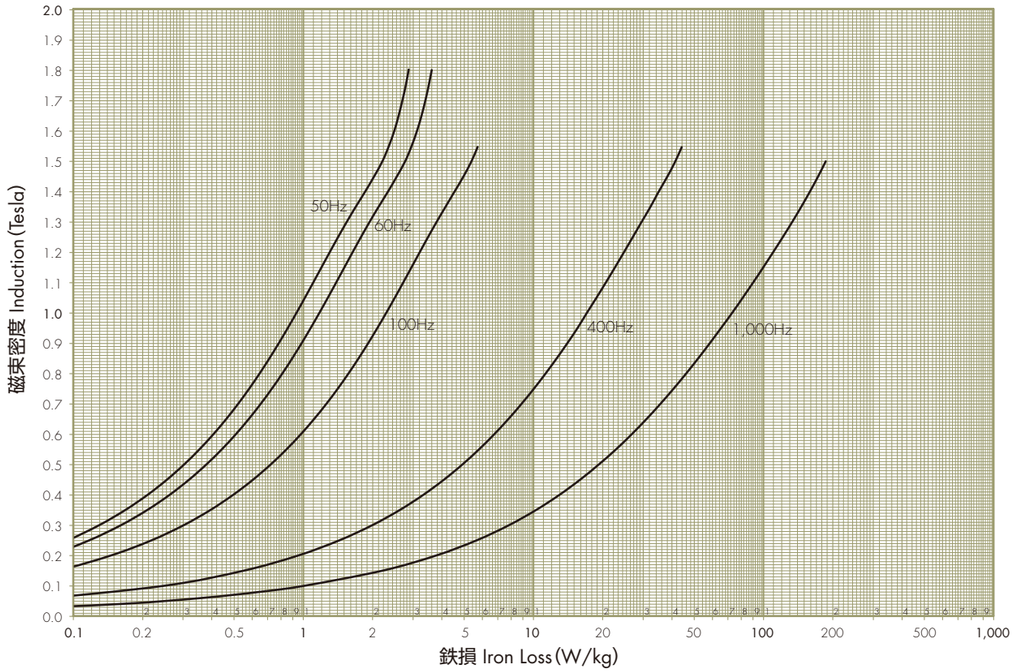


直流ヒステリシス曲線 DC Hysteresis Curve

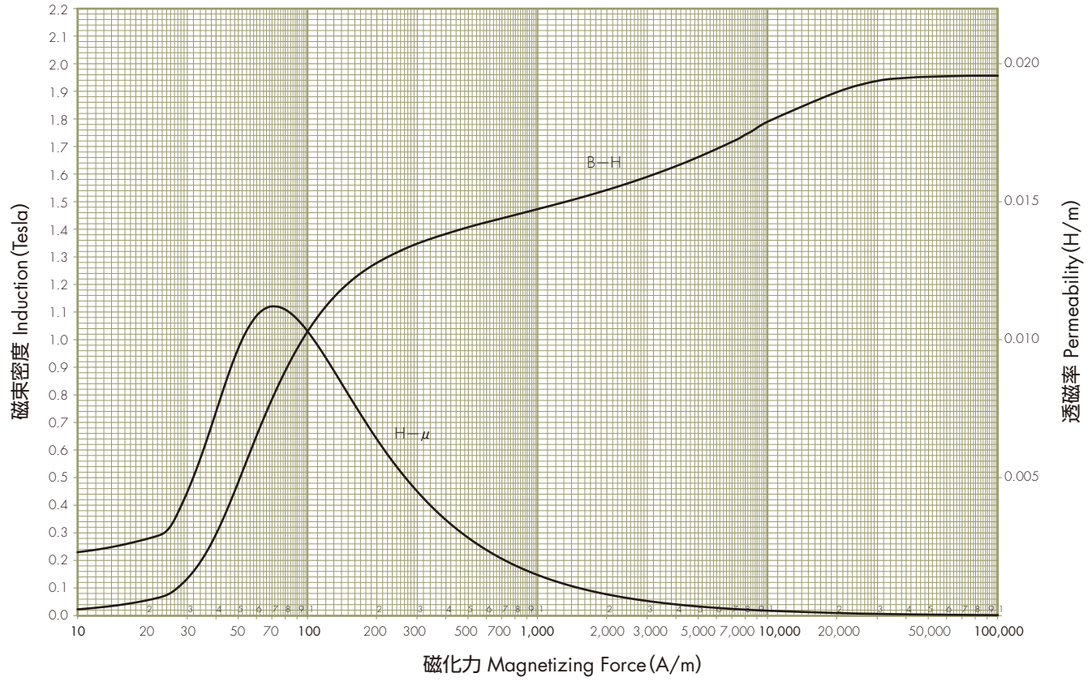


35H250

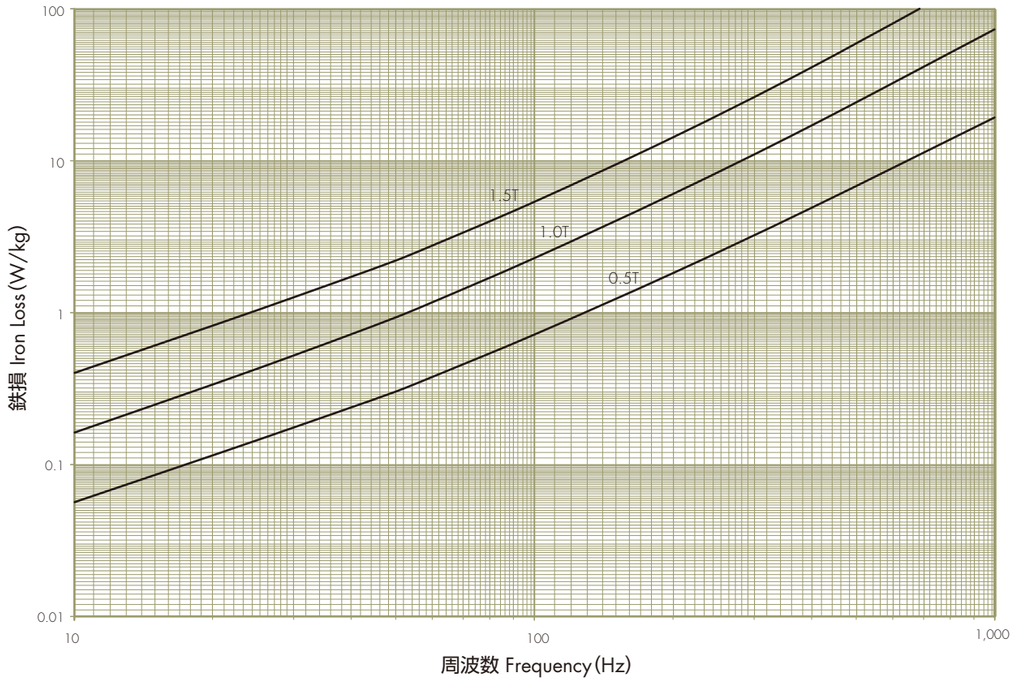
鉄損曲線 Iron Loss Curve



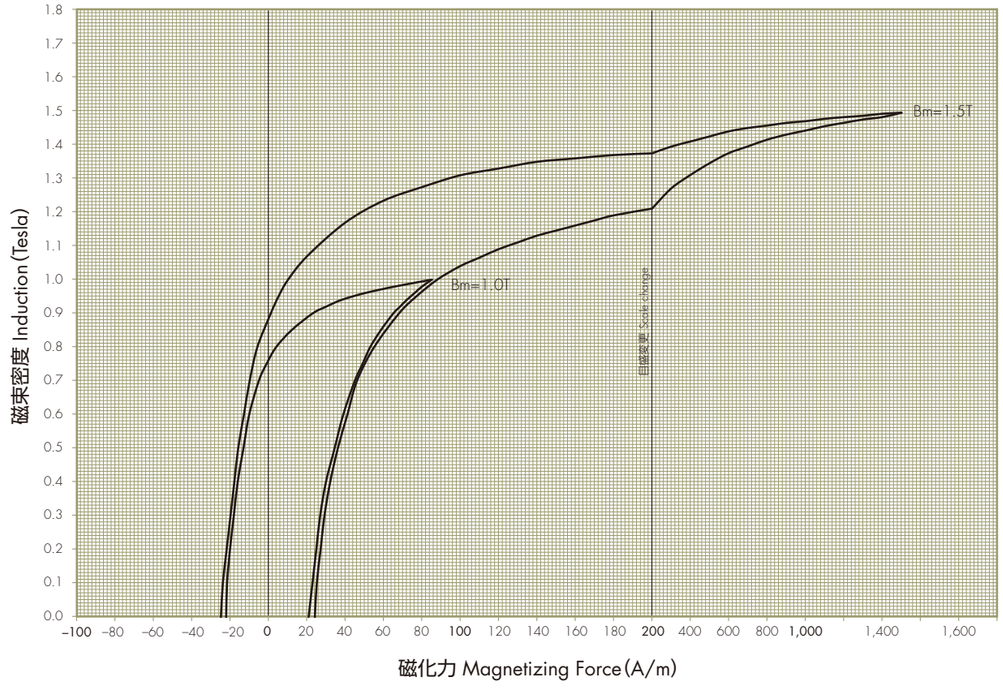
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

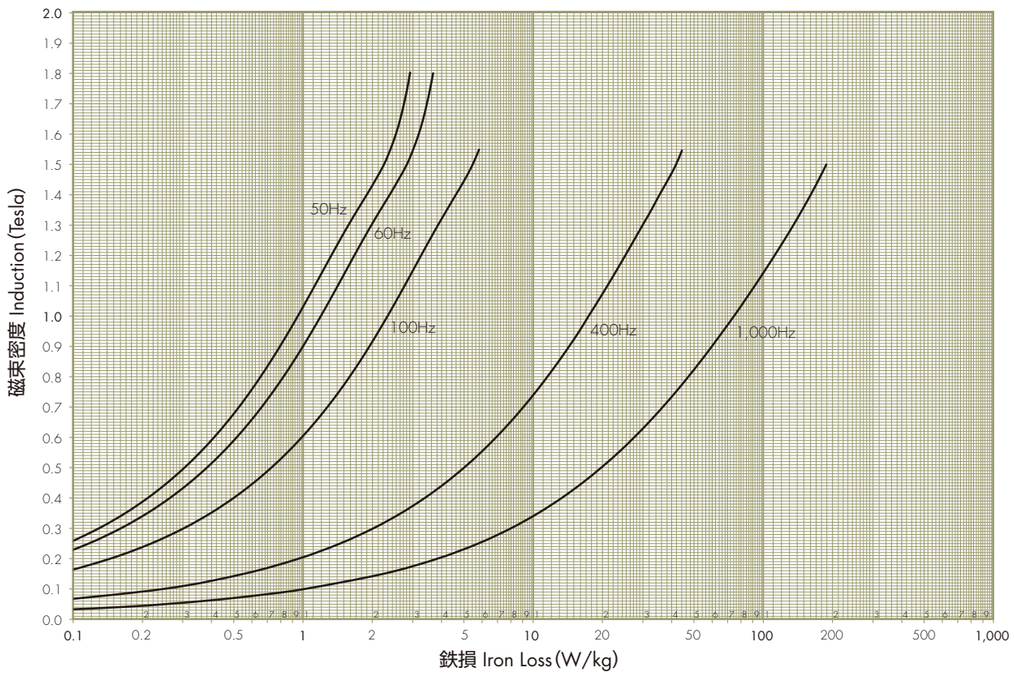


直流ヒステリシス曲線 DC Hysteresis Curve

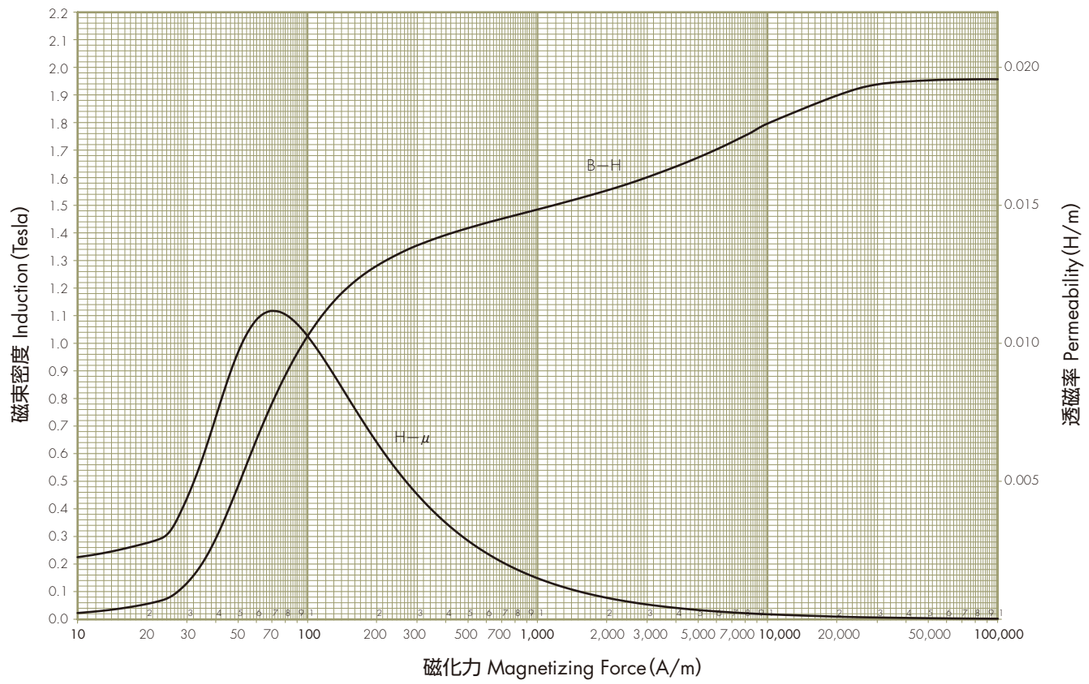


35H270

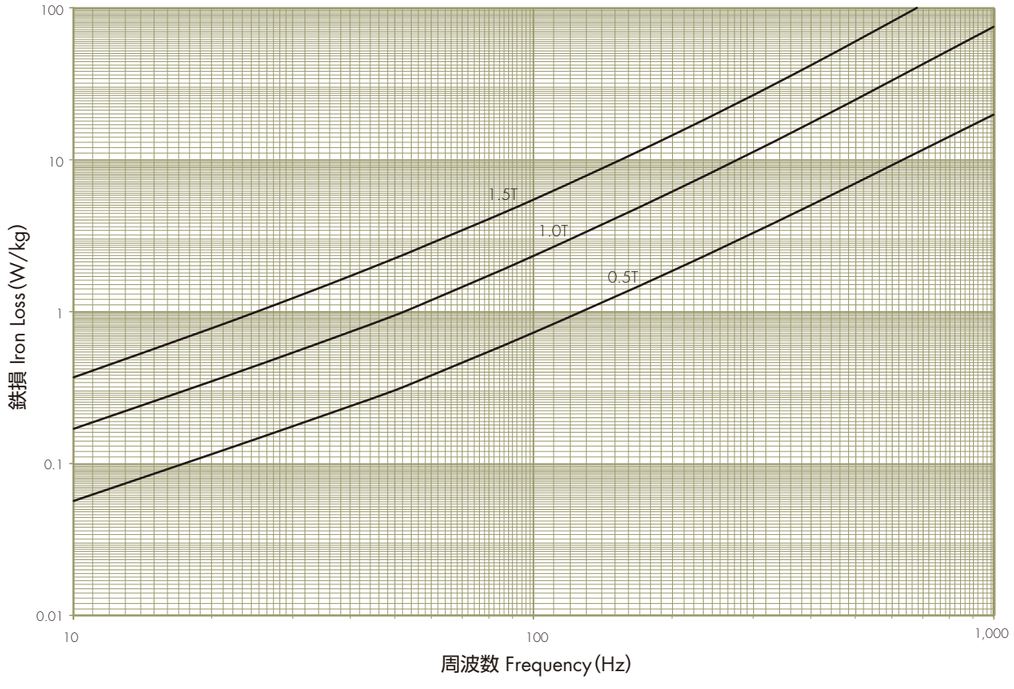
鉄損曲線 Iron Loss Curve



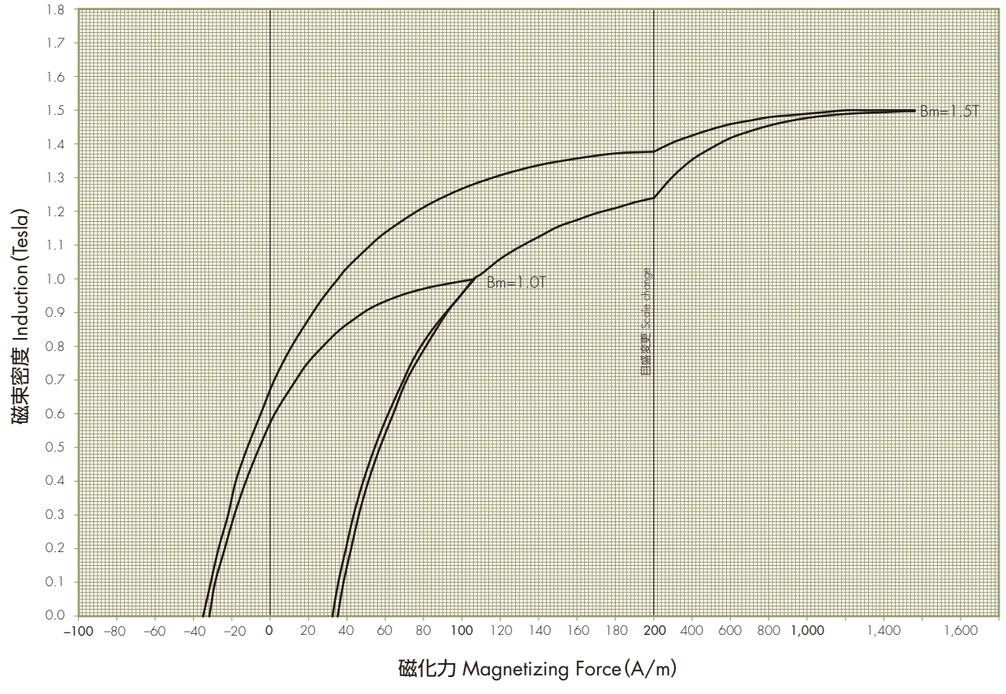
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance



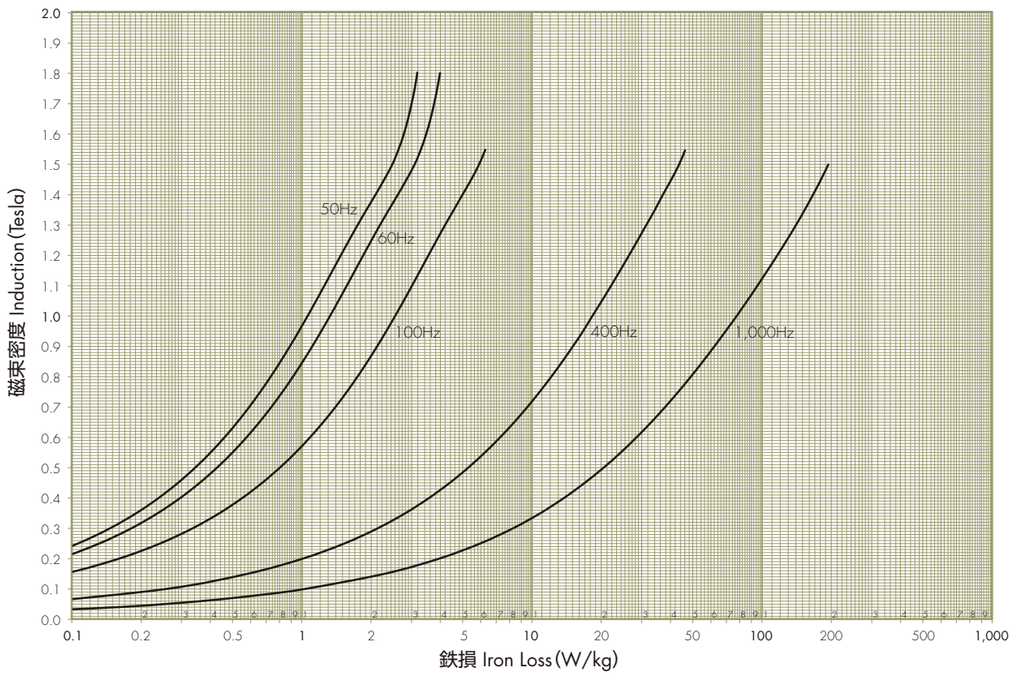
直流ヒステリシス曲線 DC Hysteresis Curve



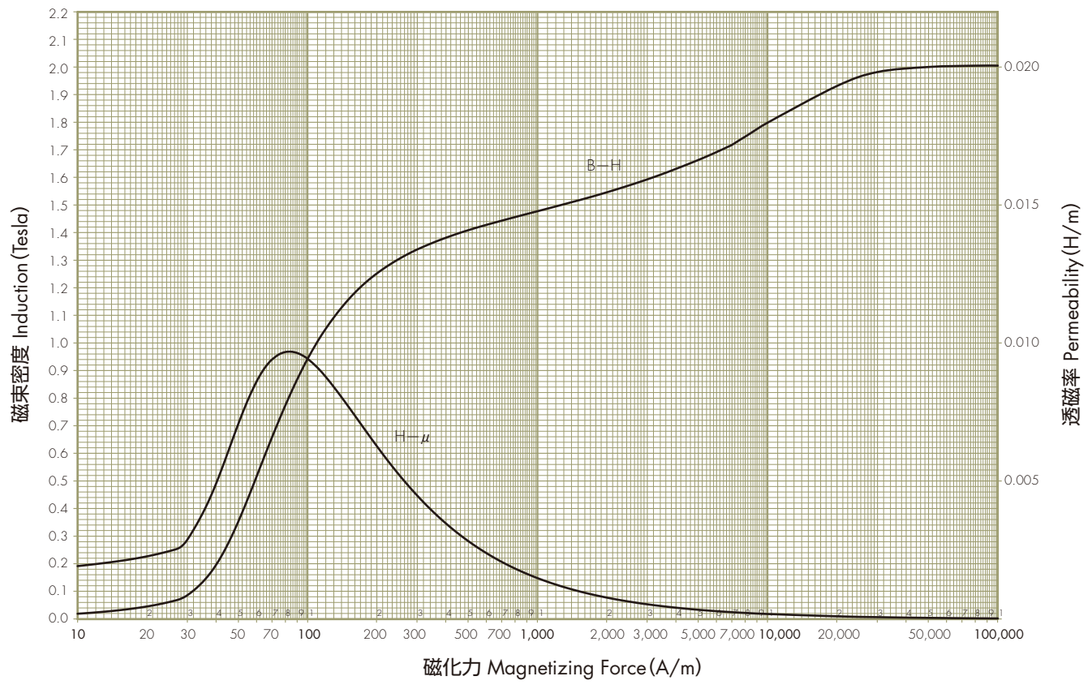
35H270

35H300

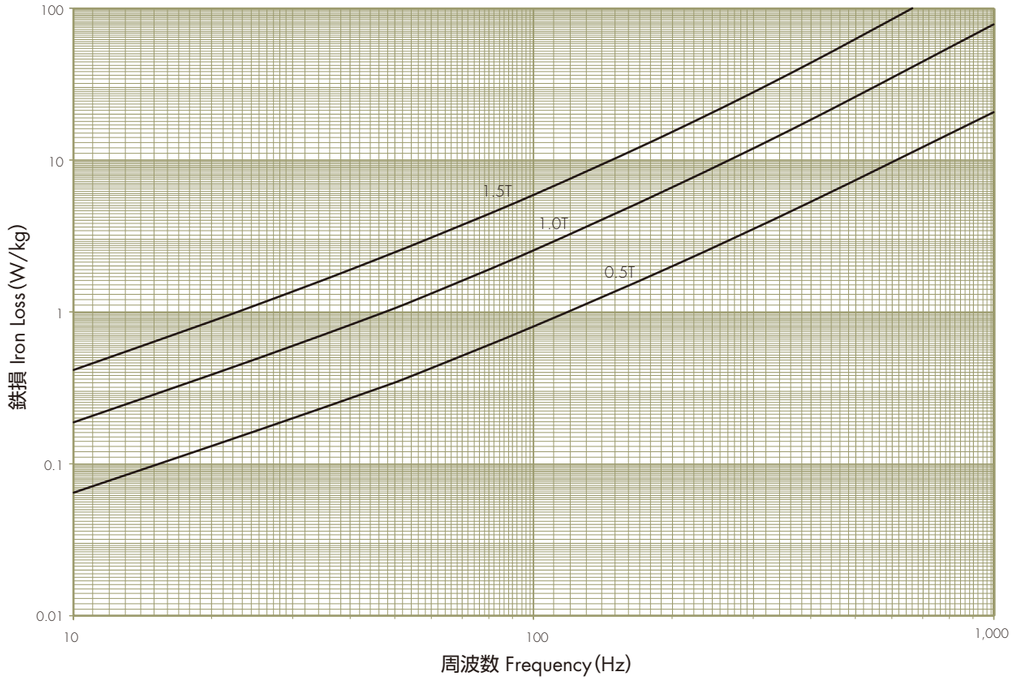
鉄損曲線 Iron Loss Curve



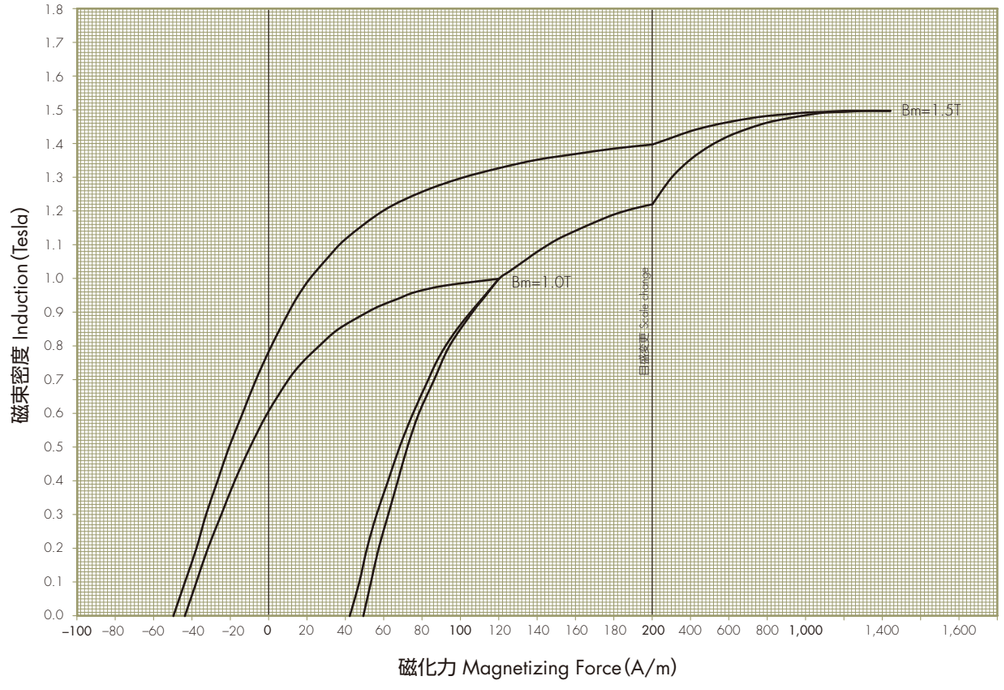
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance



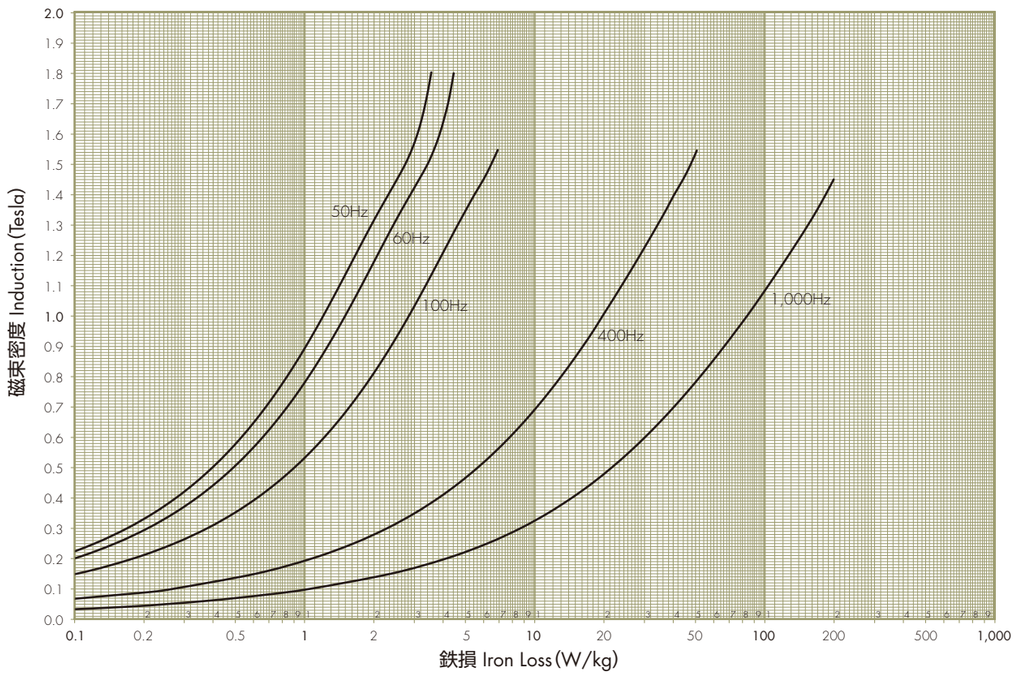
直流ヒステリシス曲線 DC Hysteresis Curve



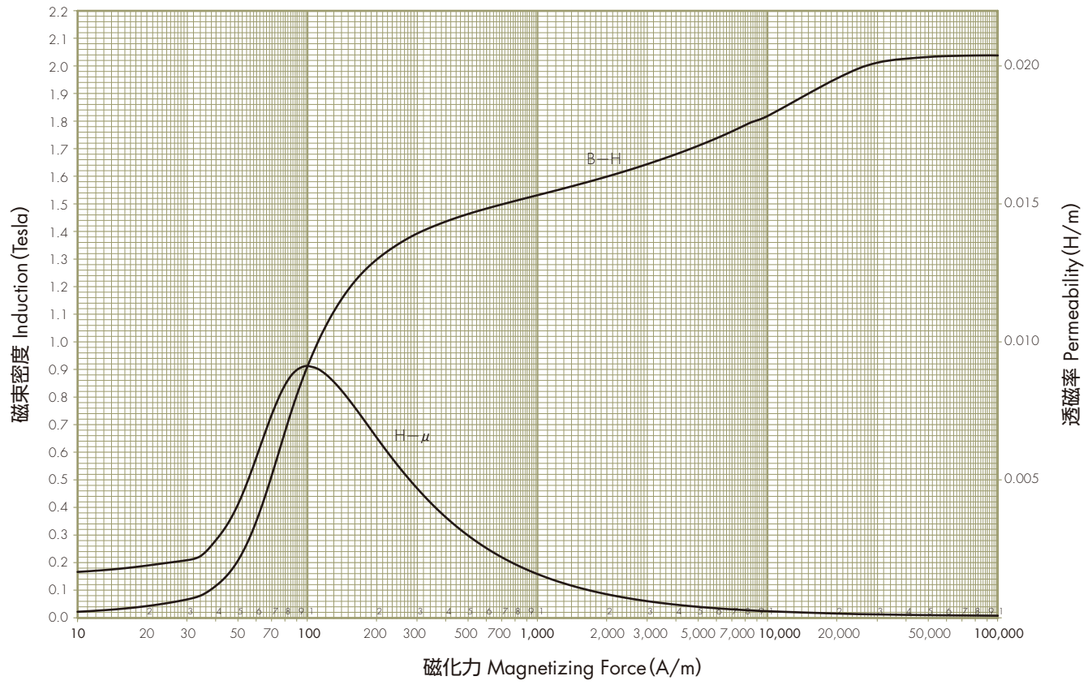
35H300

35H360

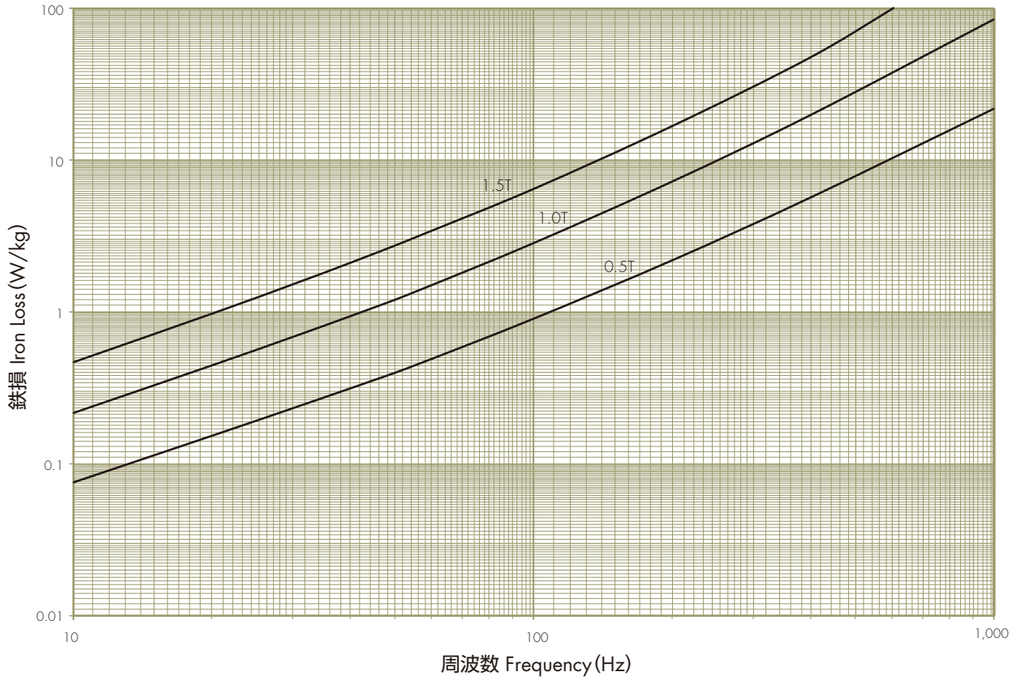
鉄損曲線 Iron Loss Curve



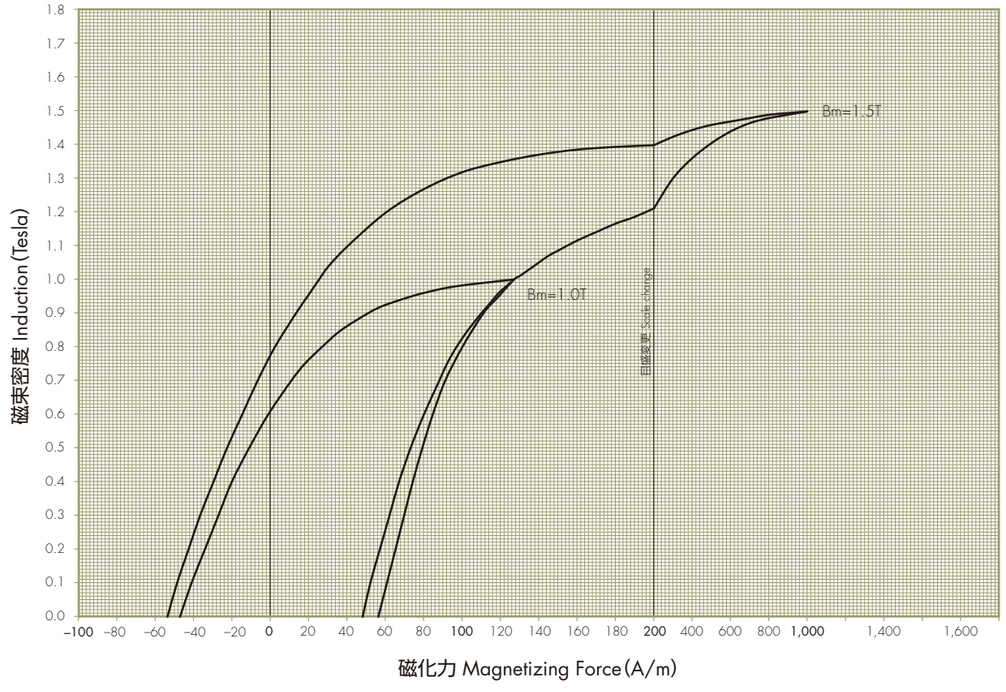
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

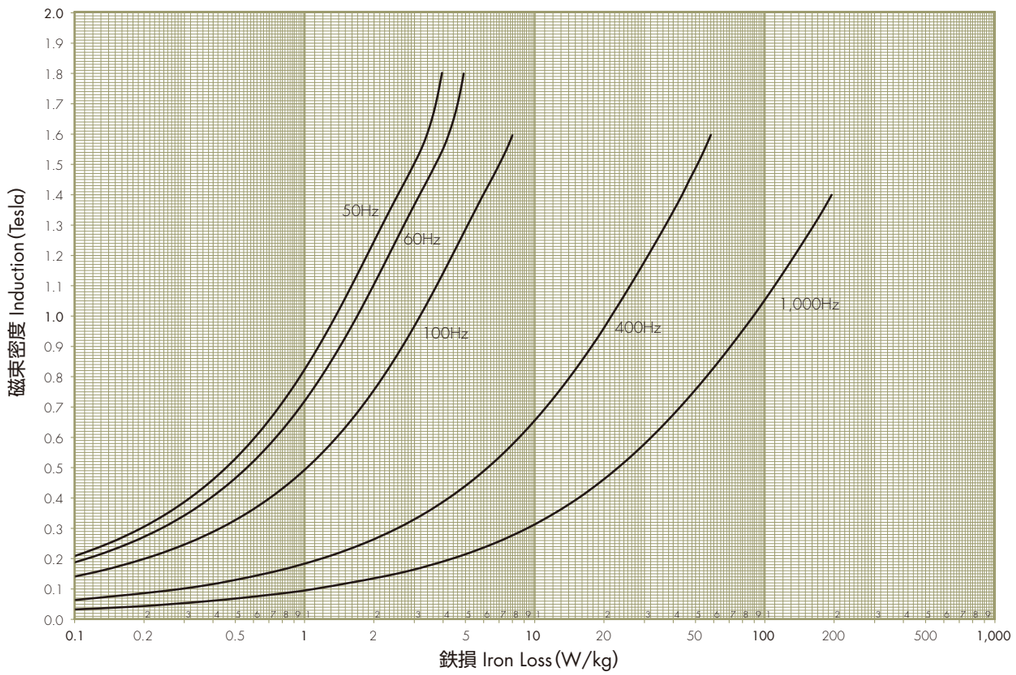


直流ヒステリシス曲線 DC Hysteresis Curve

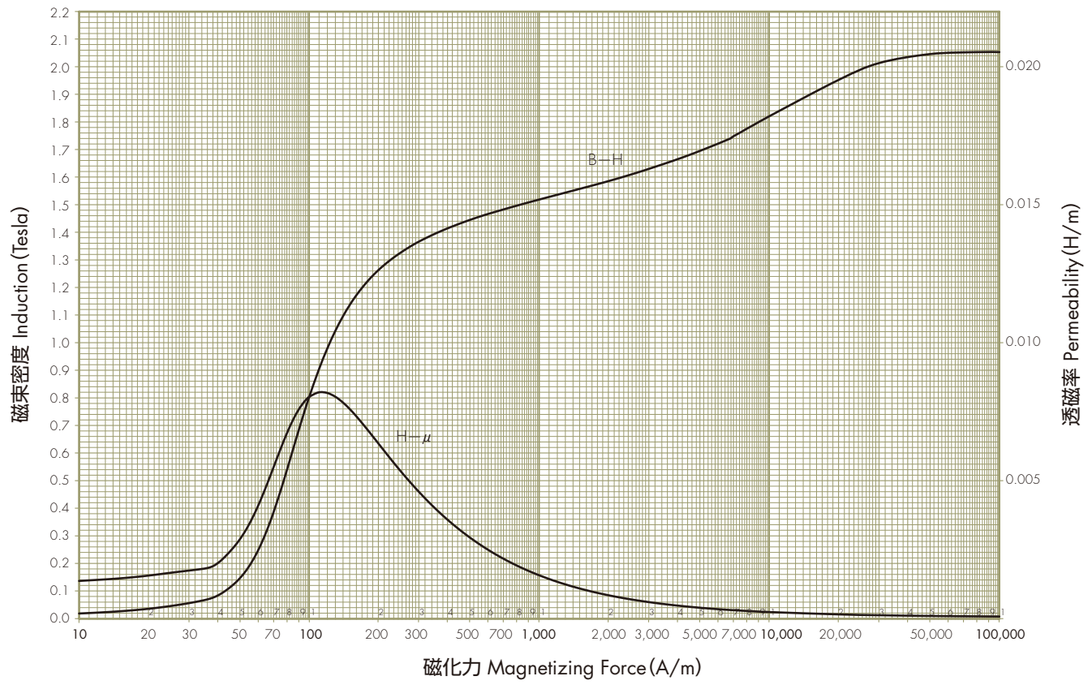


35H440

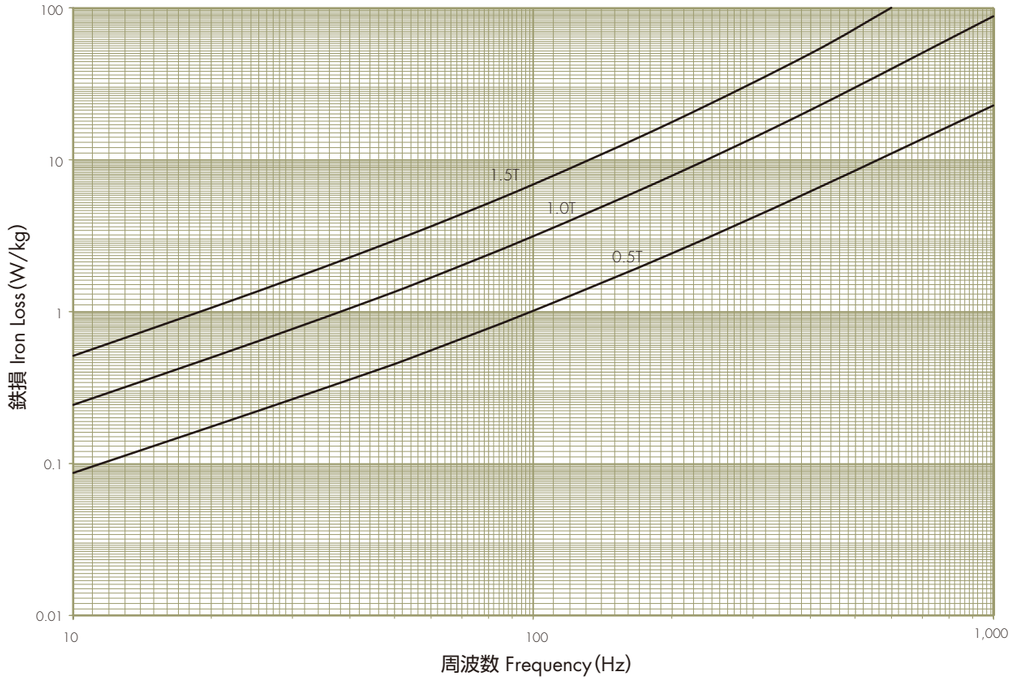
鉄損曲線 Iron Loss Curve



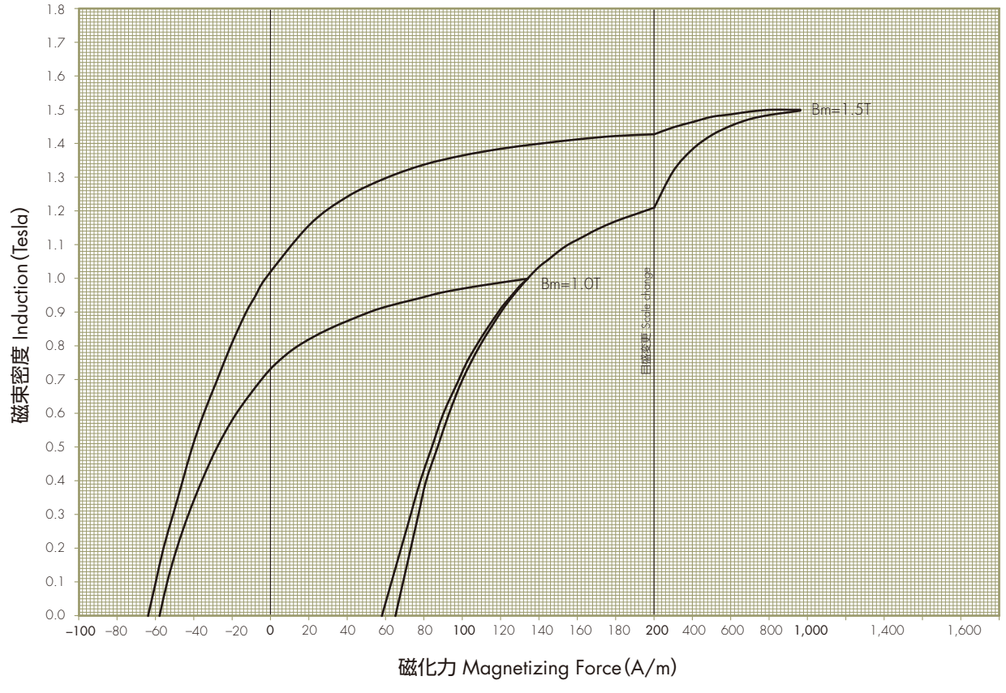
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

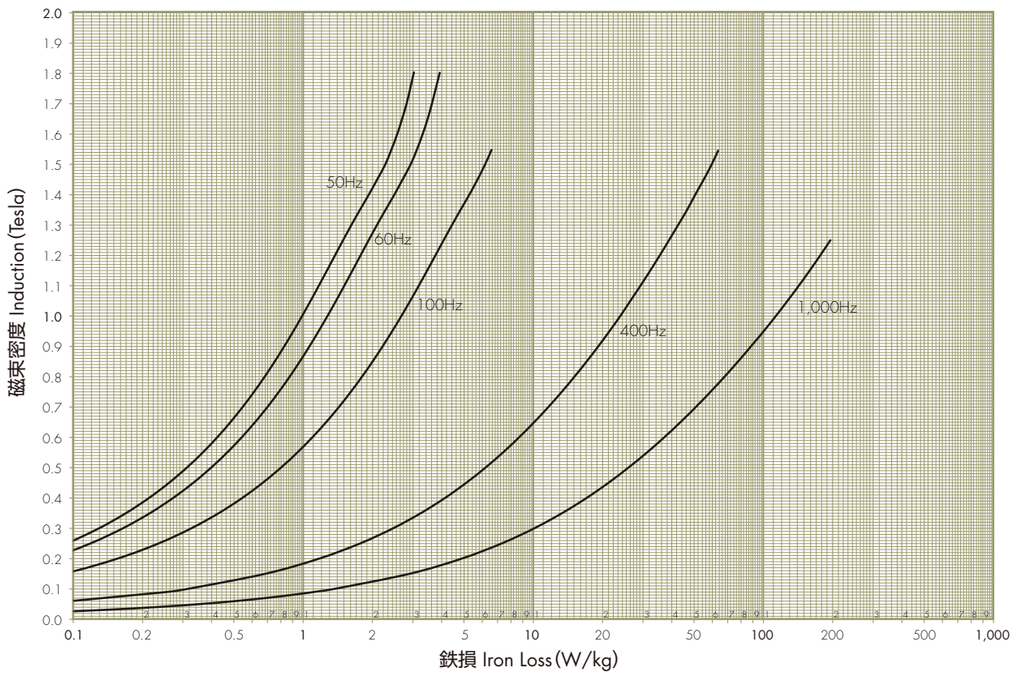


直流ヒステリシス曲線 DC Hysteresis Curve

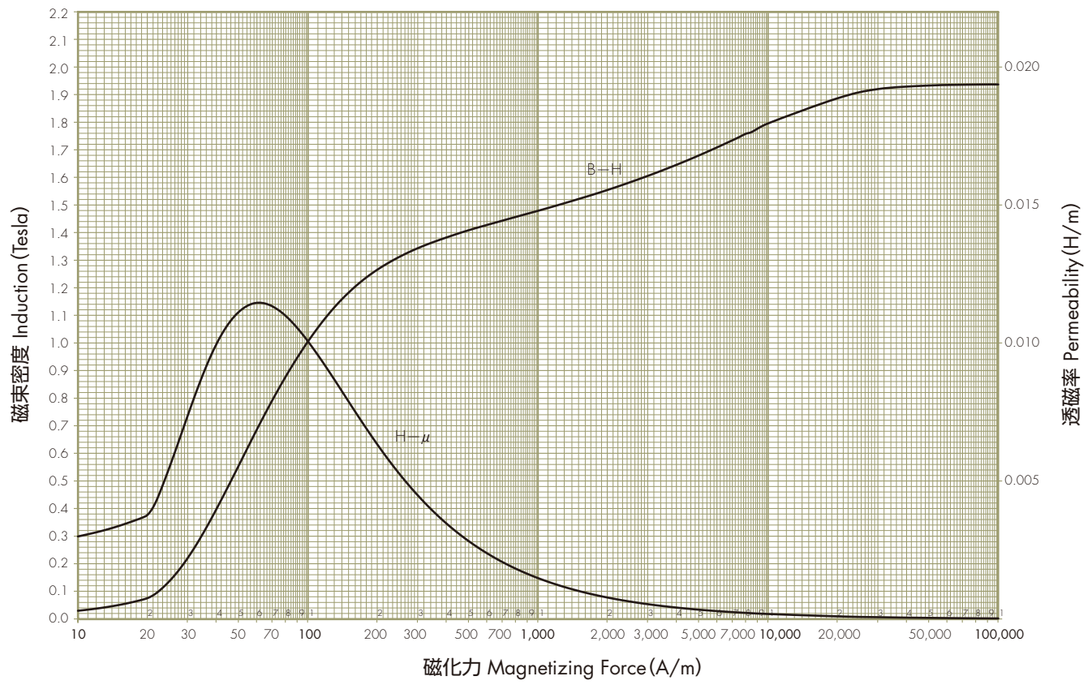


50H230

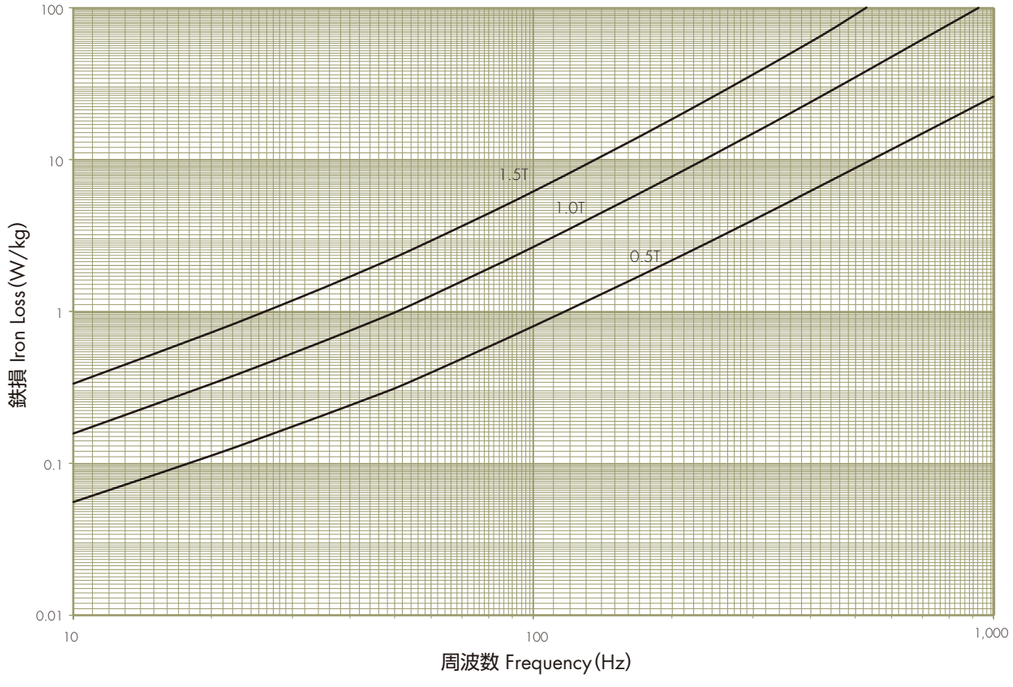
鉄損曲線 Iron Loss Curve



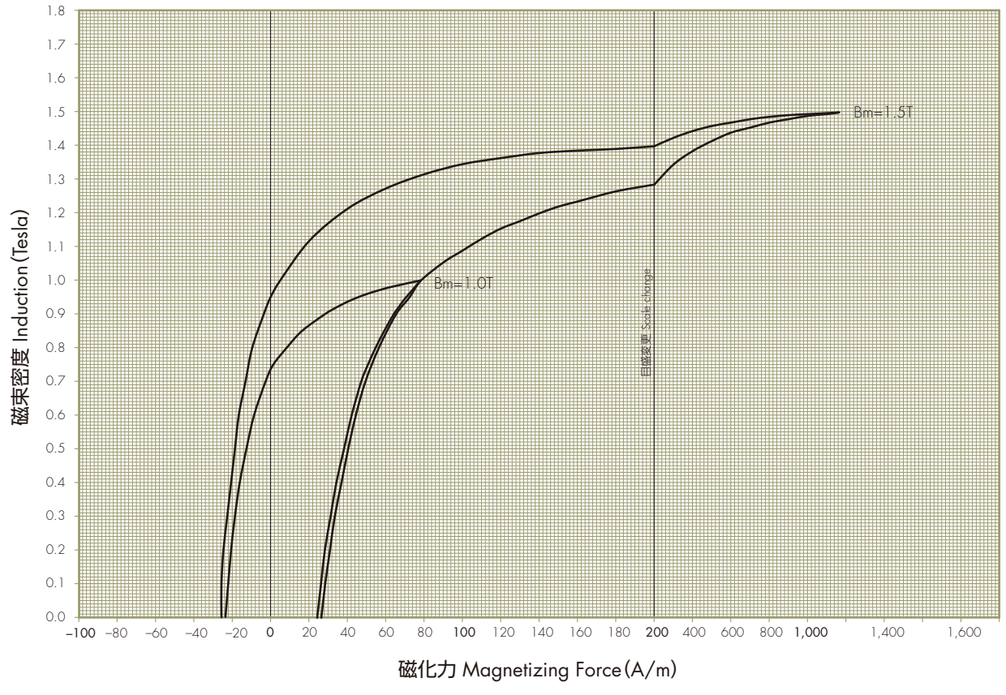
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

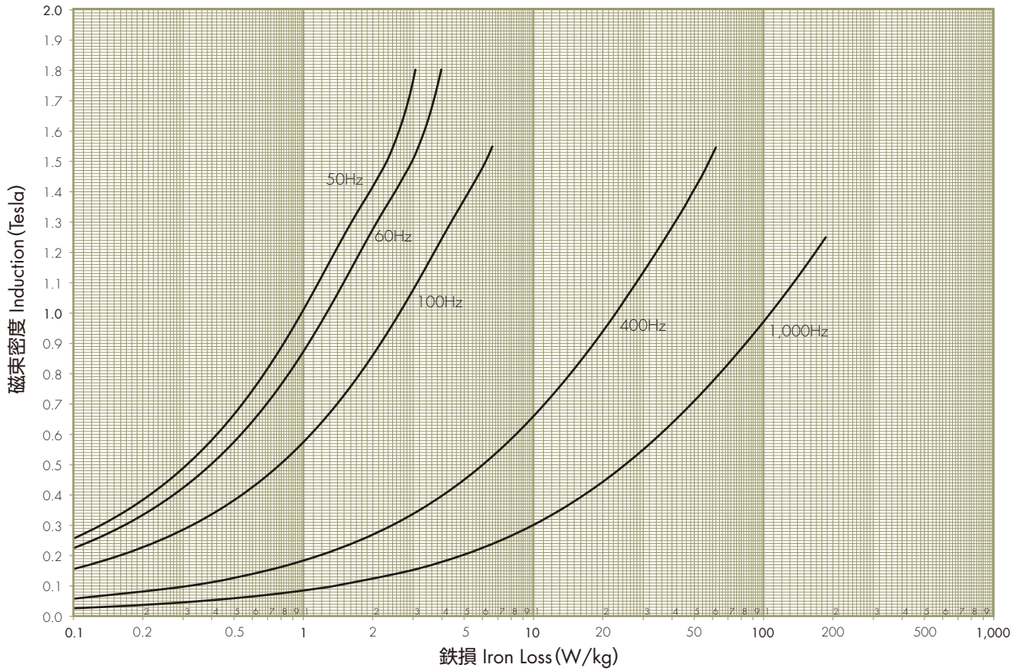


直流ヒステリシス曲線 DC Hysteresis Curve

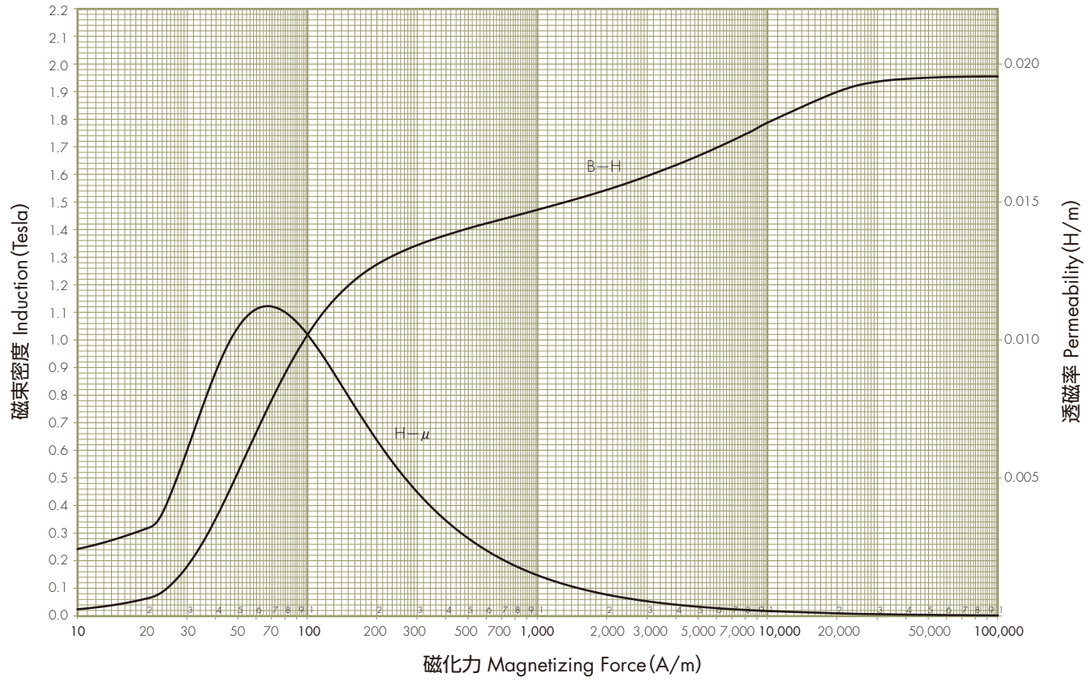


50H250

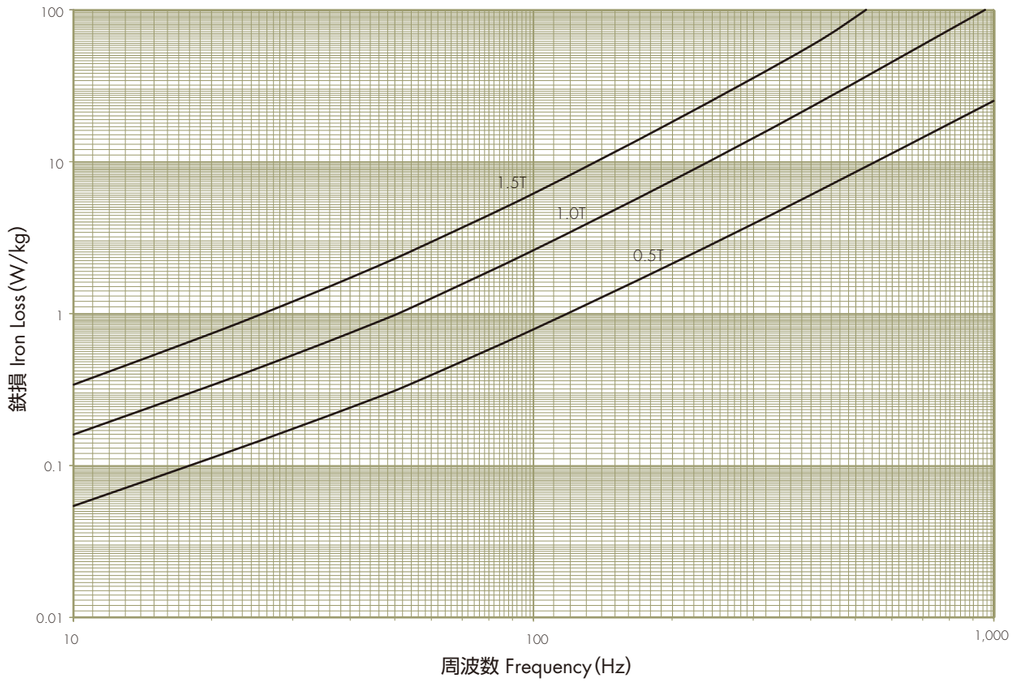
鉄損曲線 Iron Loss Curve



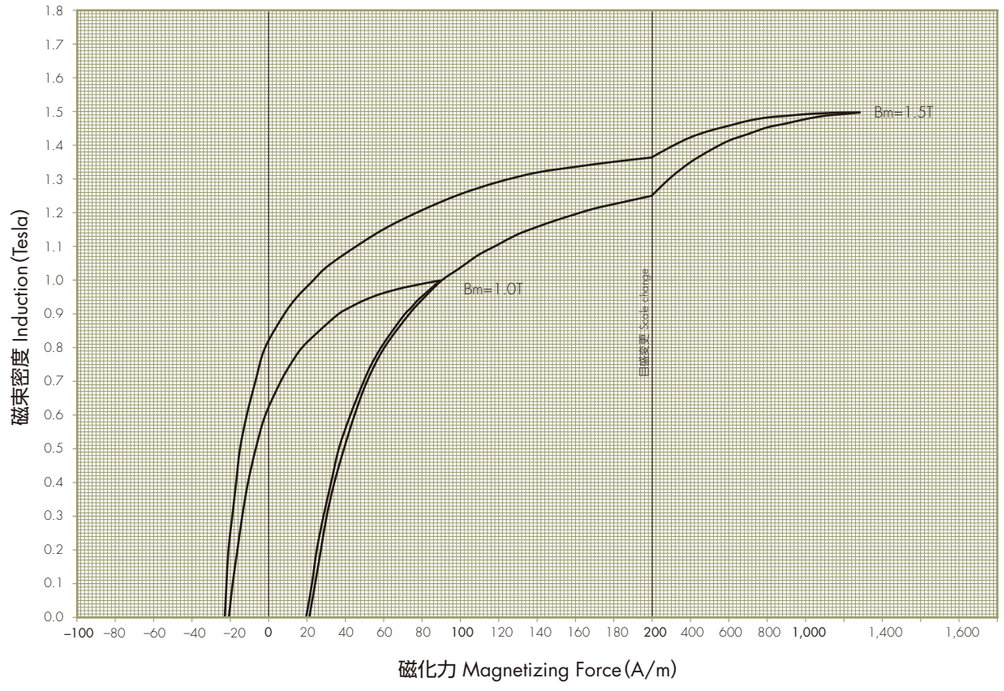
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

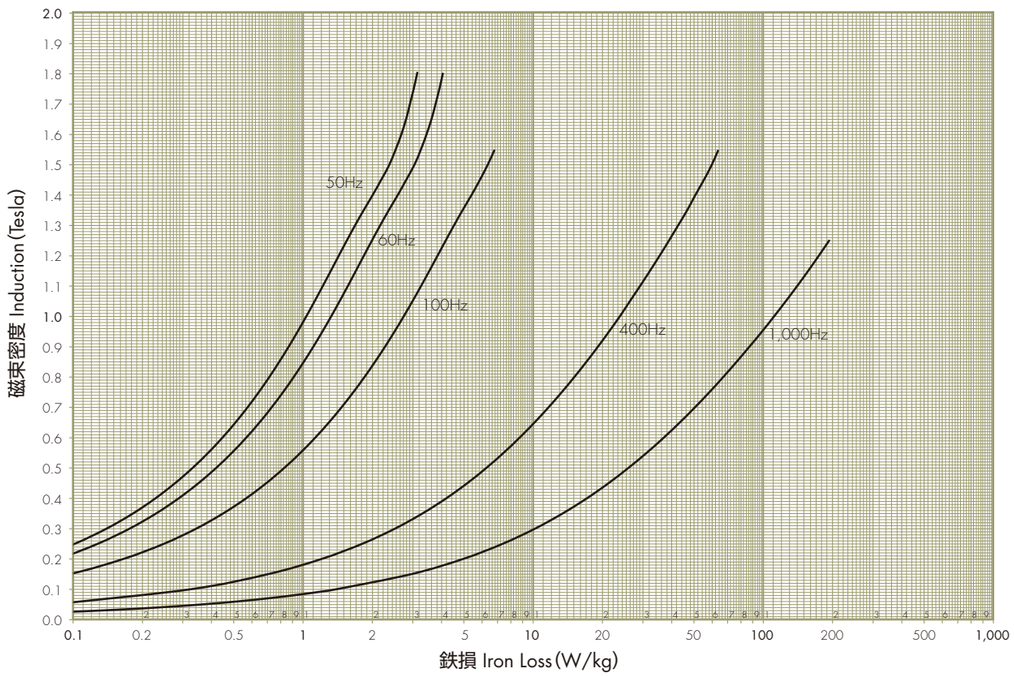


直流ヒステリシス曲線 DC Hysteresis Curve

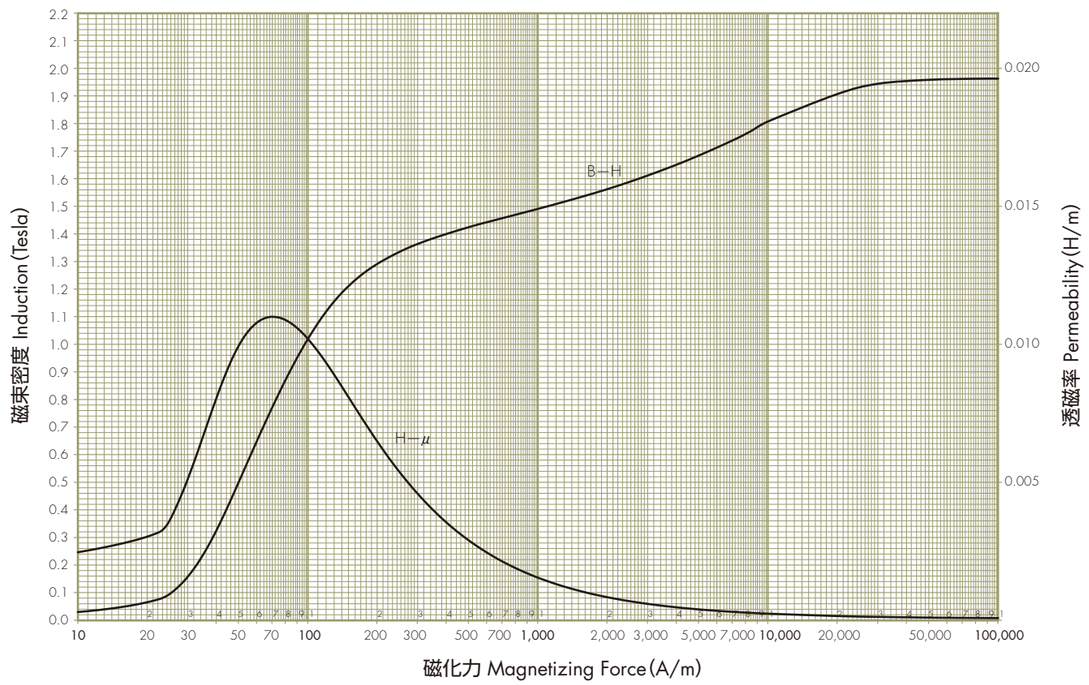


50H270

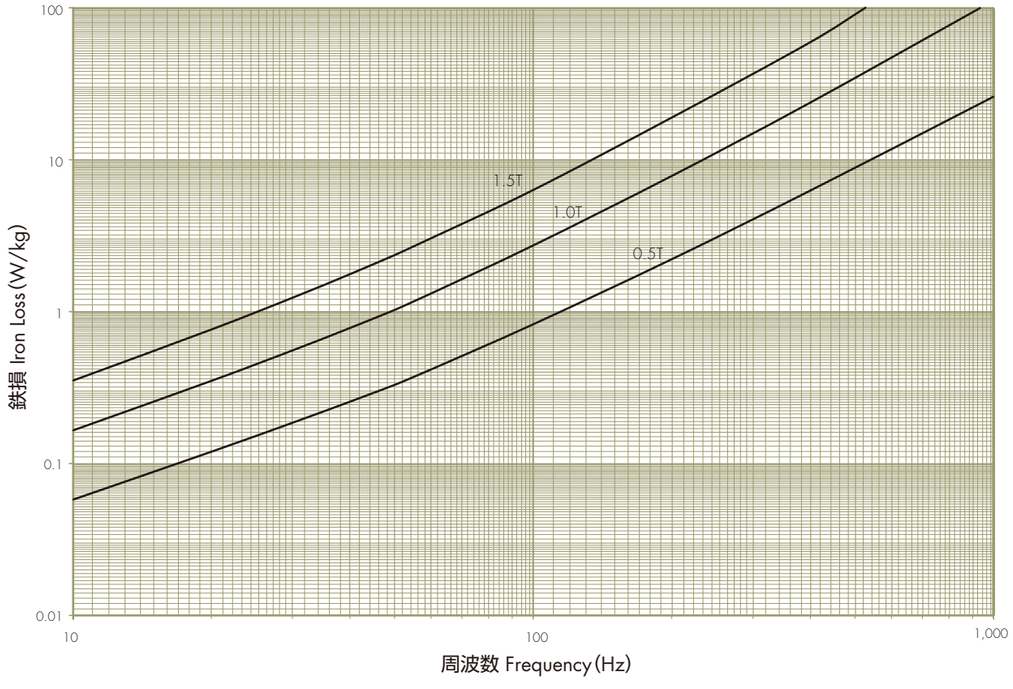
鉄損曲線 Iron Loss Curve



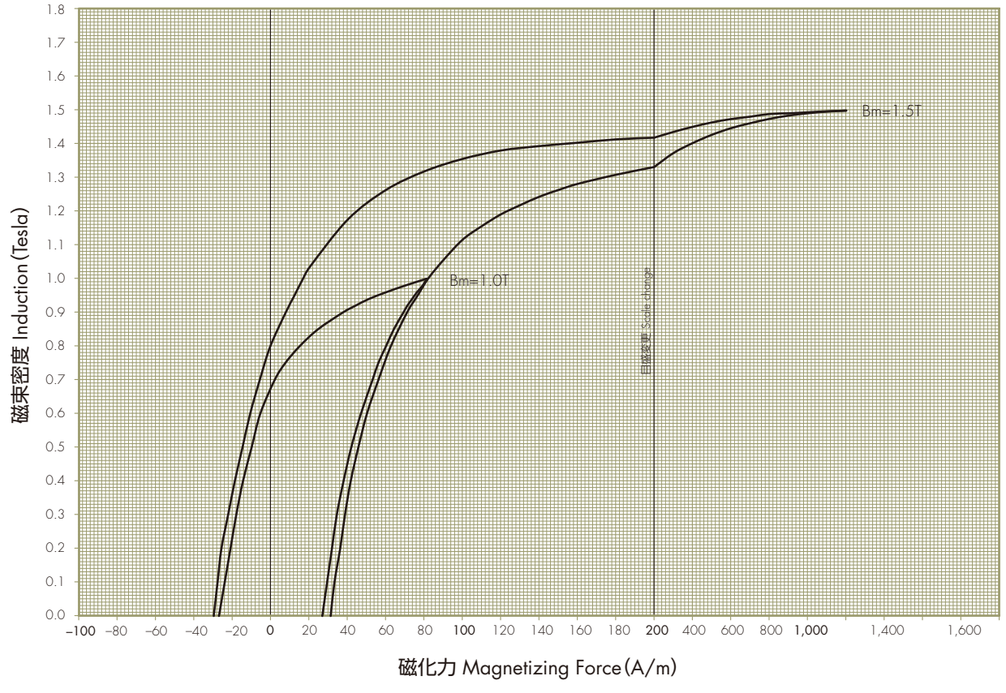
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

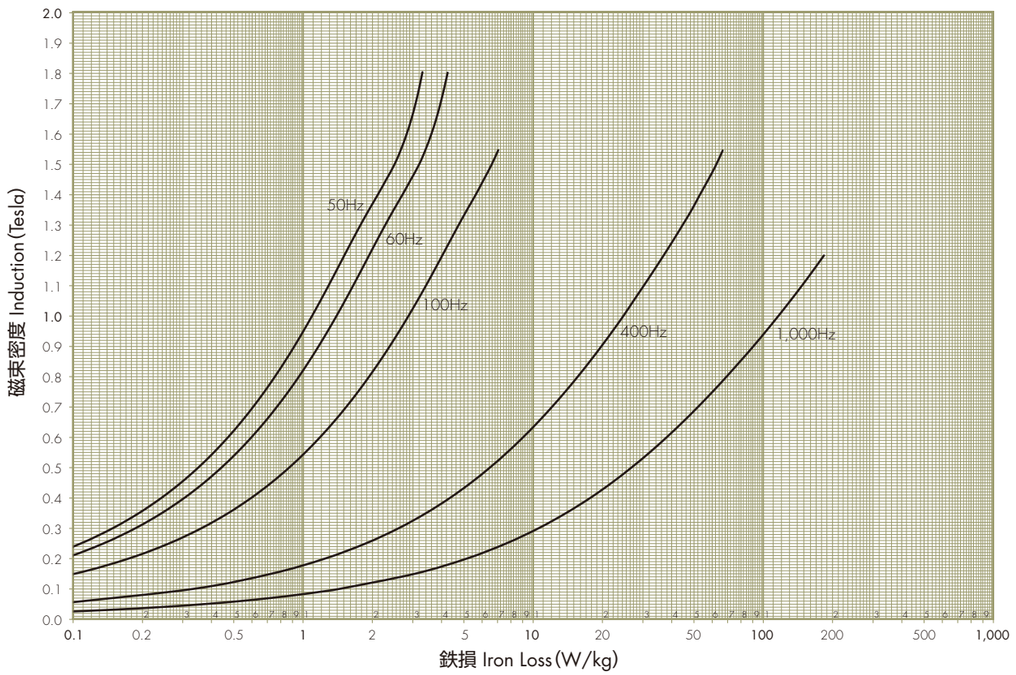


直流ヒステリシス曲線 DC Hysteresis Curve

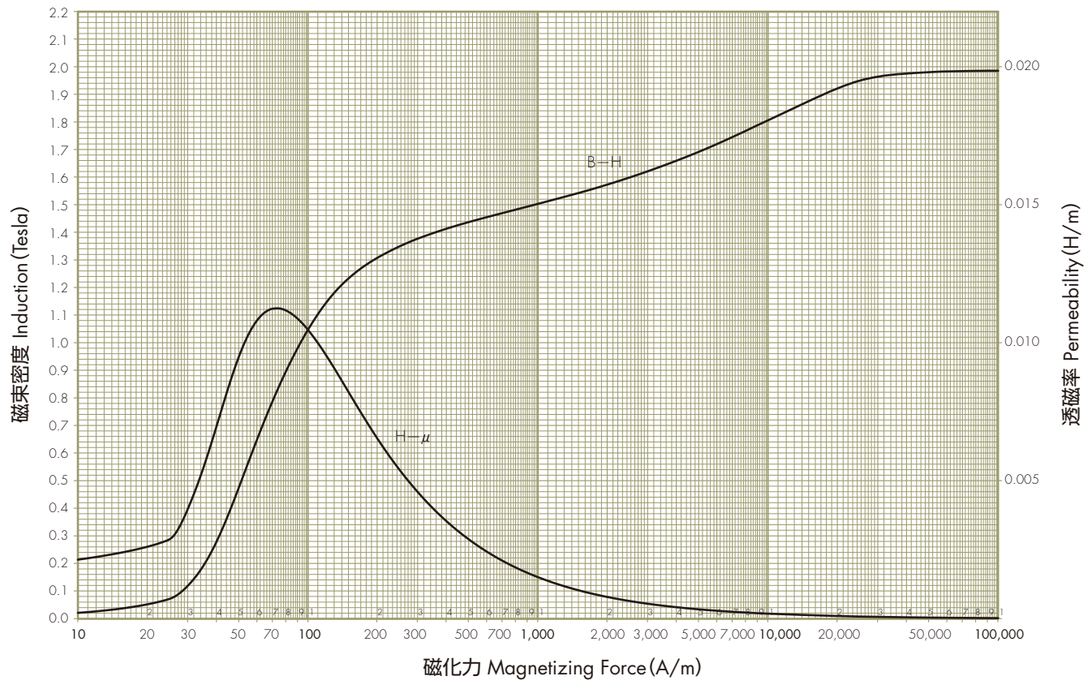


50H290

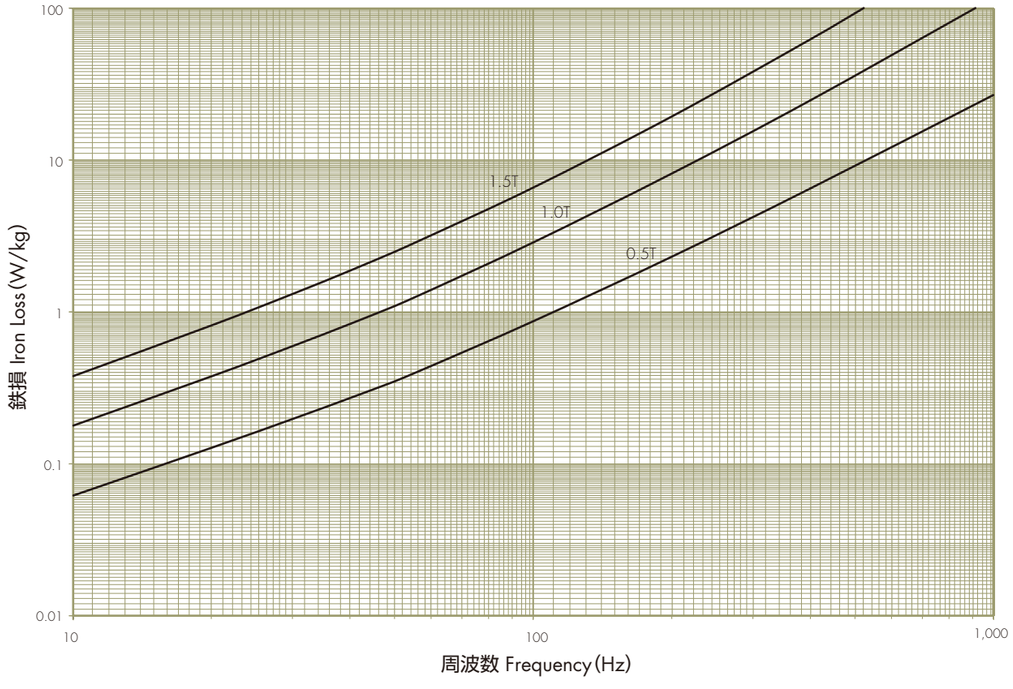
鉄損曲線 Iron Loss Curve



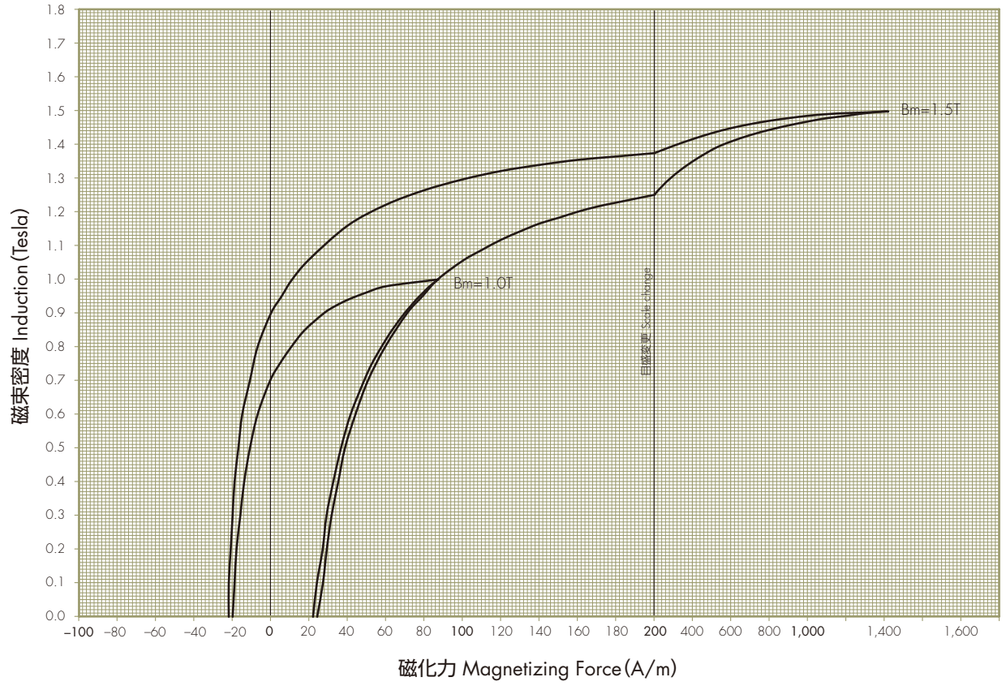
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance



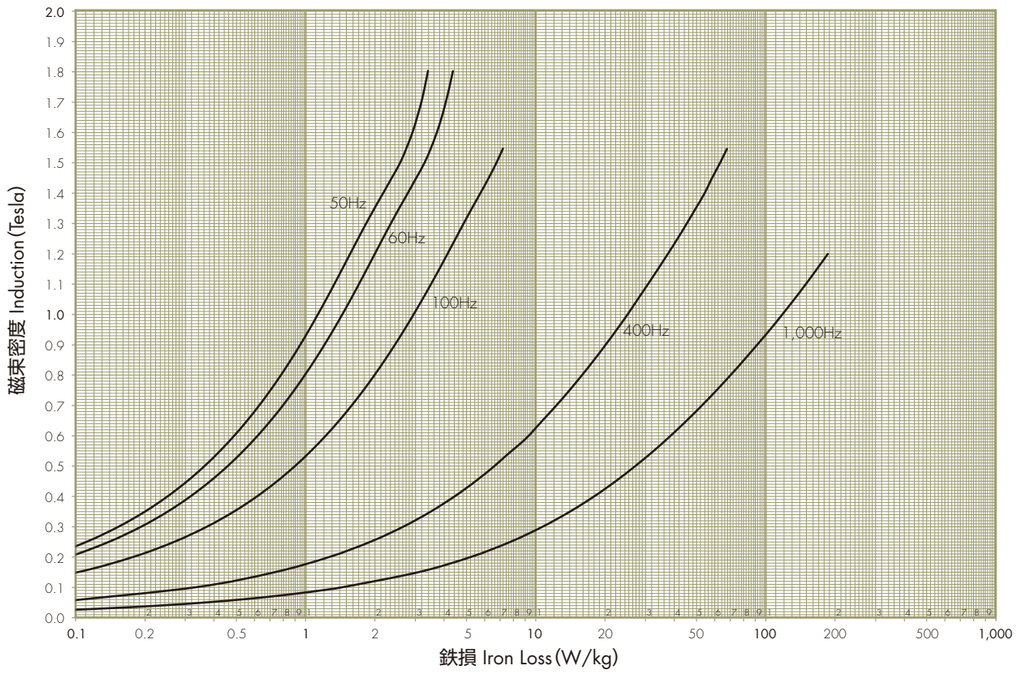
直流ヒステリシス曲線 DC Hysteresis Curve



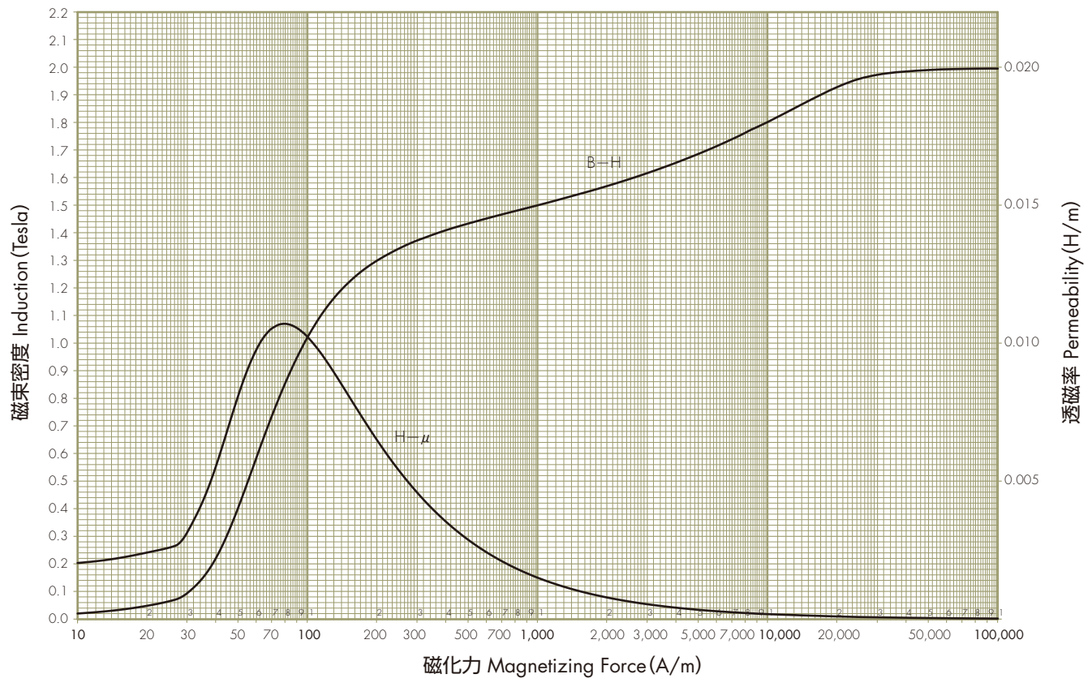
50H290

50H310

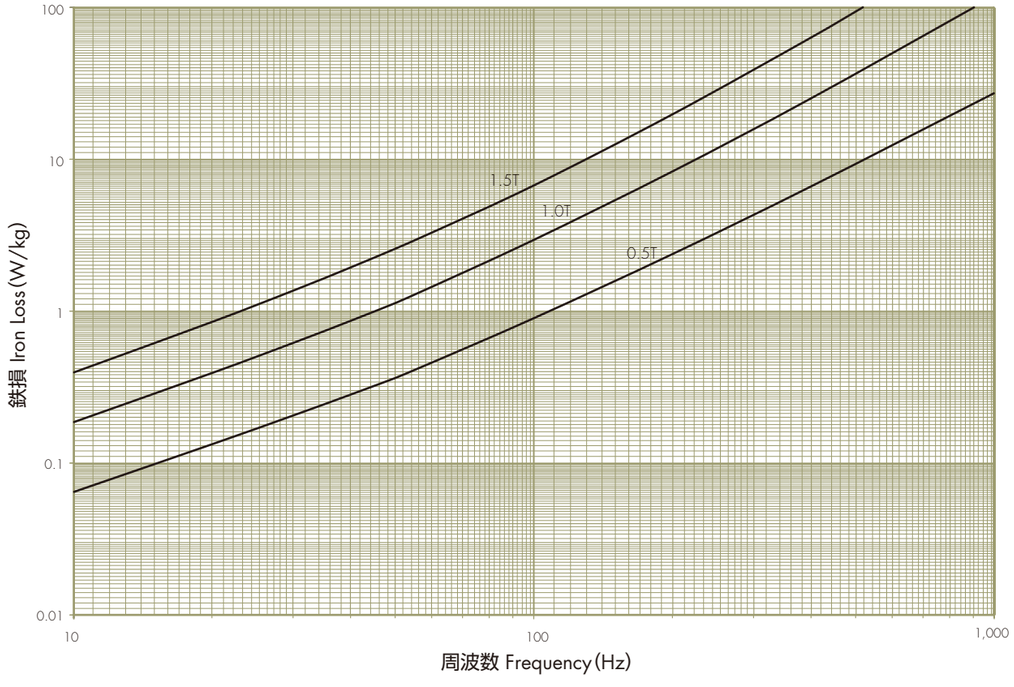
鉄損曲線 Iron Loss Curve



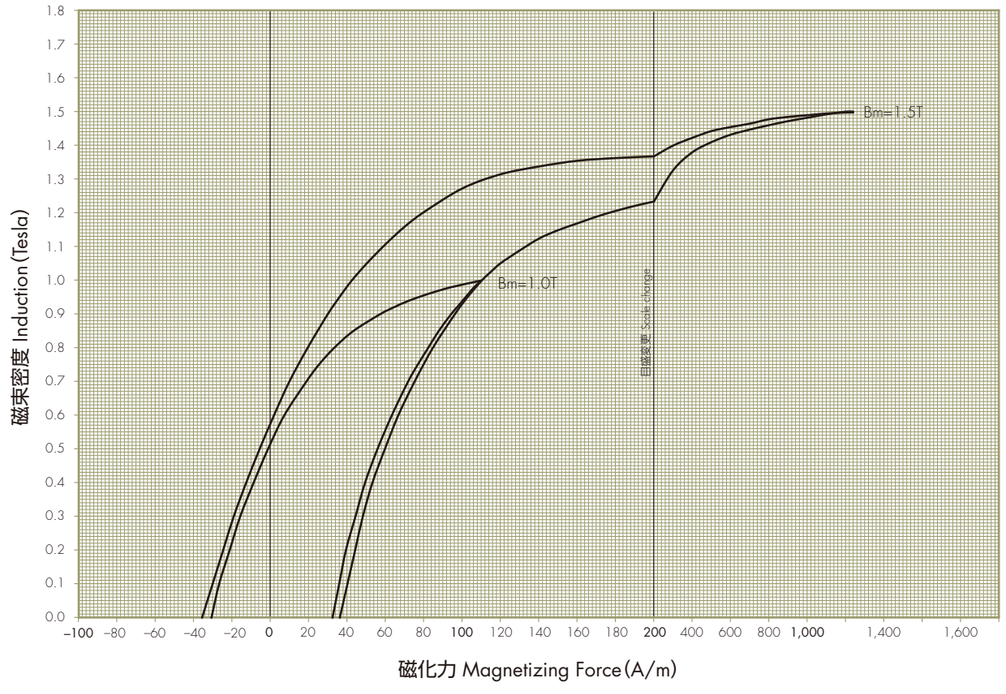
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

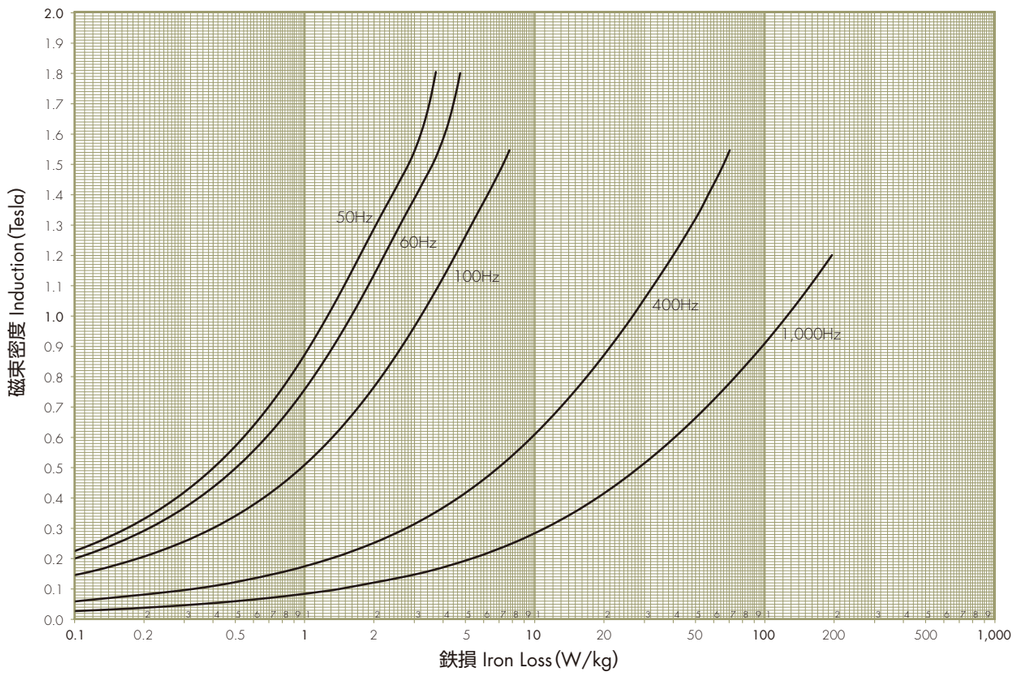


直流ヒステリシス曲線 DC Hysteresis Curve

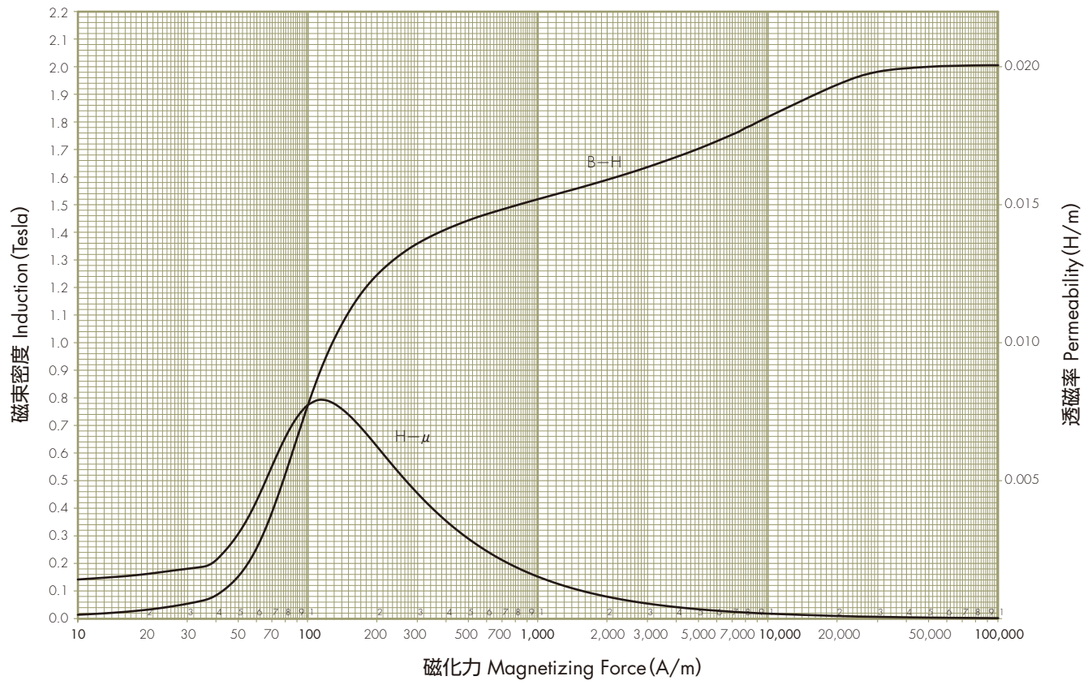


50H350

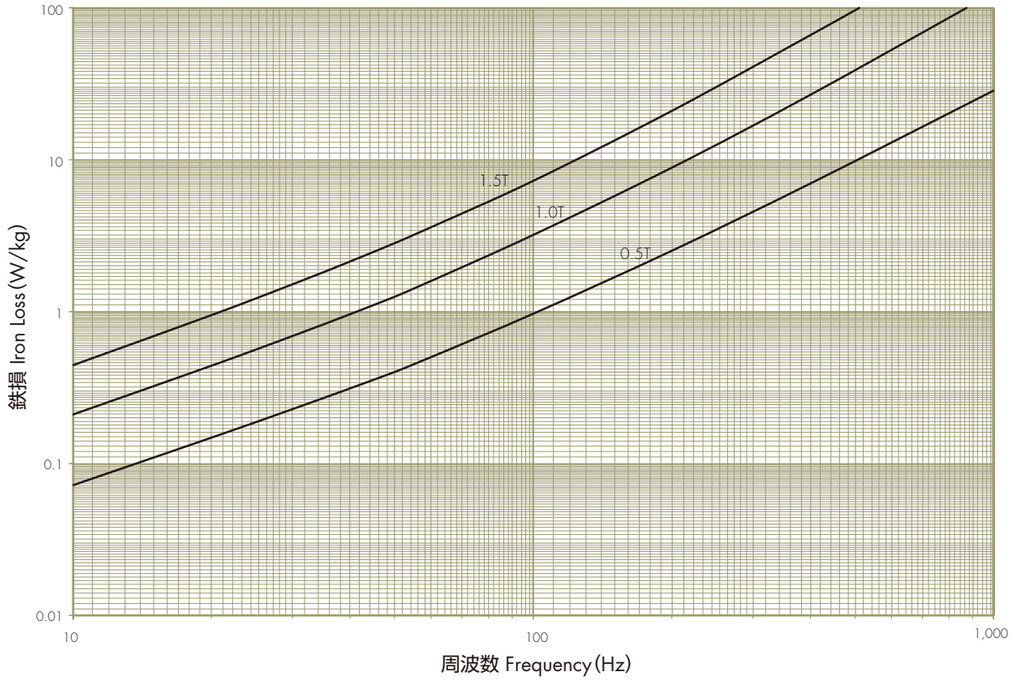
鉄損曲線 Iron Loss Curve



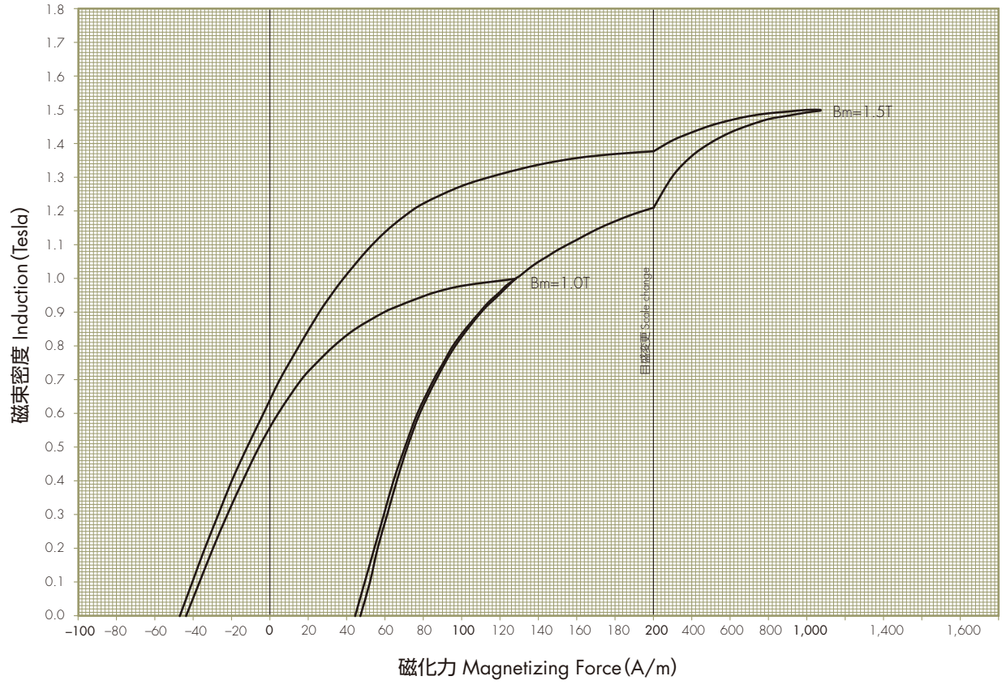
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

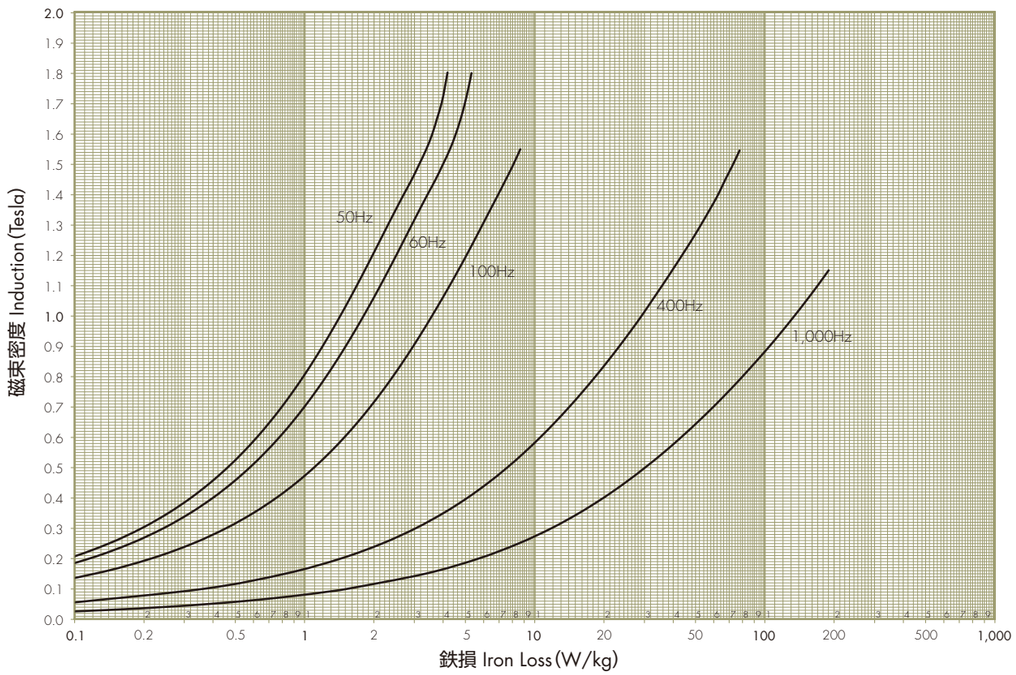


直流ヒステリシス曲線 DC Hysteresis Curve

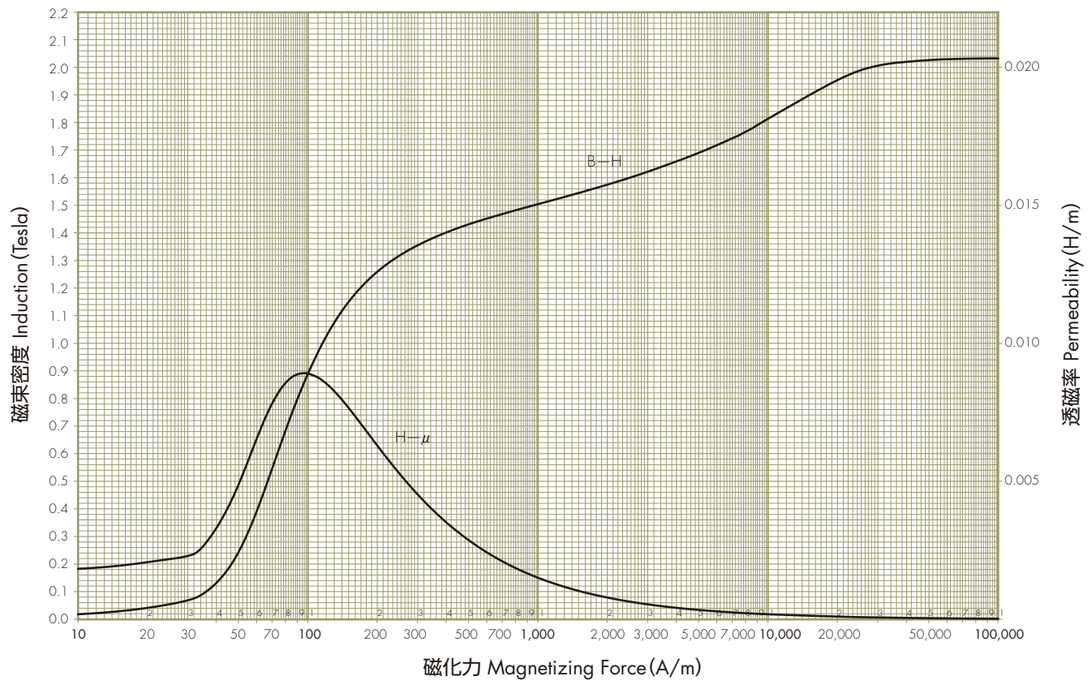


50H400

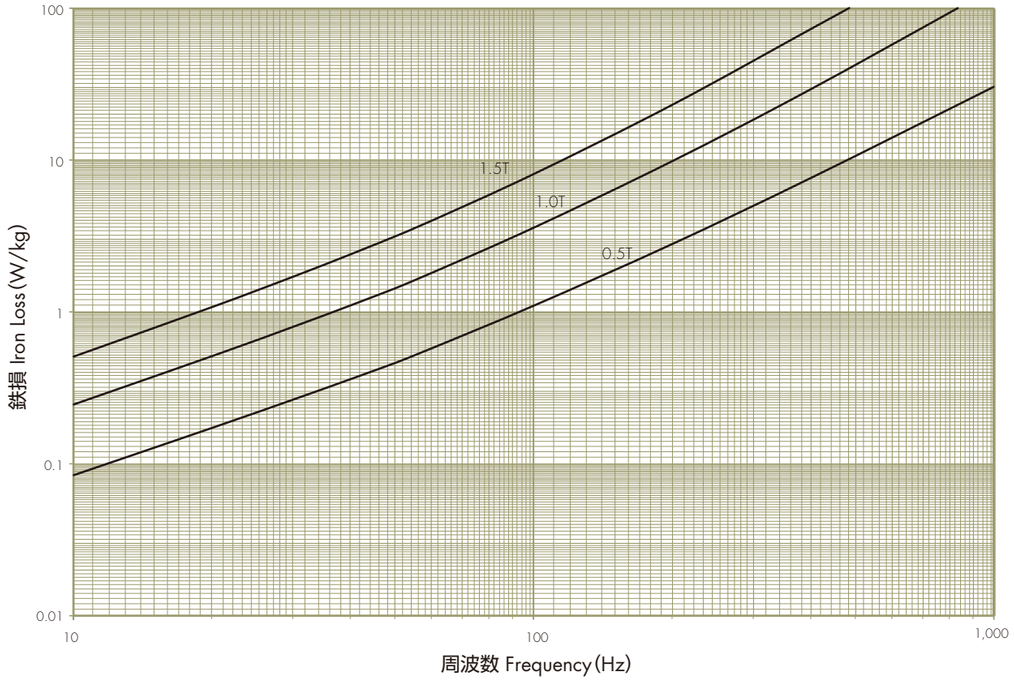
鉄損曲線 Iron Loss Curve



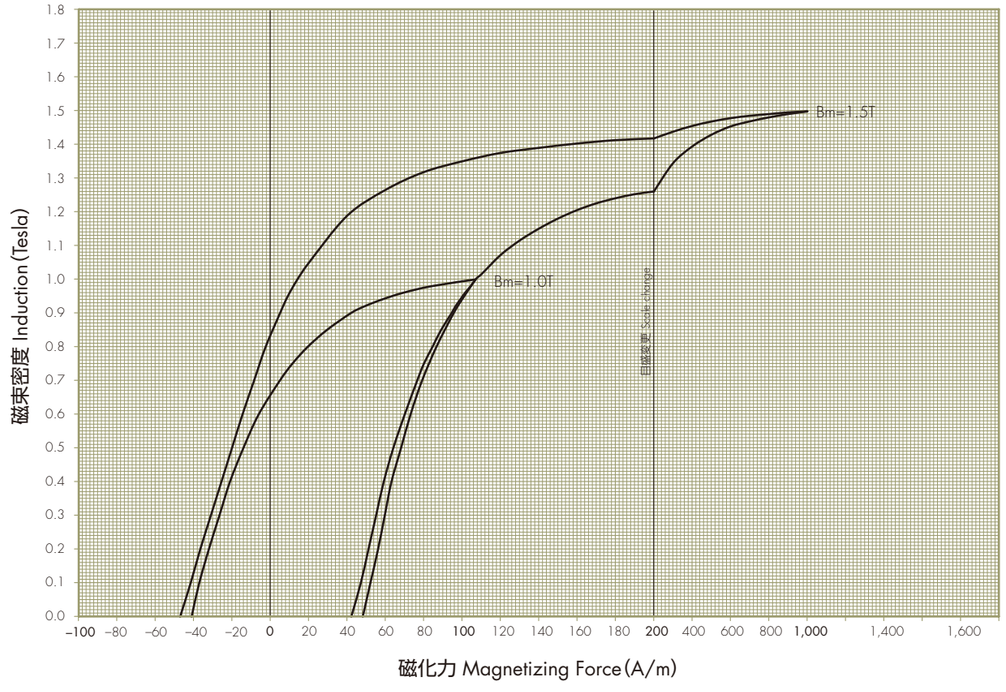
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

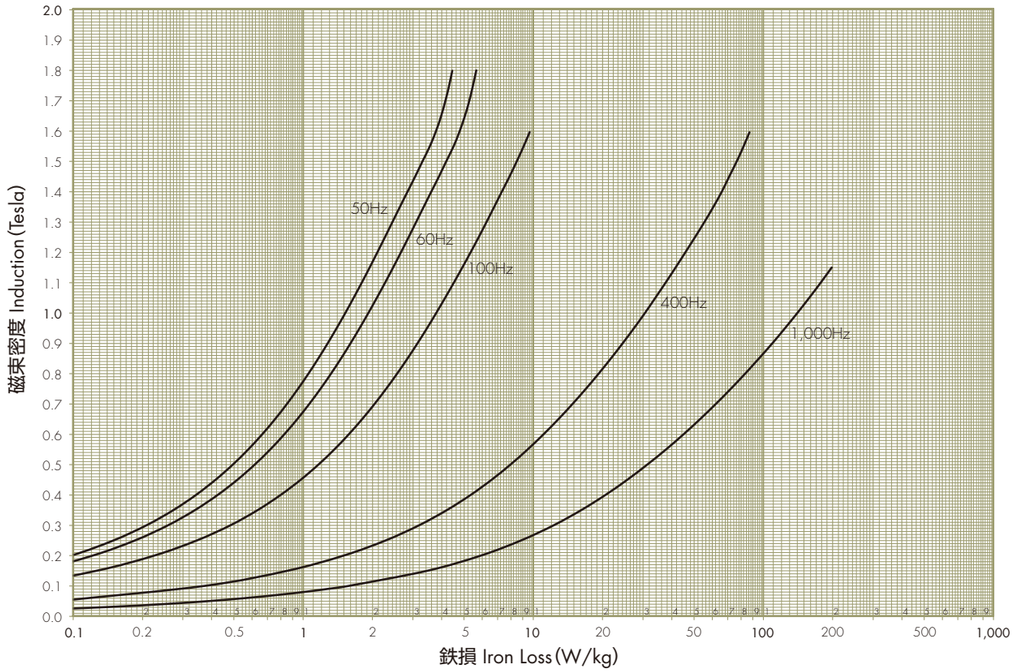


直流ヒステリシス曲線 DC Hysteresis Curve

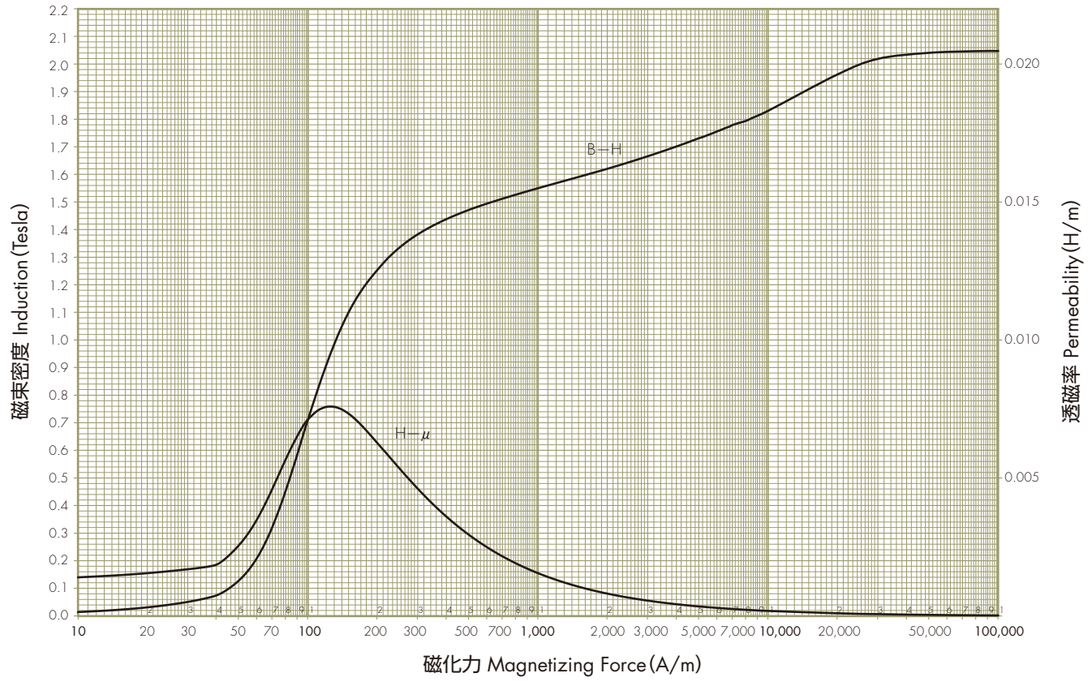


50H470

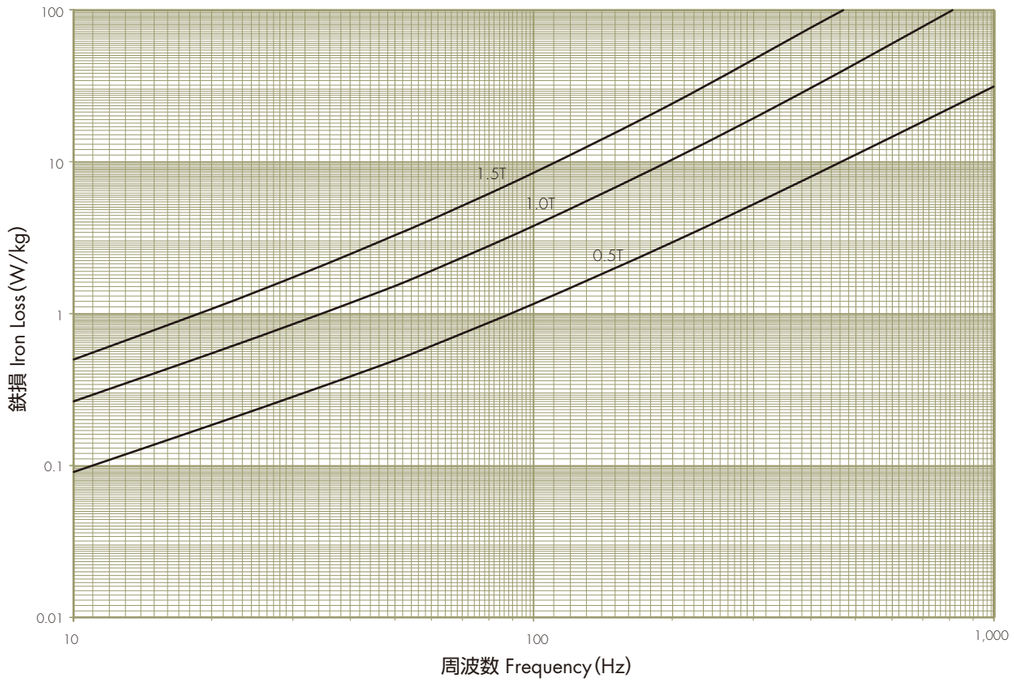
鉄損曲線 Iron Loss Curve



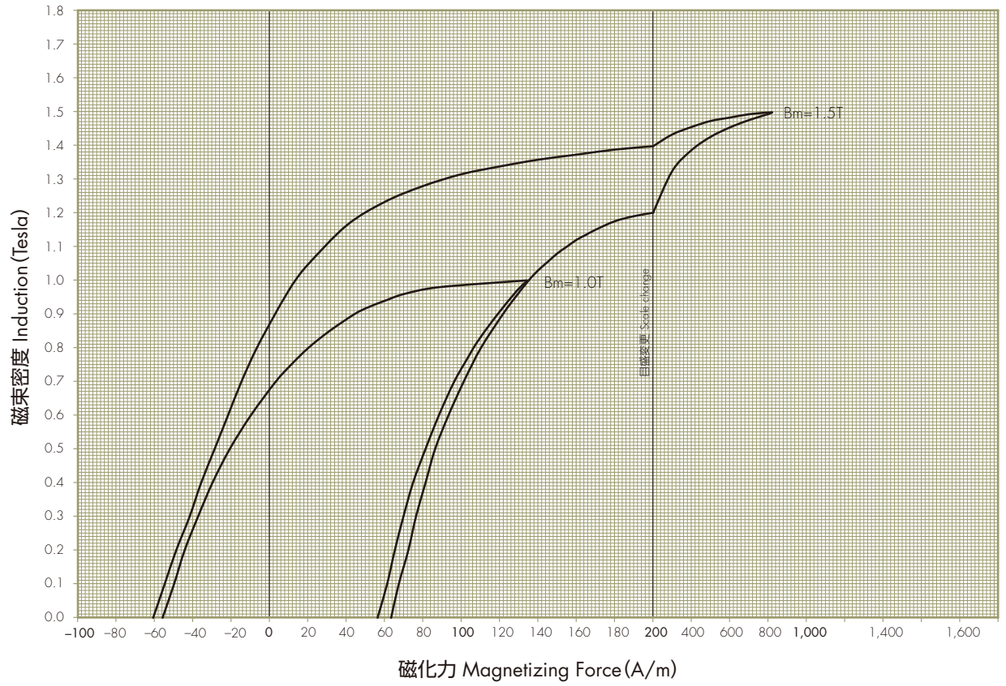
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

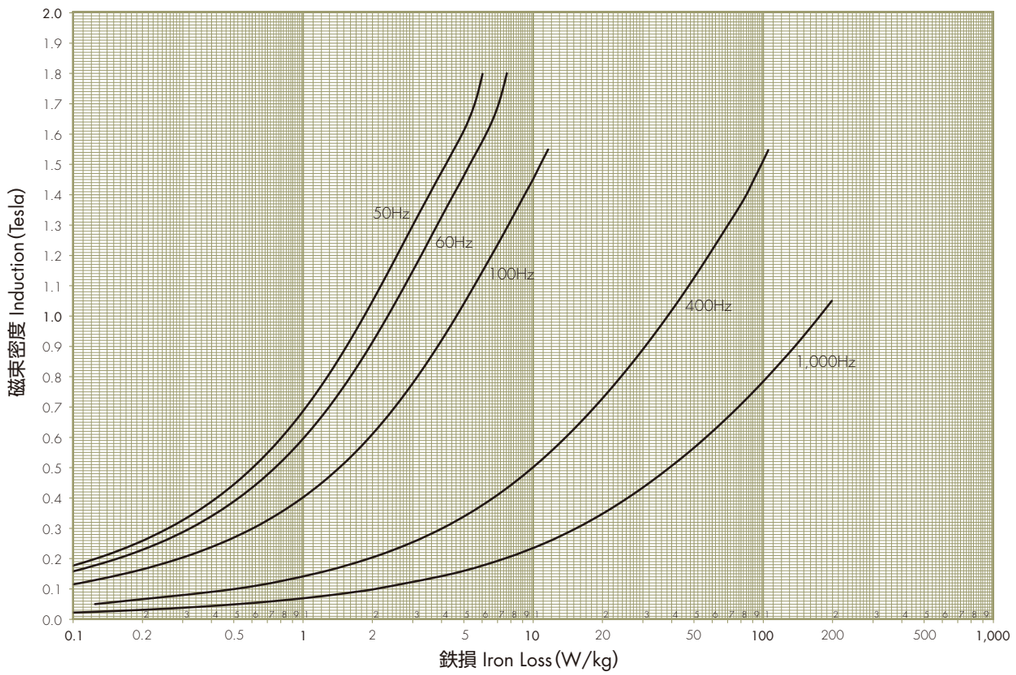


直流ヒステリシス曲線 DC Hysteresis Curve

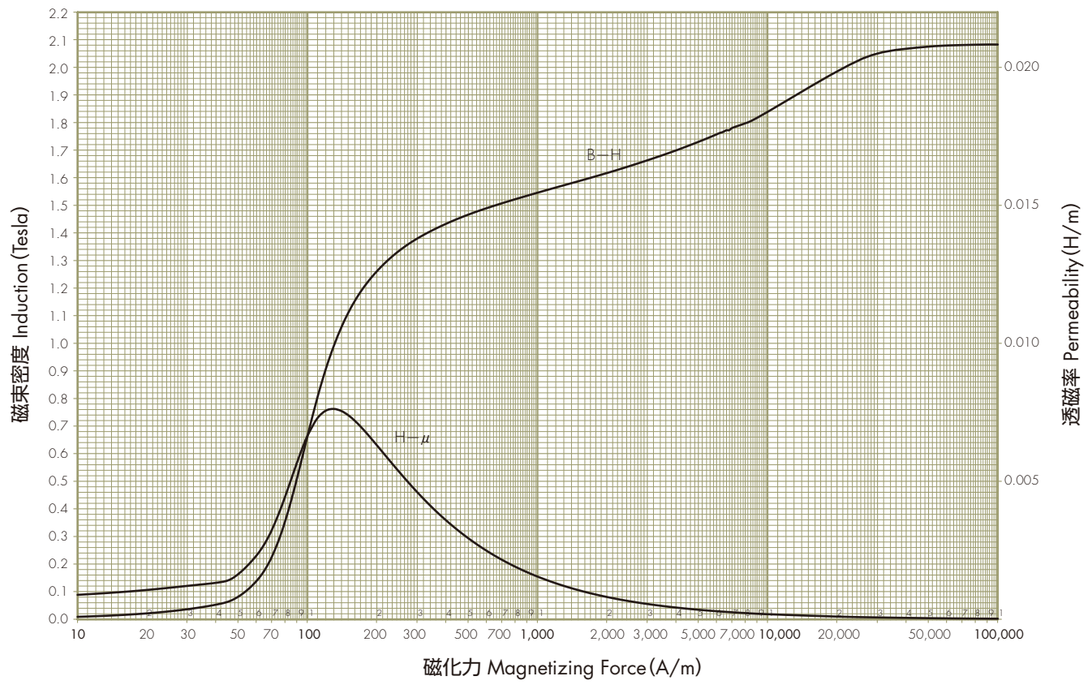


50H600

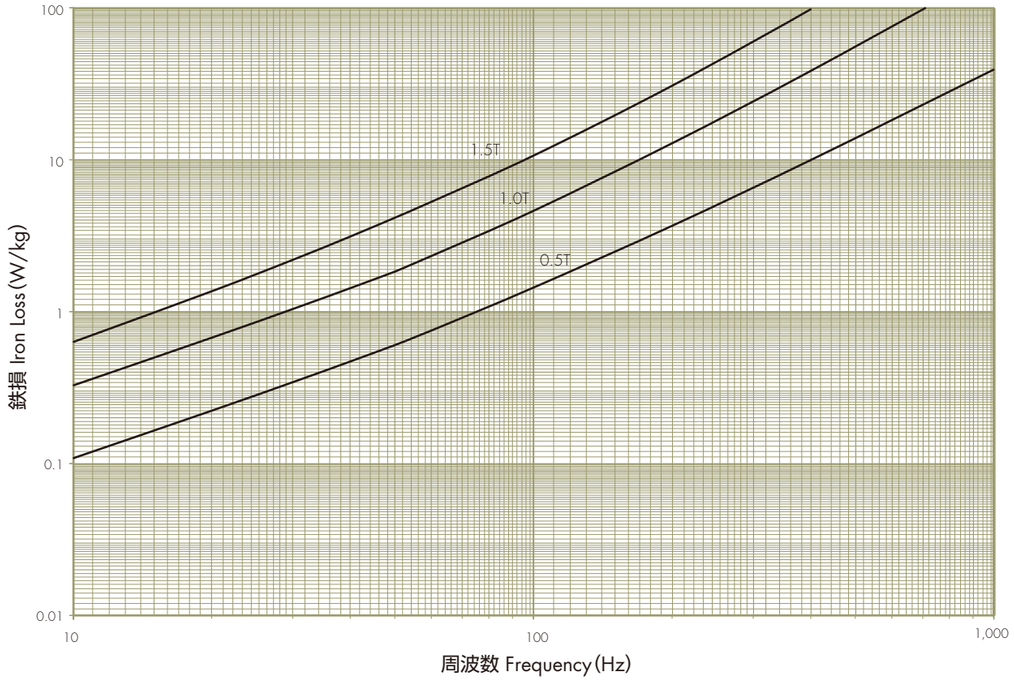
鉄損曲線 Iron Loss Curve



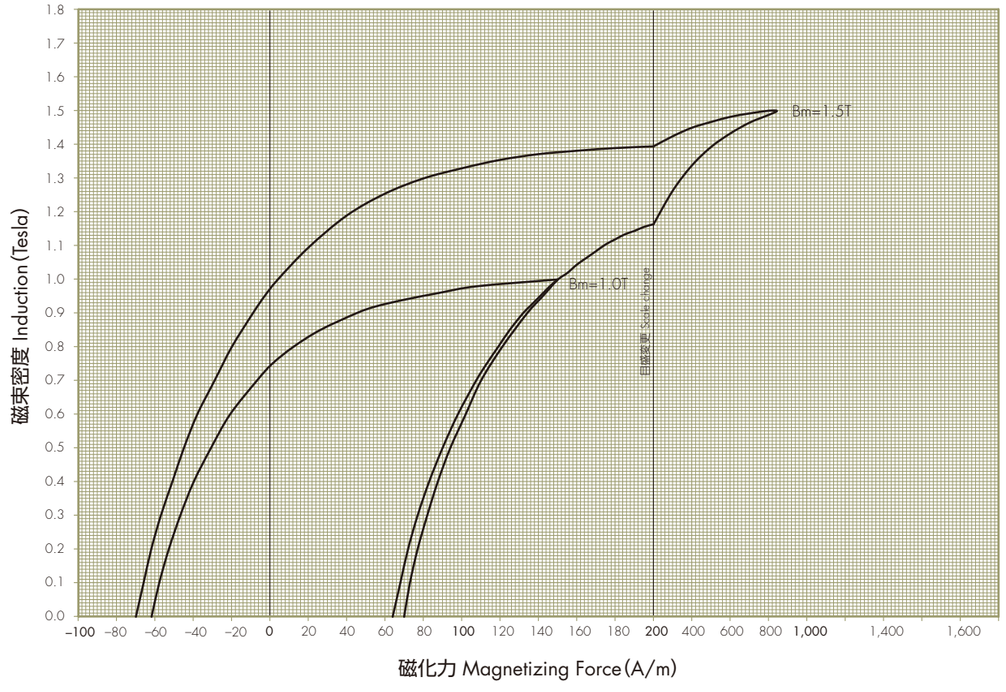
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

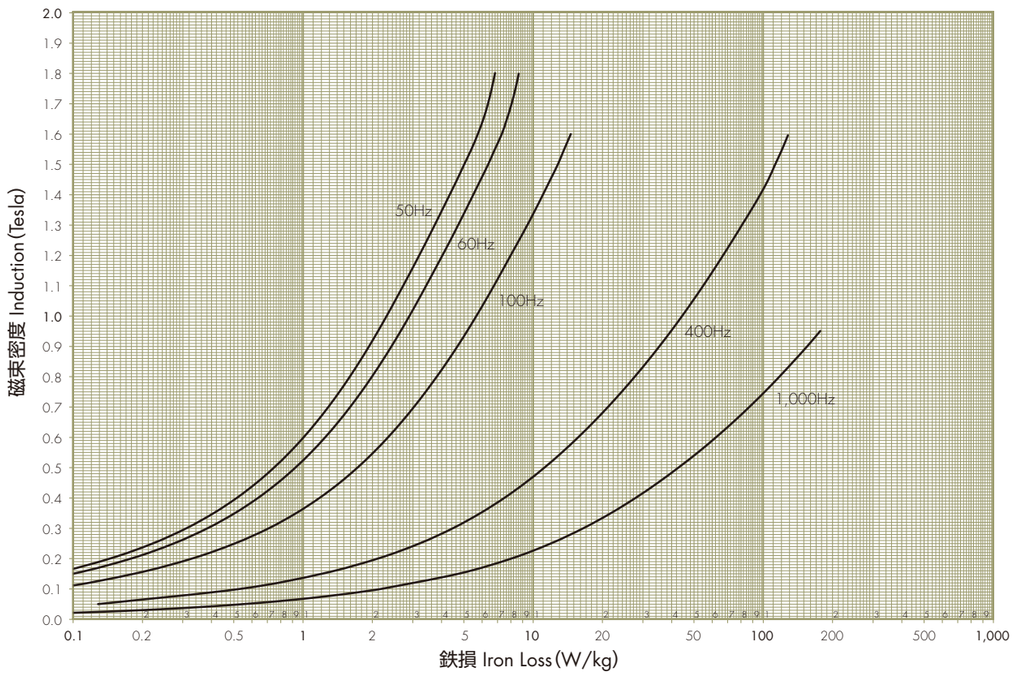


直流ヒステリシス曲線 DC Hysteresis Curve

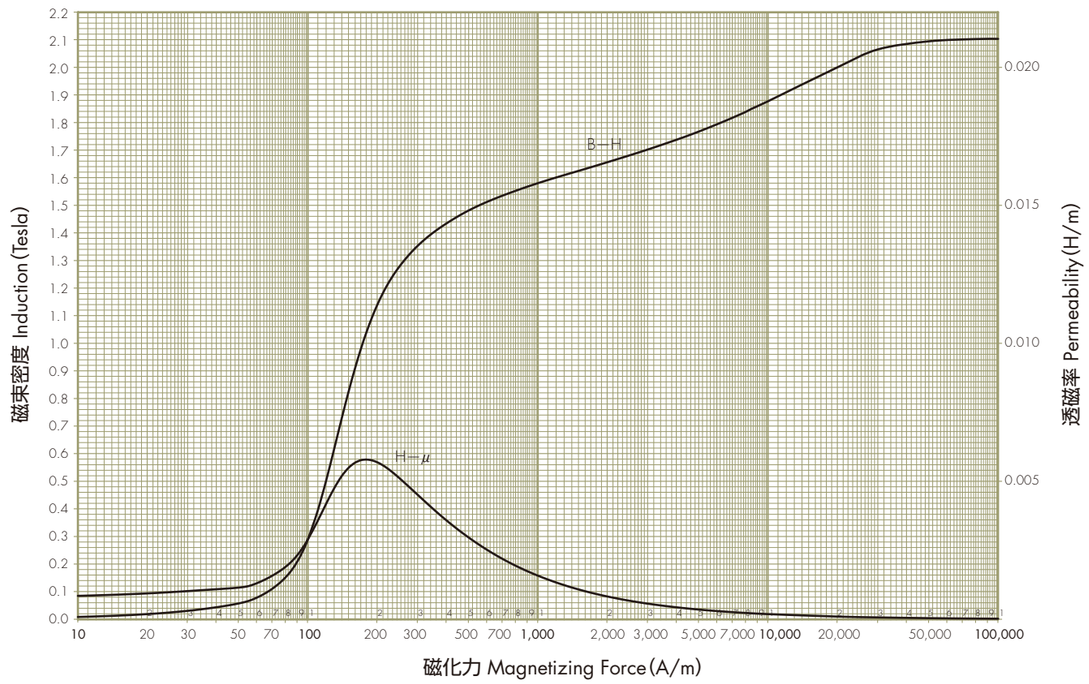


50H700

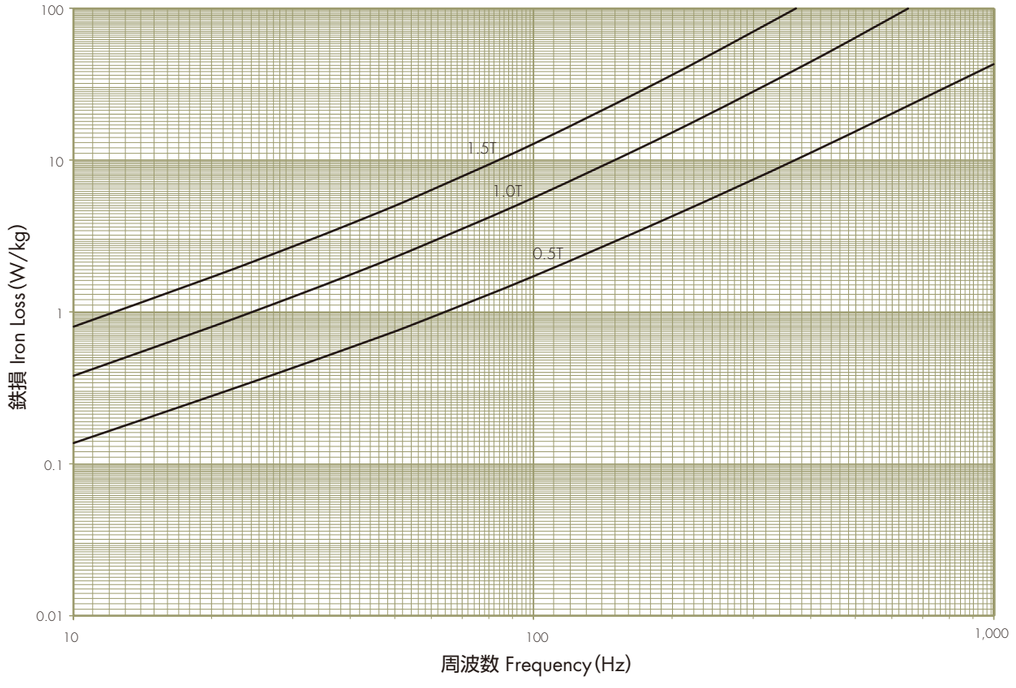
鉄損曲線 Iron Loss Curve



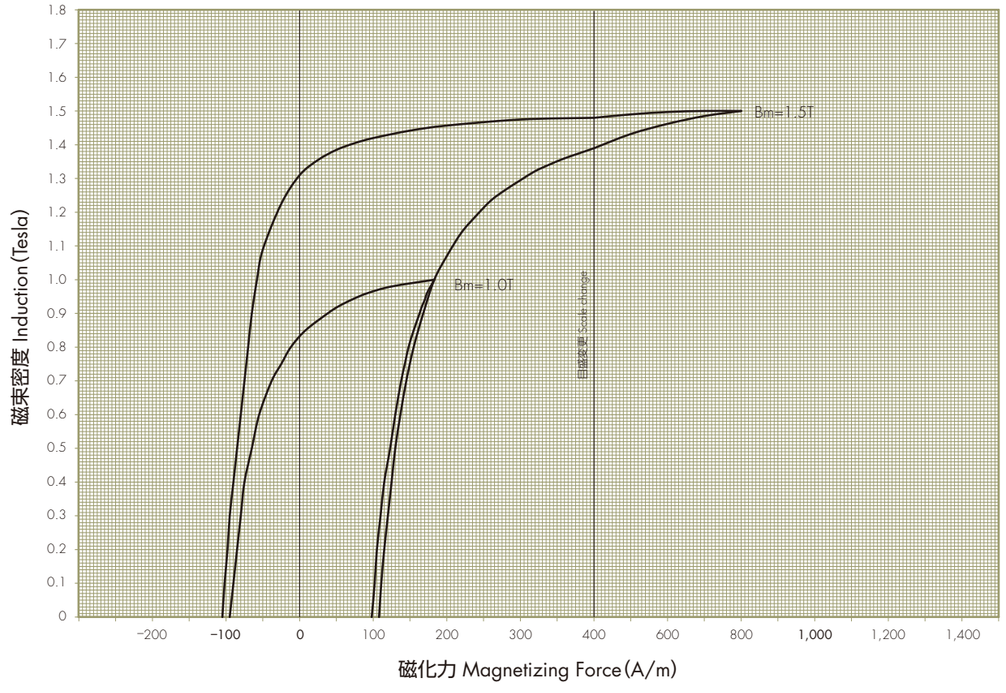
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance



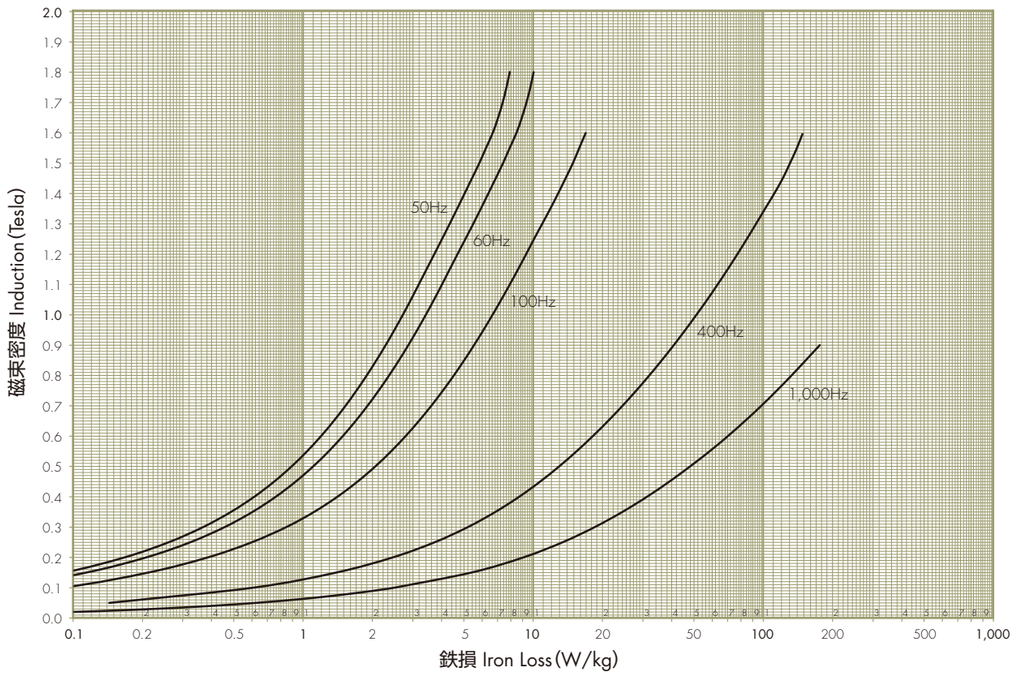
直流ヒステリシス曲線 DC Hysteresis Curve



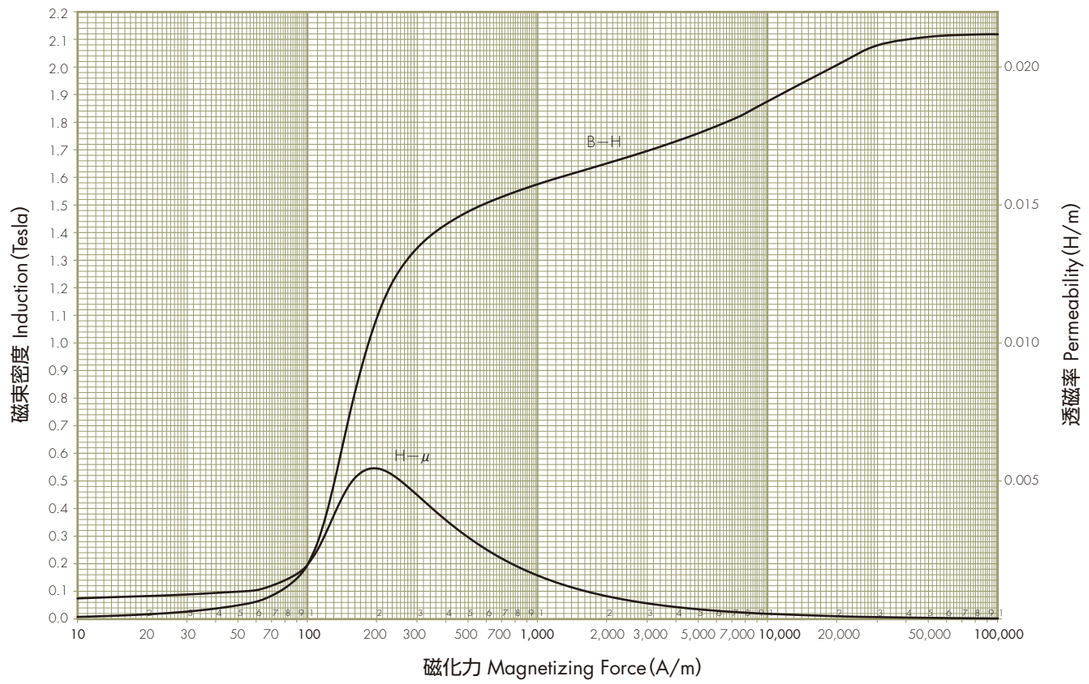
50H700

50H800

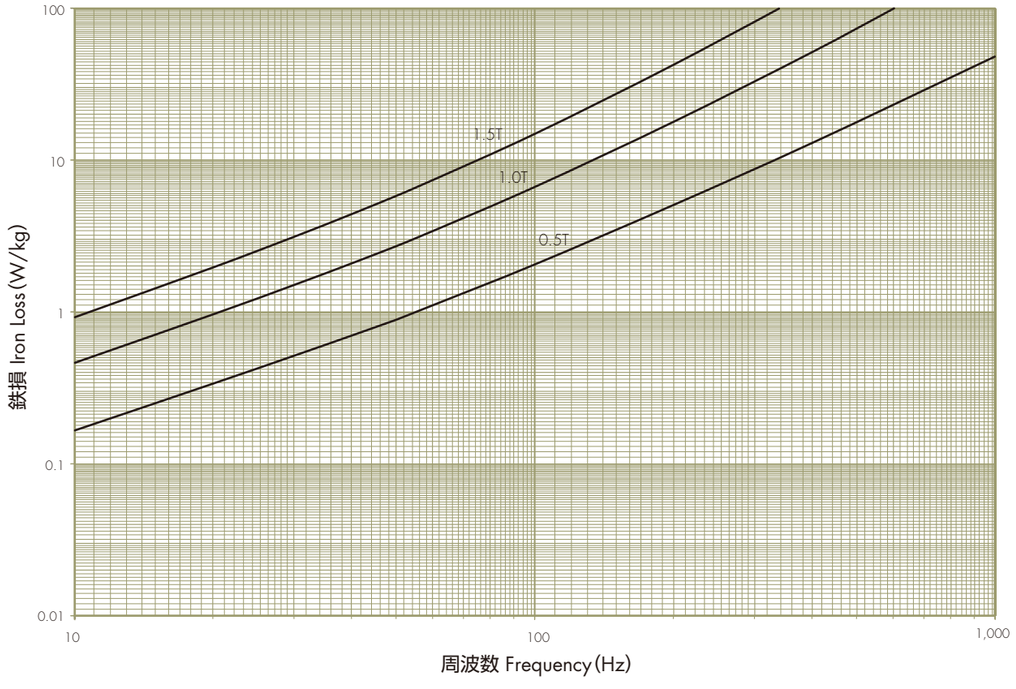
鉄損曲線 Iron Loss Curve



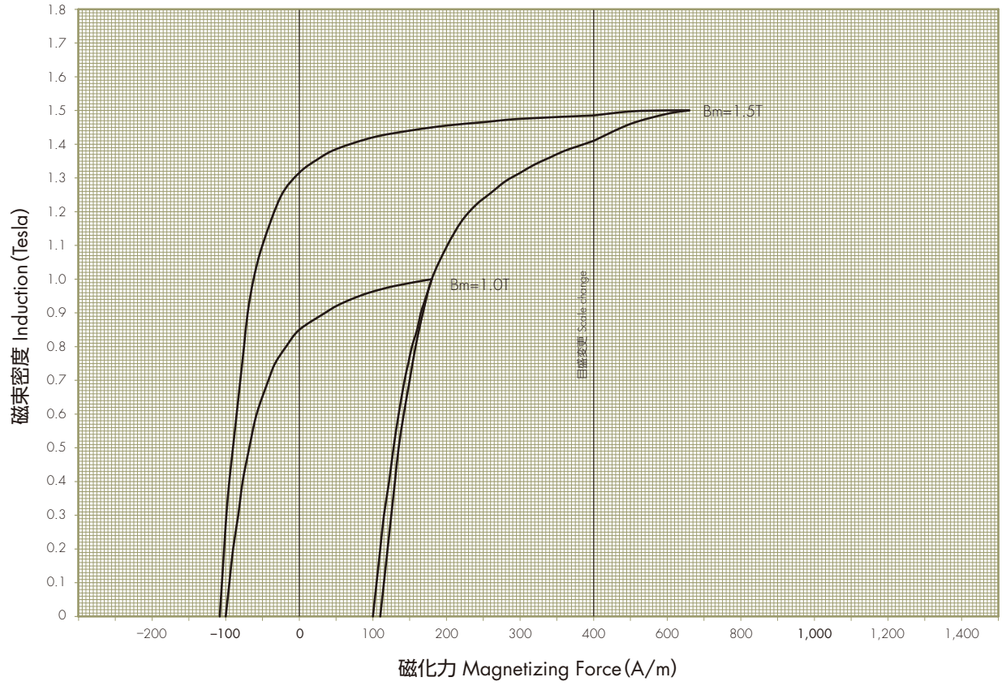
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

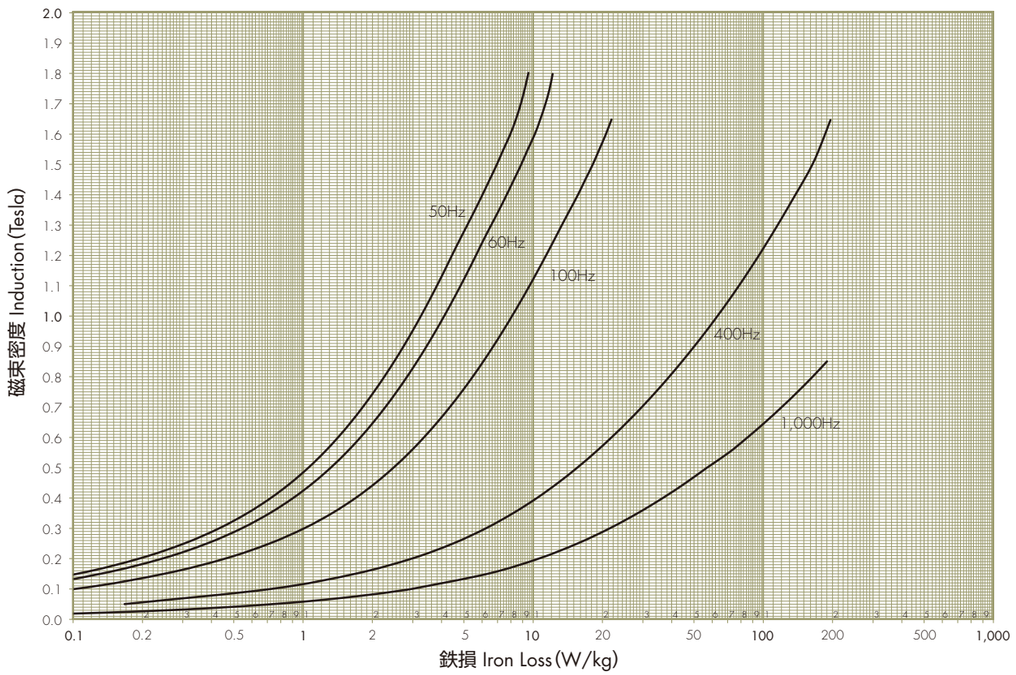


直流ヒステリシス曲線 DC Hysteresis Curve

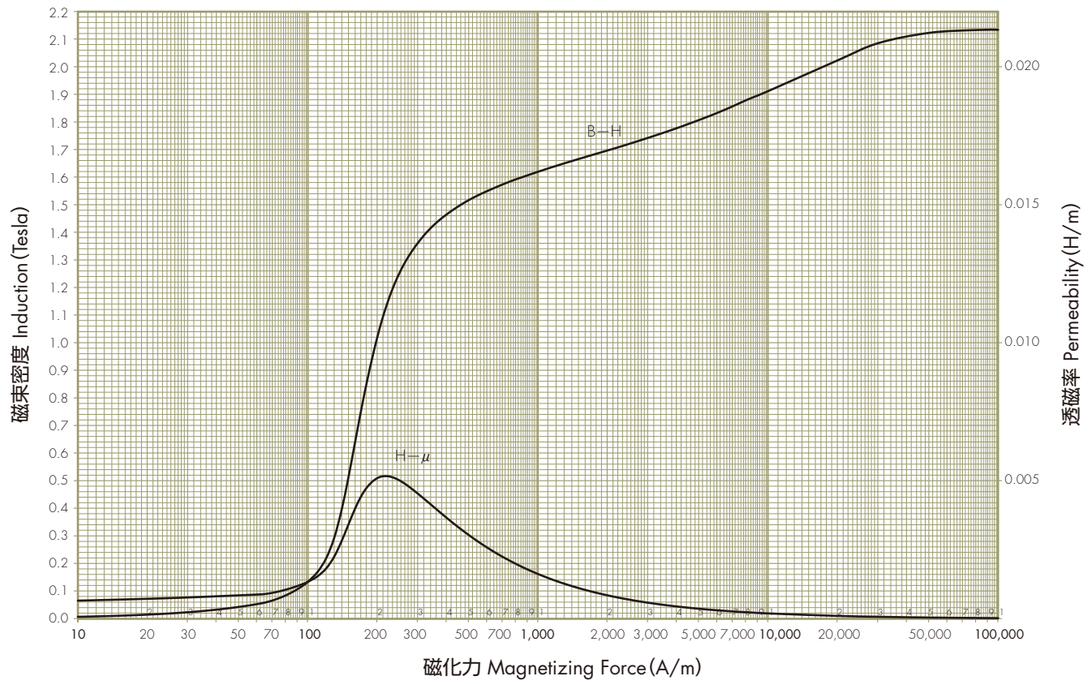


50H1000

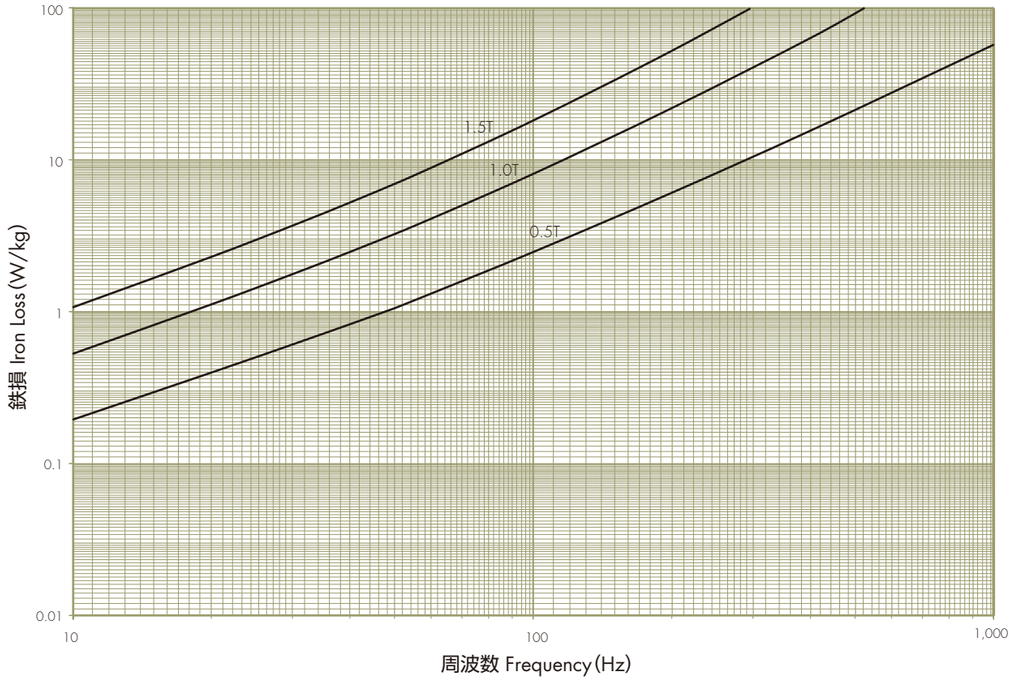
鉄損曲線 Iron Loss Curve



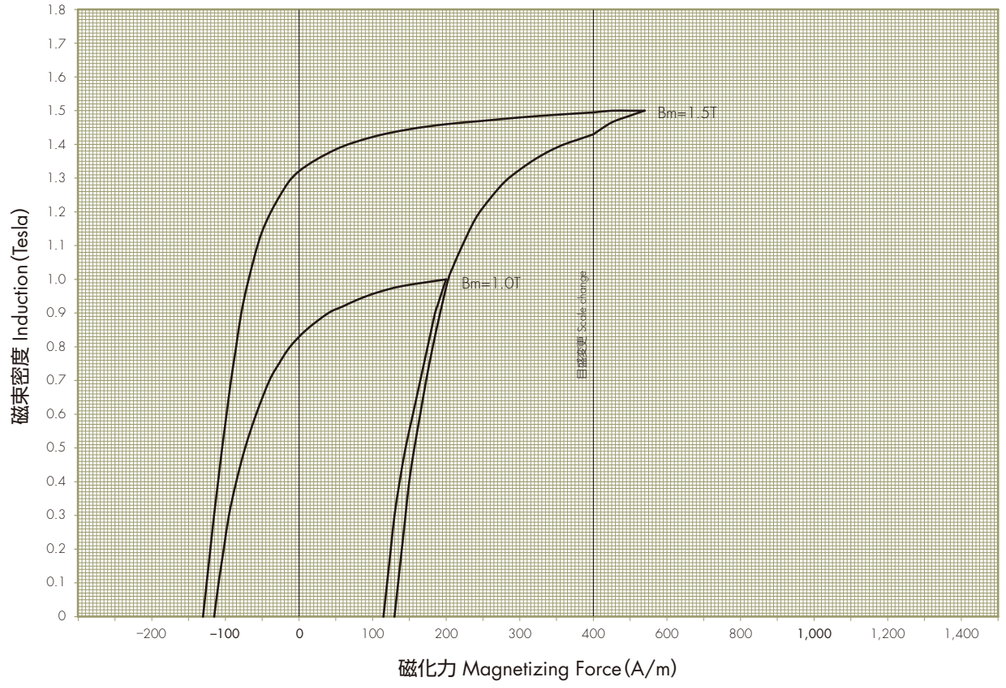
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

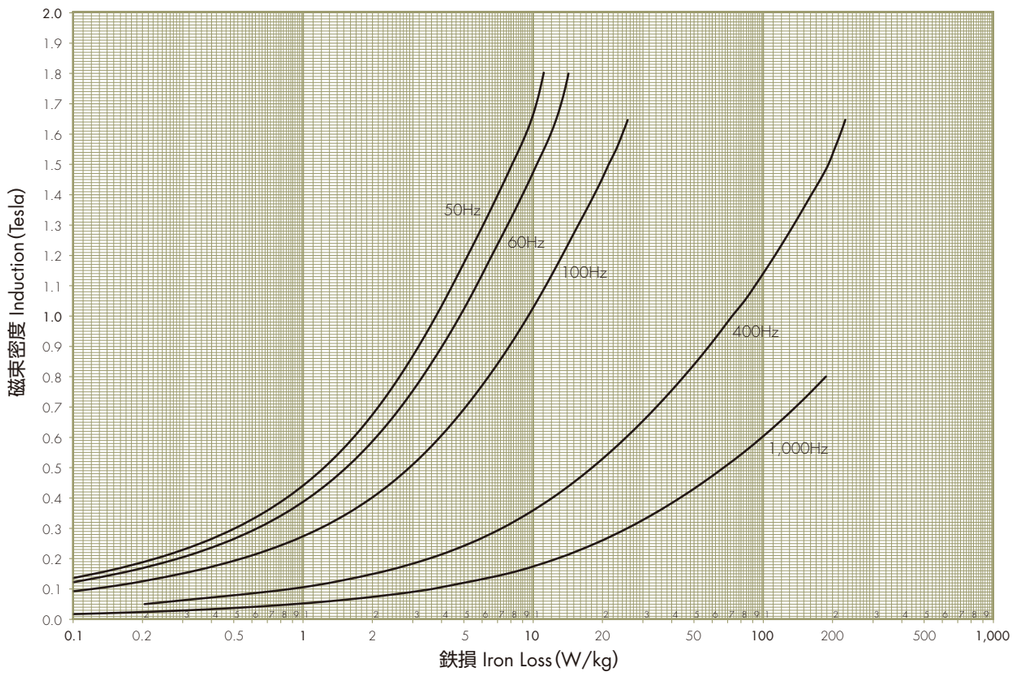


直流ヒステリシス曲線 DC Hysteresis Curve

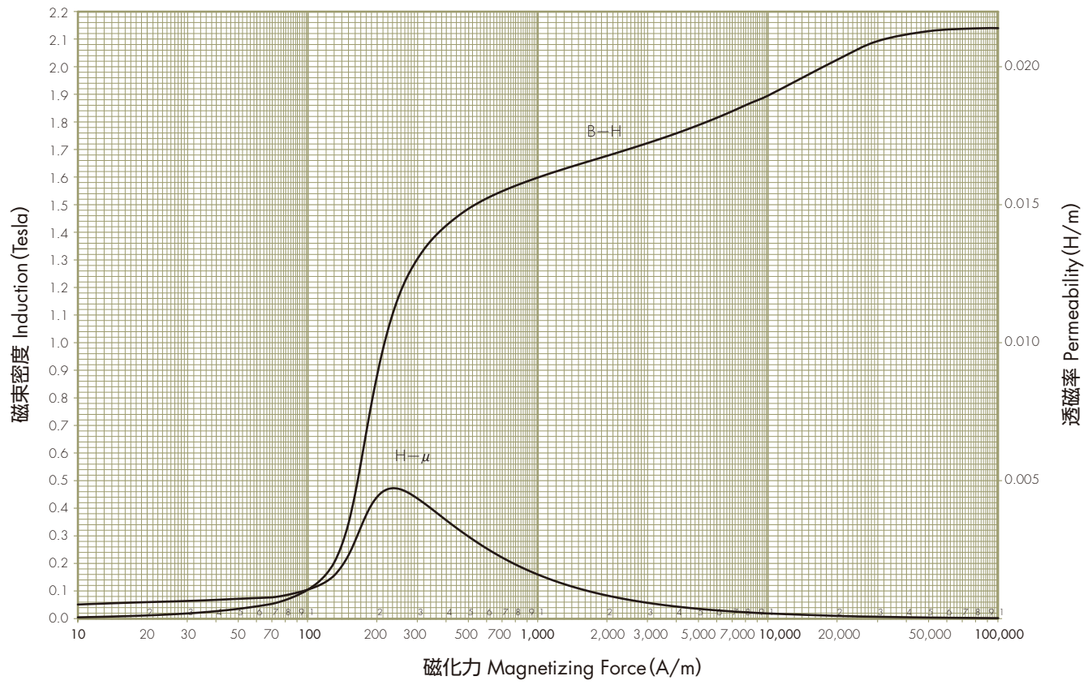


50H1300

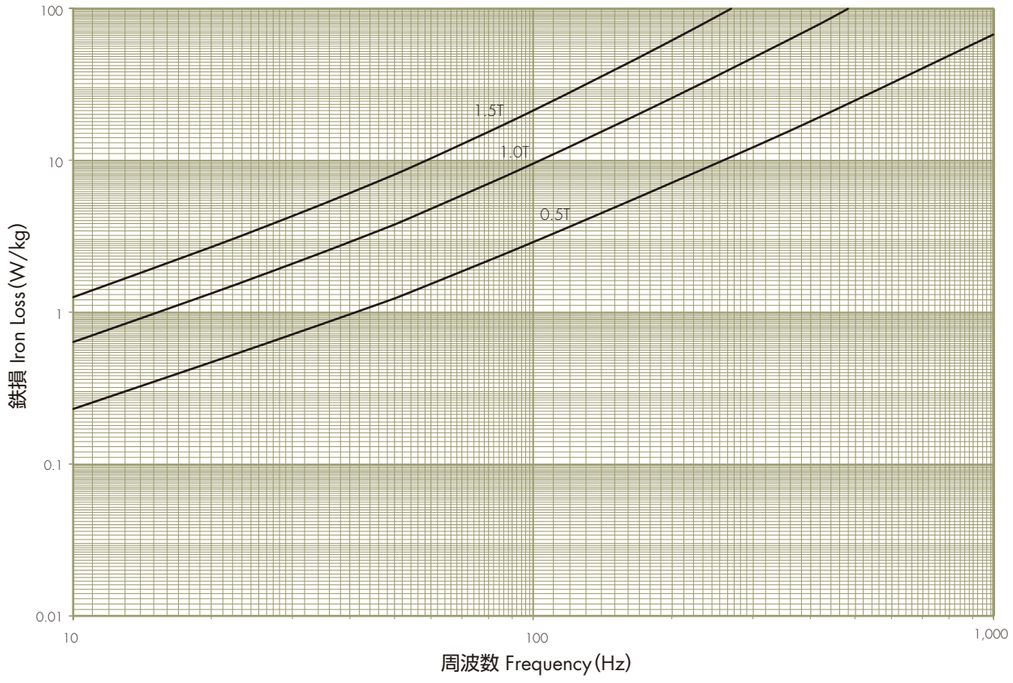
鉄損曲線 Iron Loss Curve



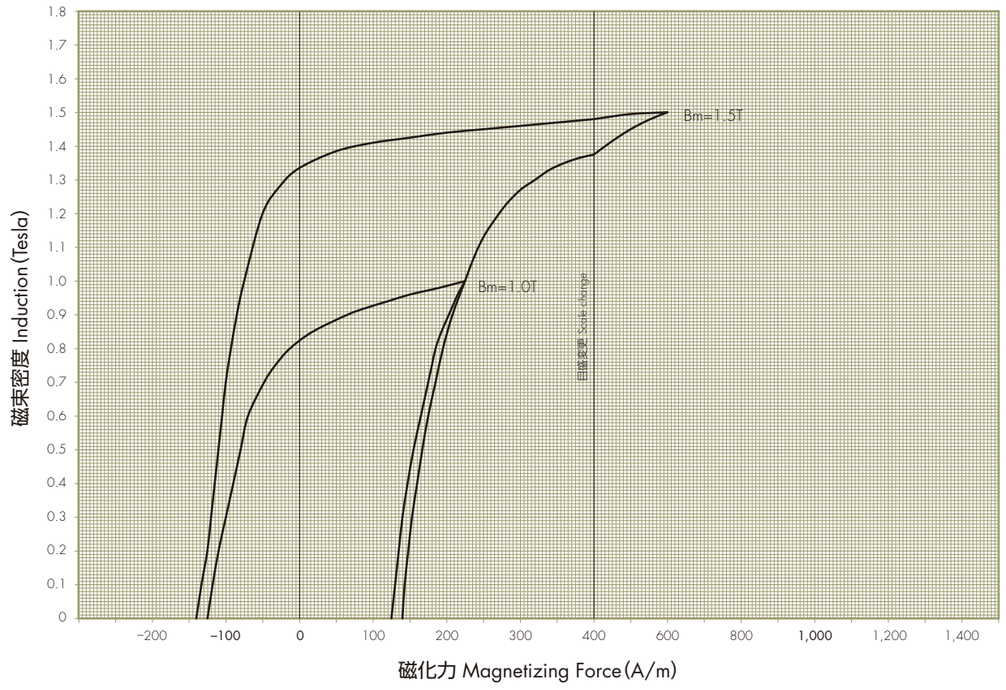
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

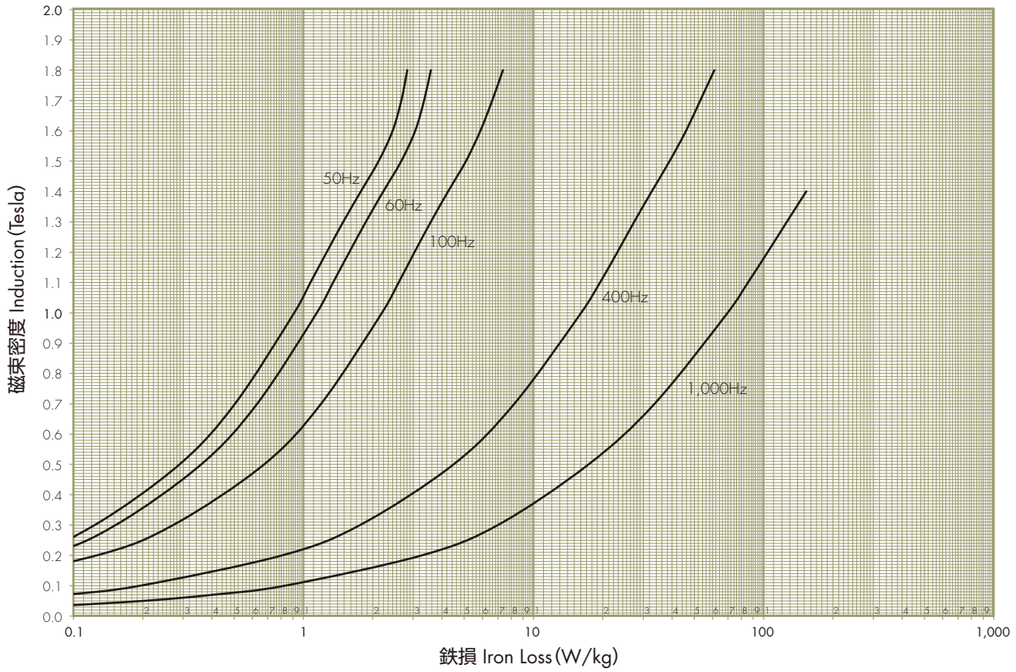


直流ヒステリシス曲線 DC Hysteresis Curve

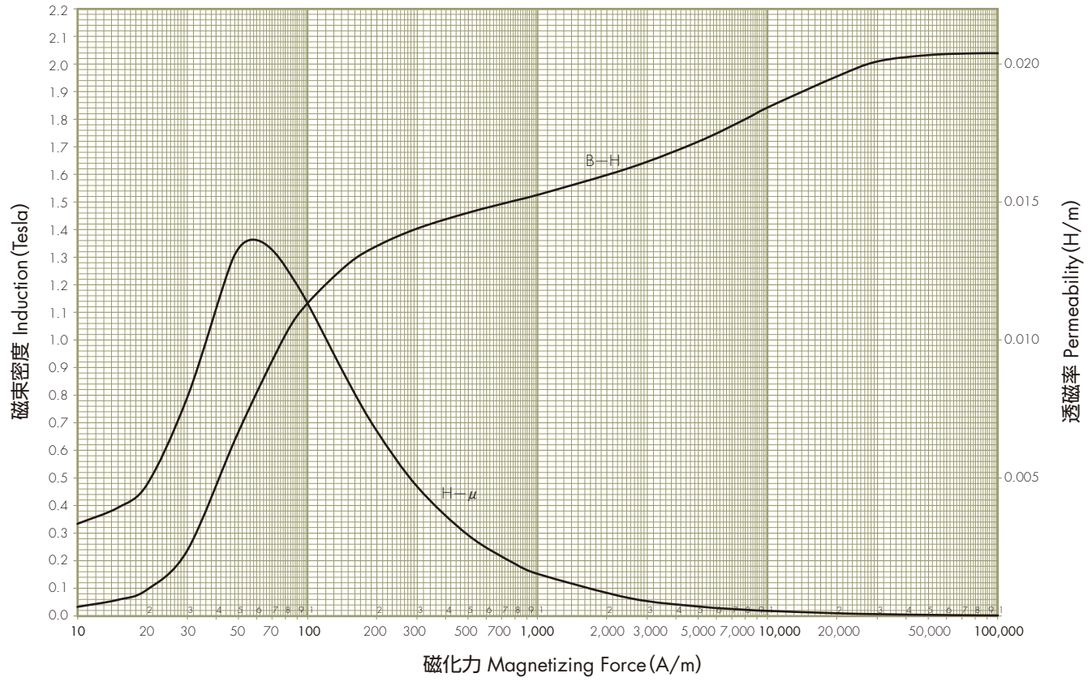


35HX230

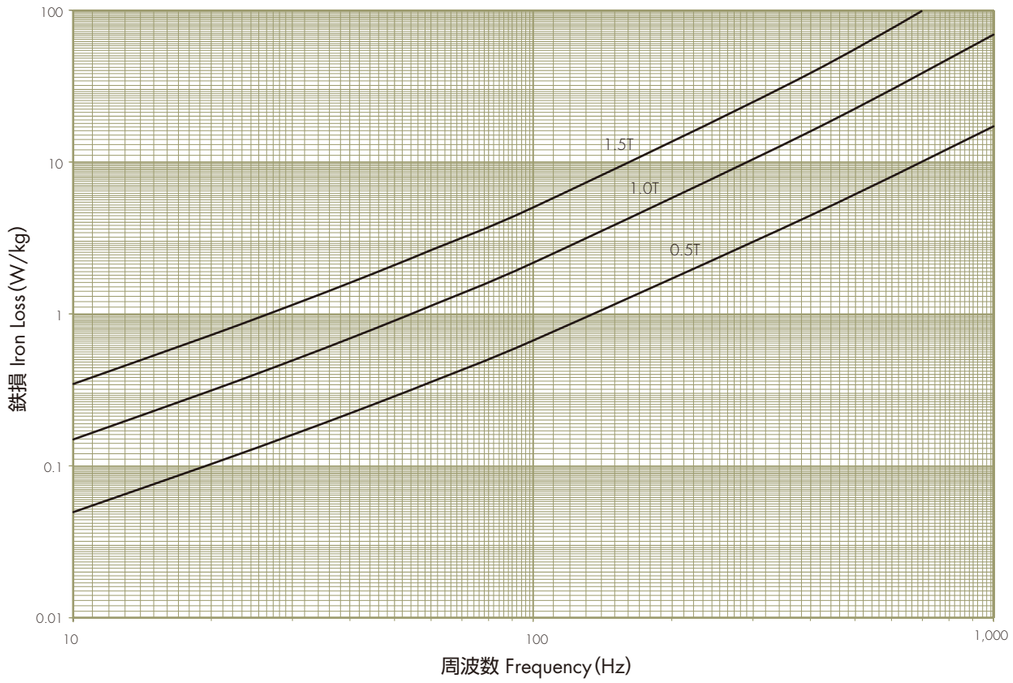
鉄損曲線 Iron Loss Curve



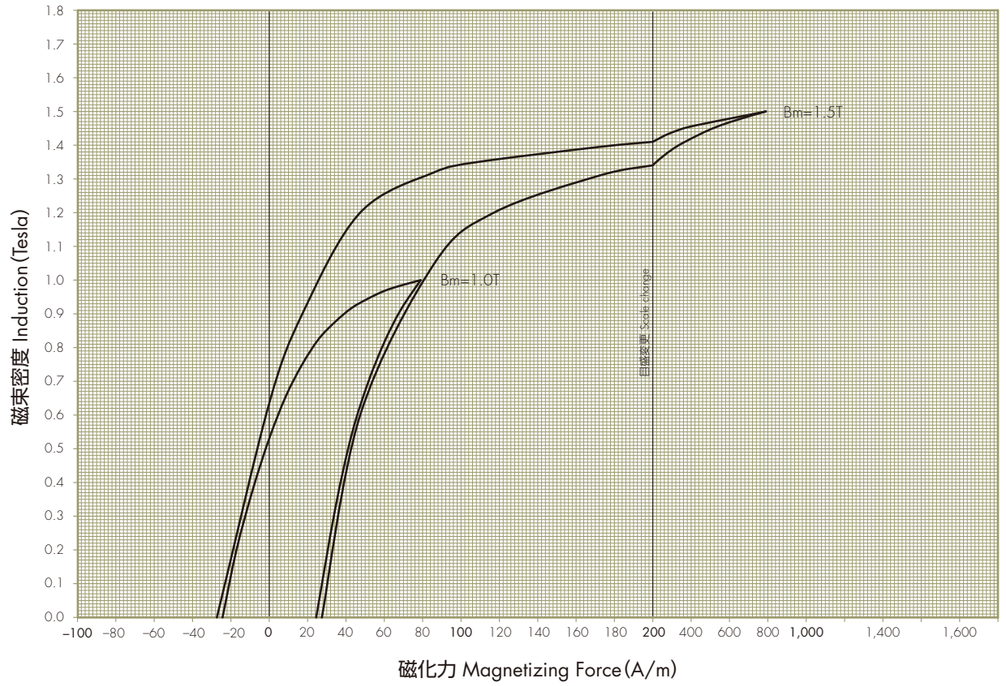
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

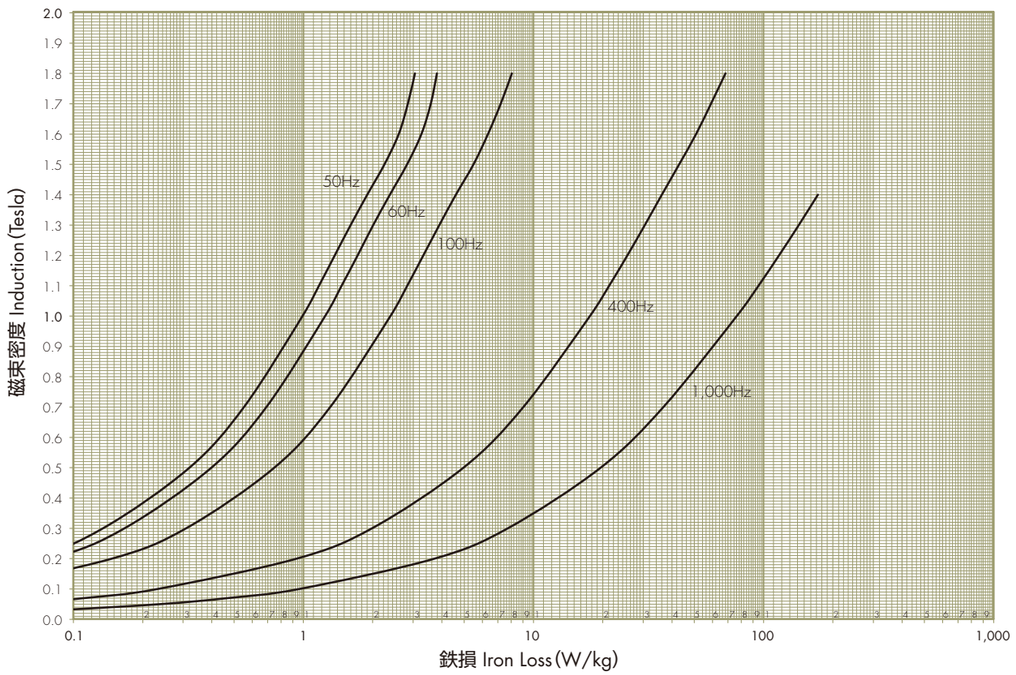


直流ヒステリシス曲線 DC Hysteresis Curve

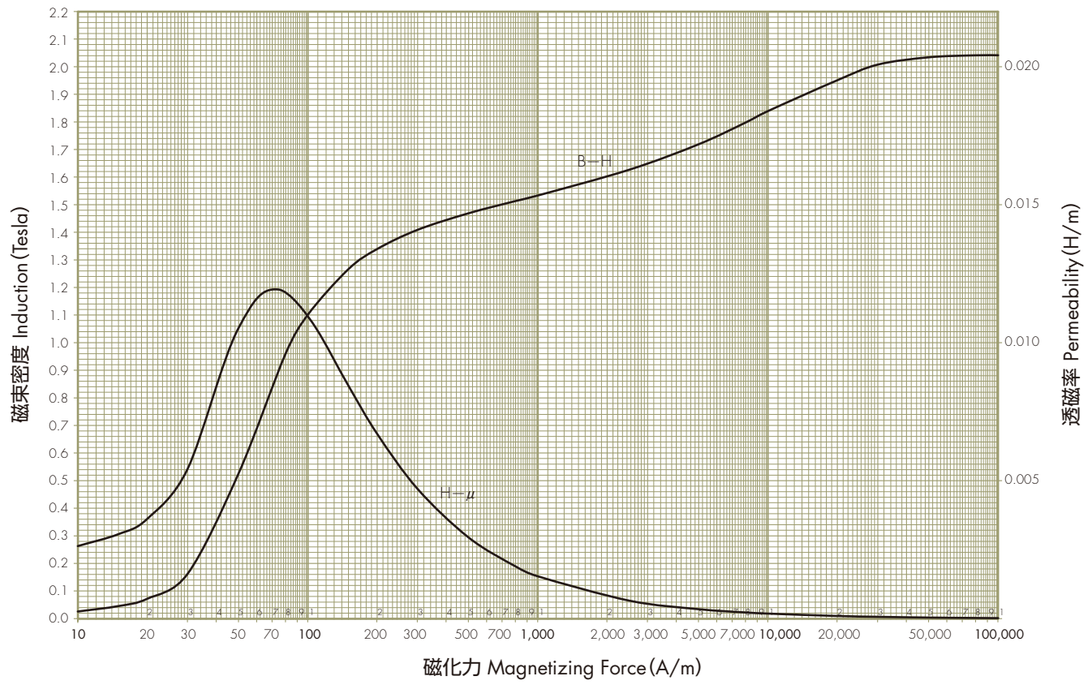


35HX250

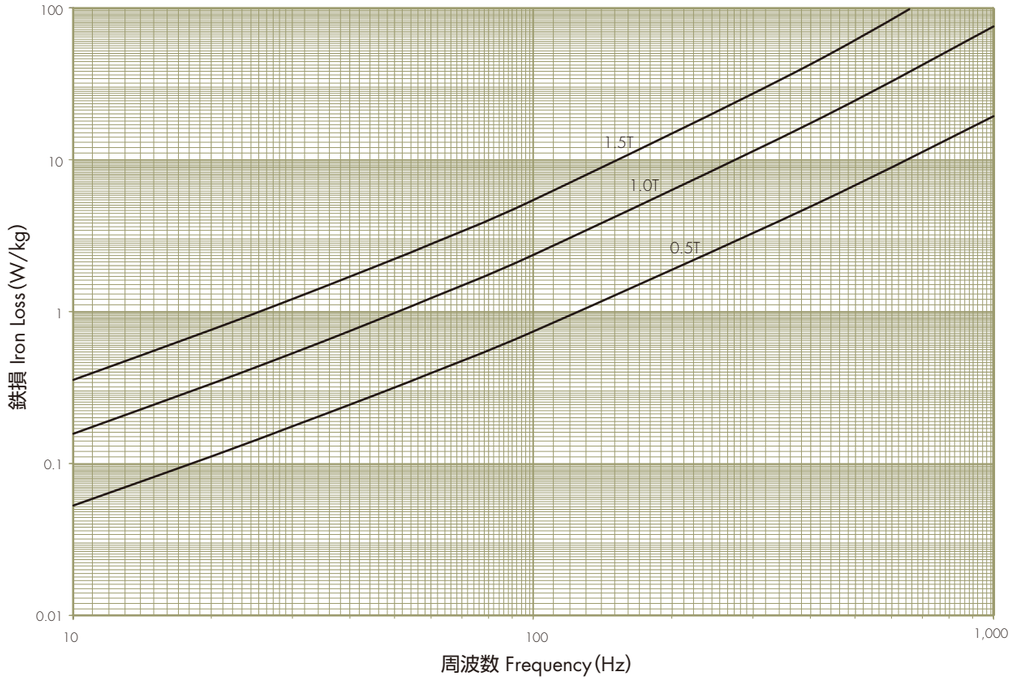
鉄損曲線 Iron Loss Curve



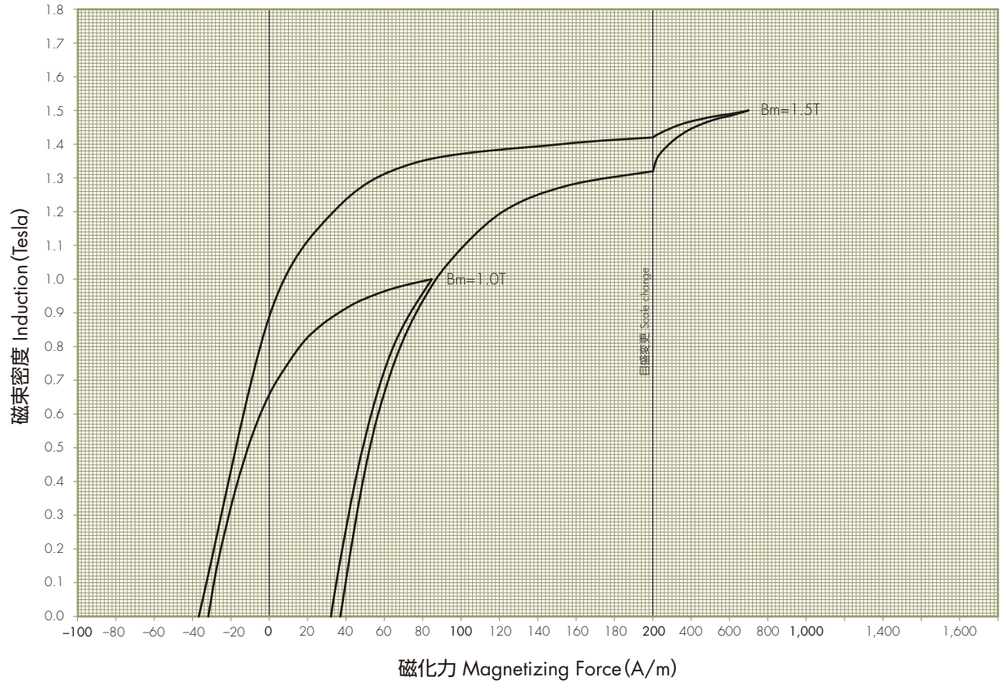
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

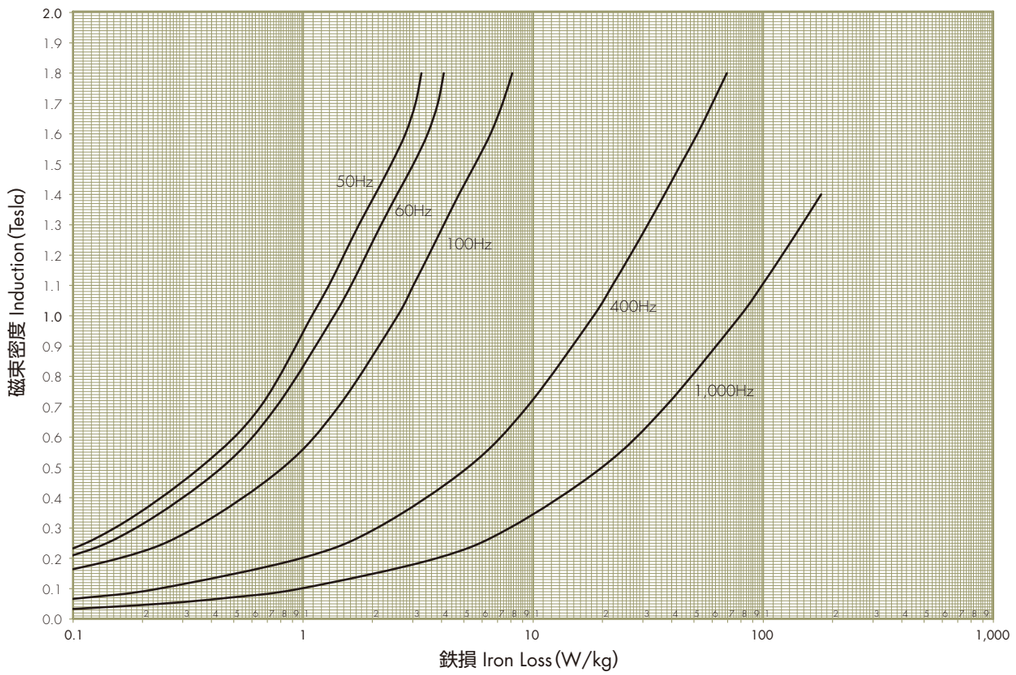


直流ヒステリシス曲線 DC Hysteresis Curve

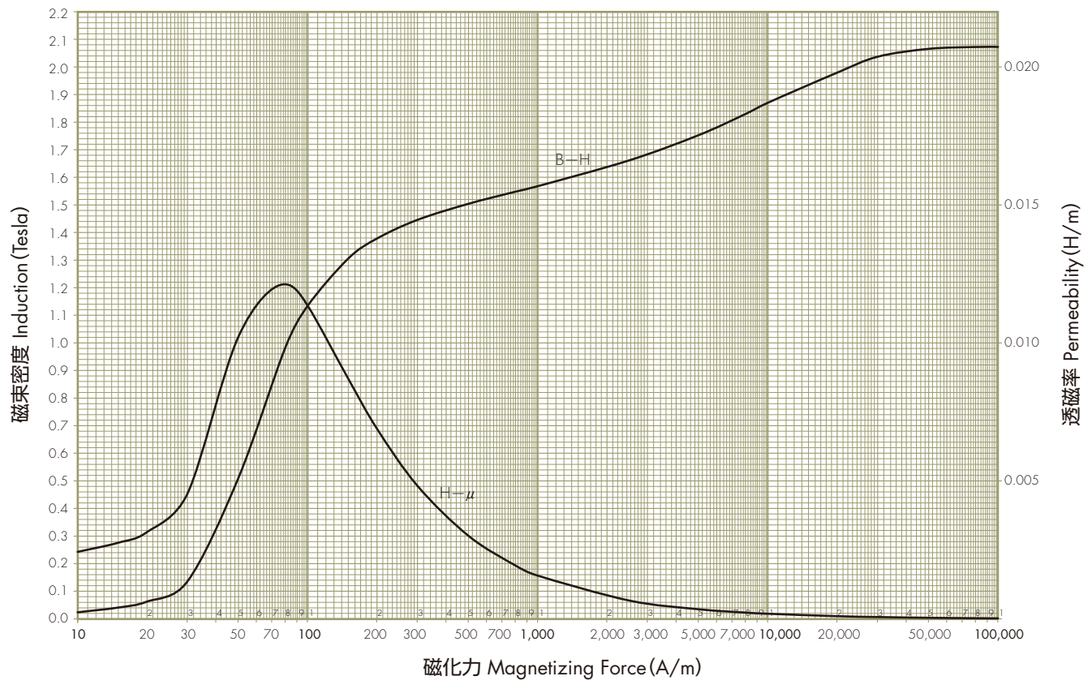


35HX300

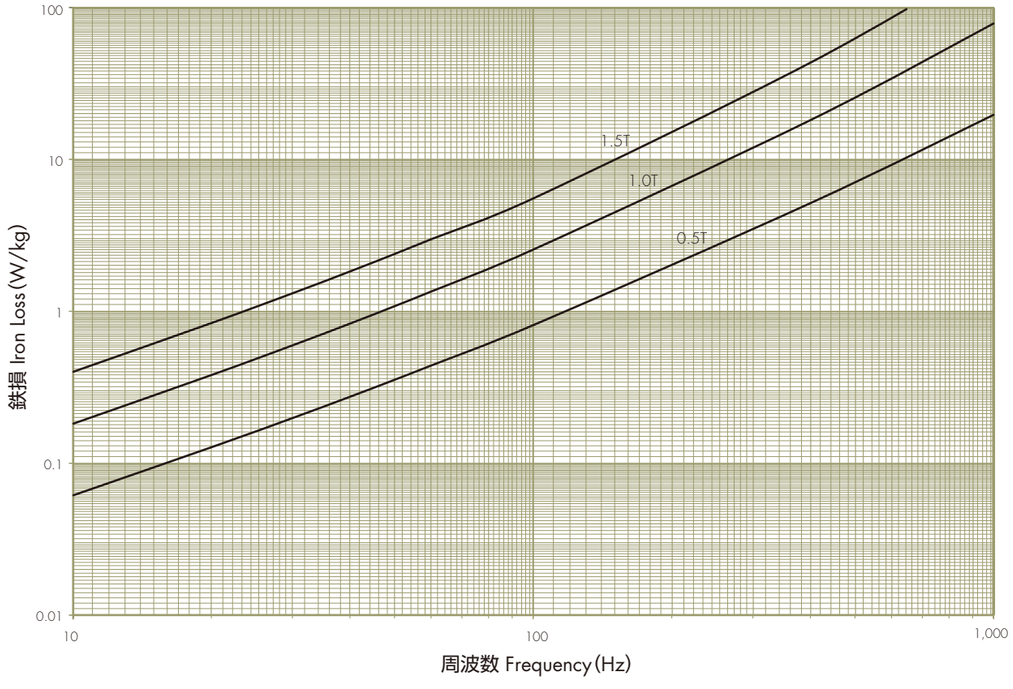
鉄損曲線 Iron Loss Curve



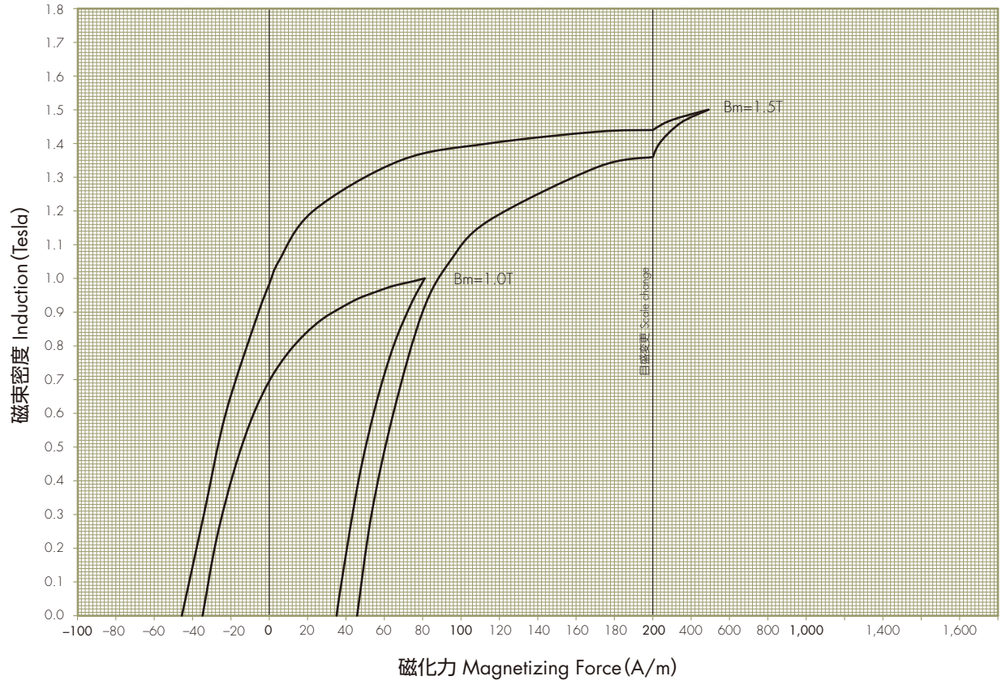
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance



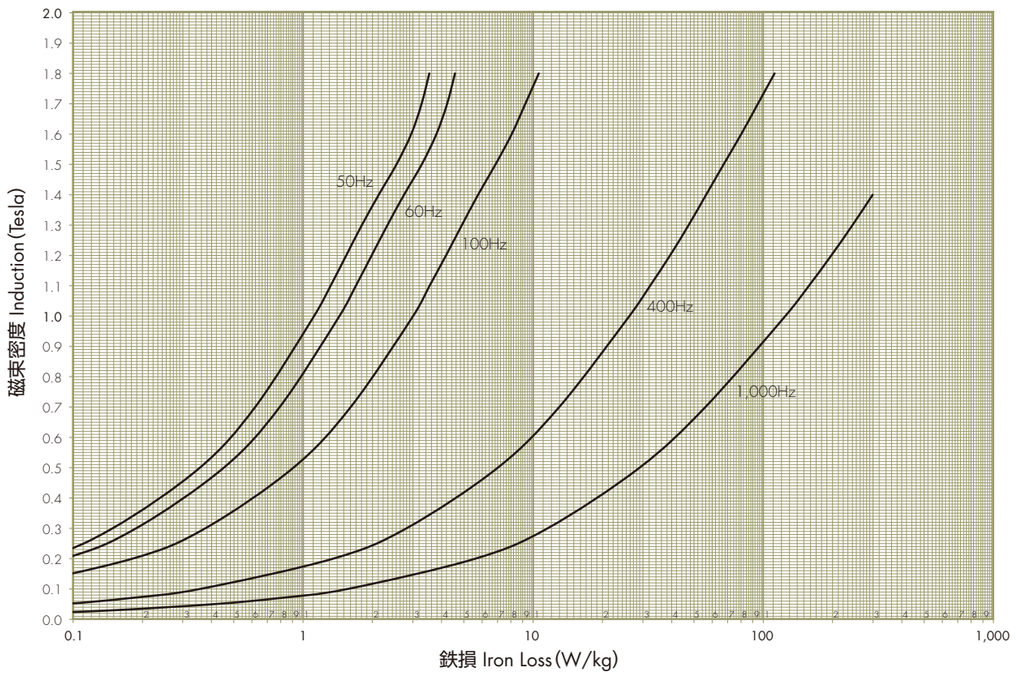
直流ヒステリシス曲線 DC Hysteresis Curve



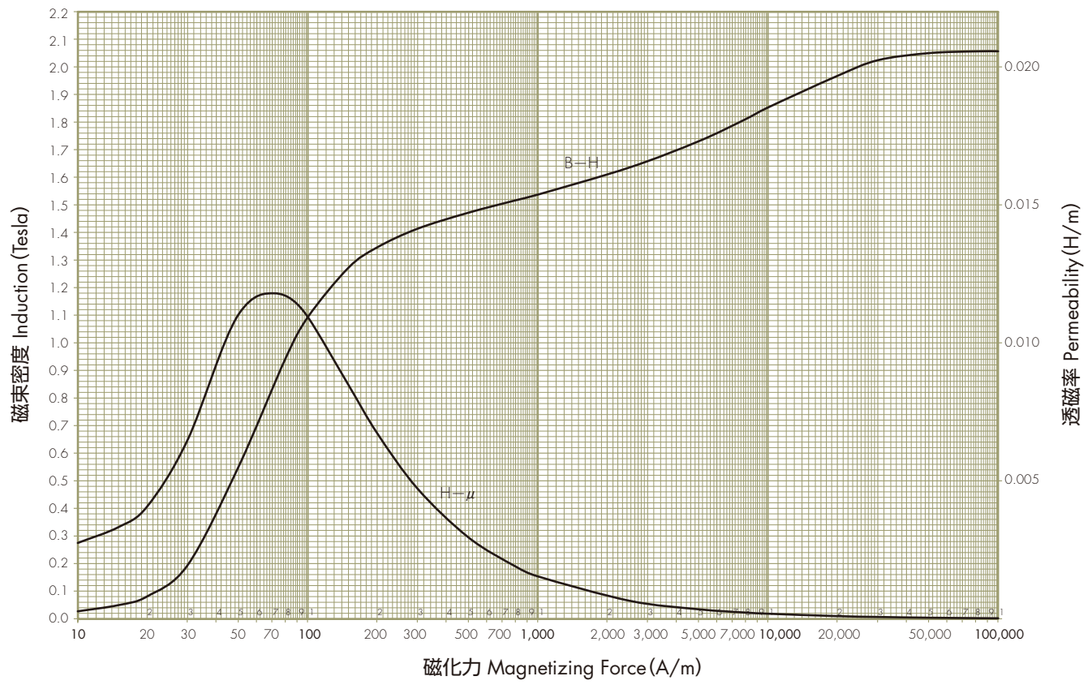
35HX300

50HX290

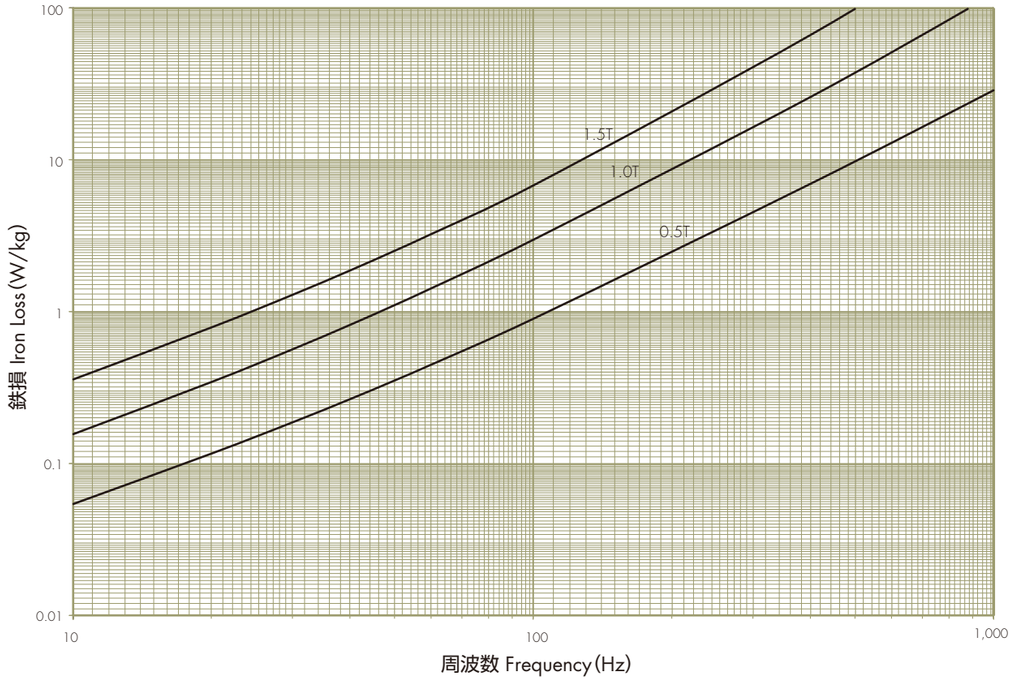
鉄損曲線 Iron Loss Curve



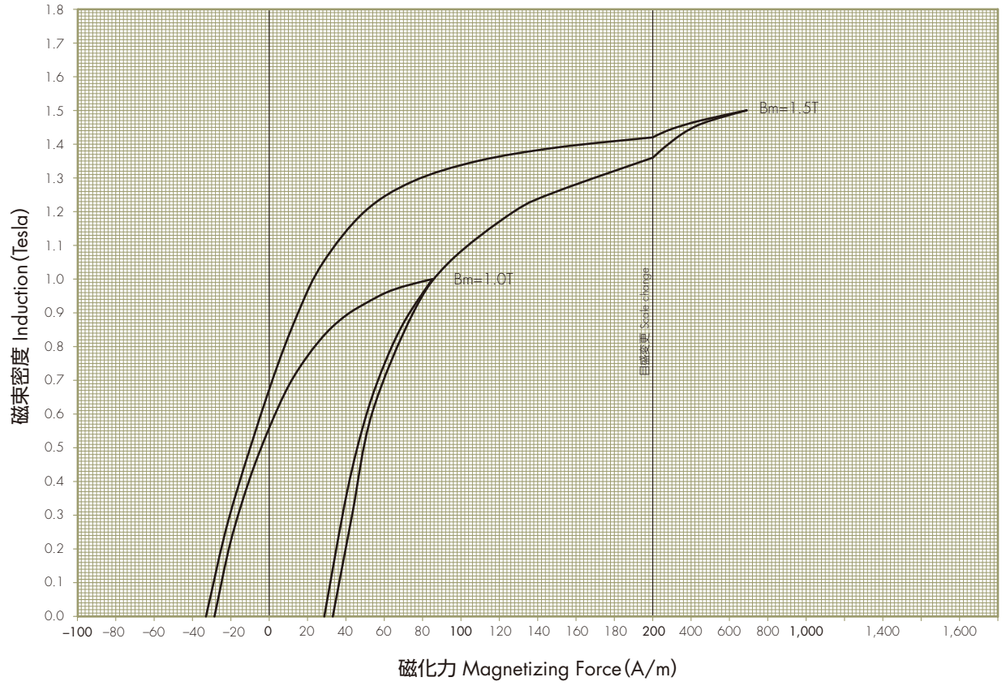
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance



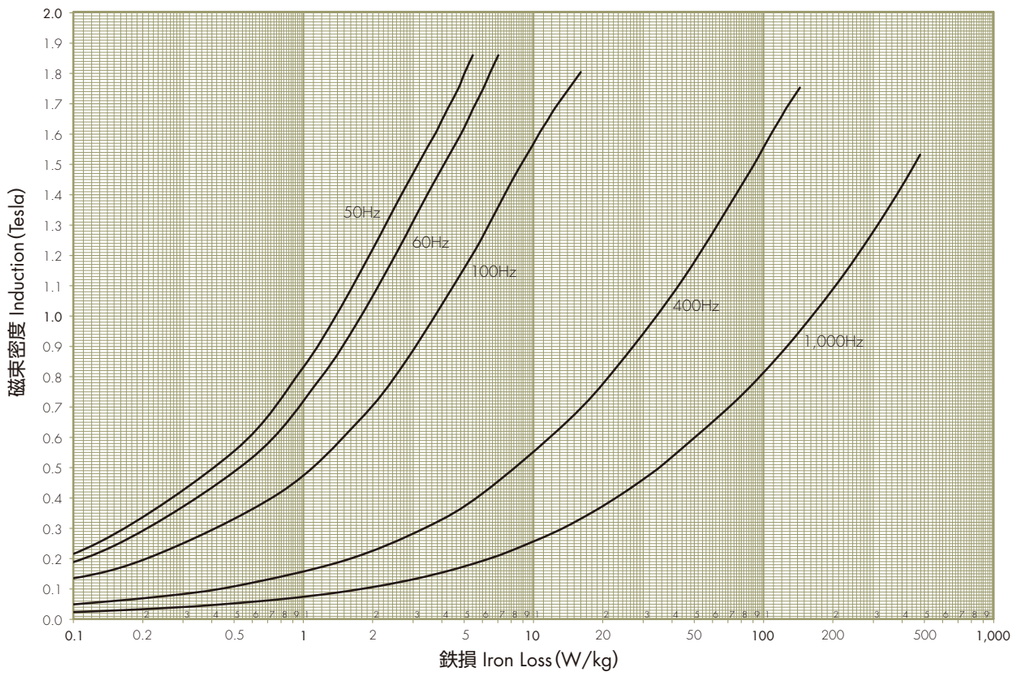
直流ヒステリシス曲線 DC Hysteresis Curve



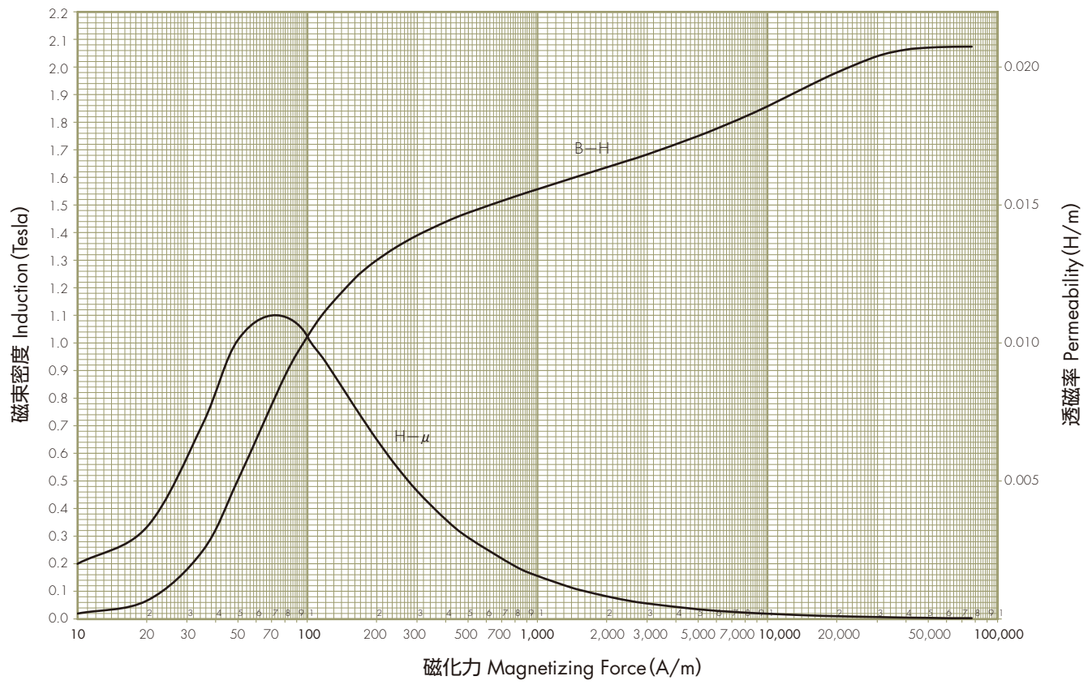
50HX290

50HX350

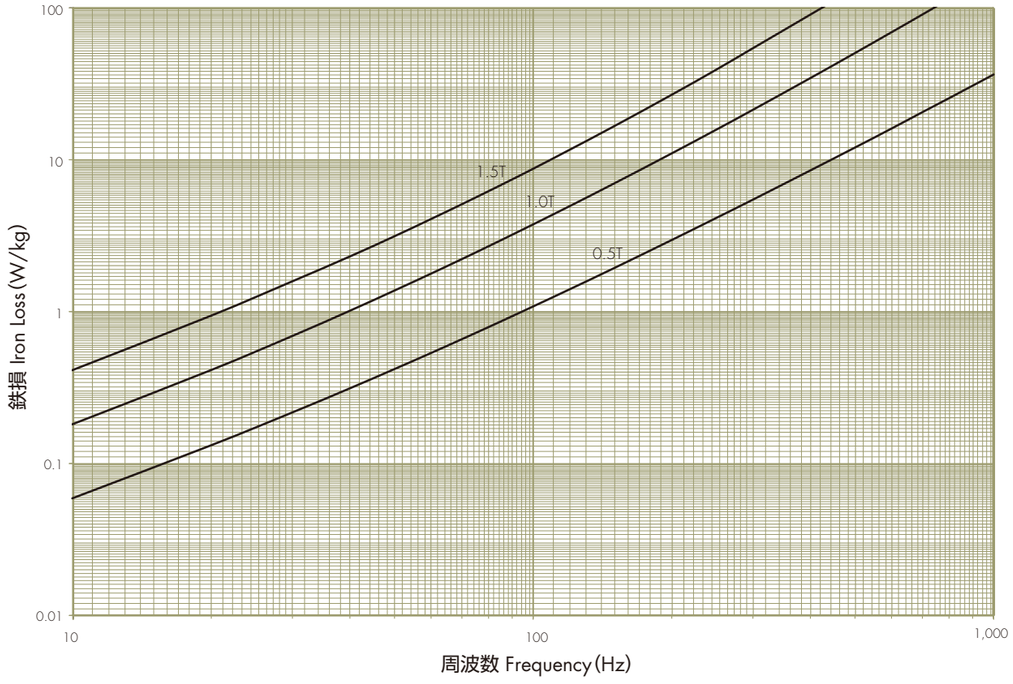
鉄損曲線 Iron Loss Curve



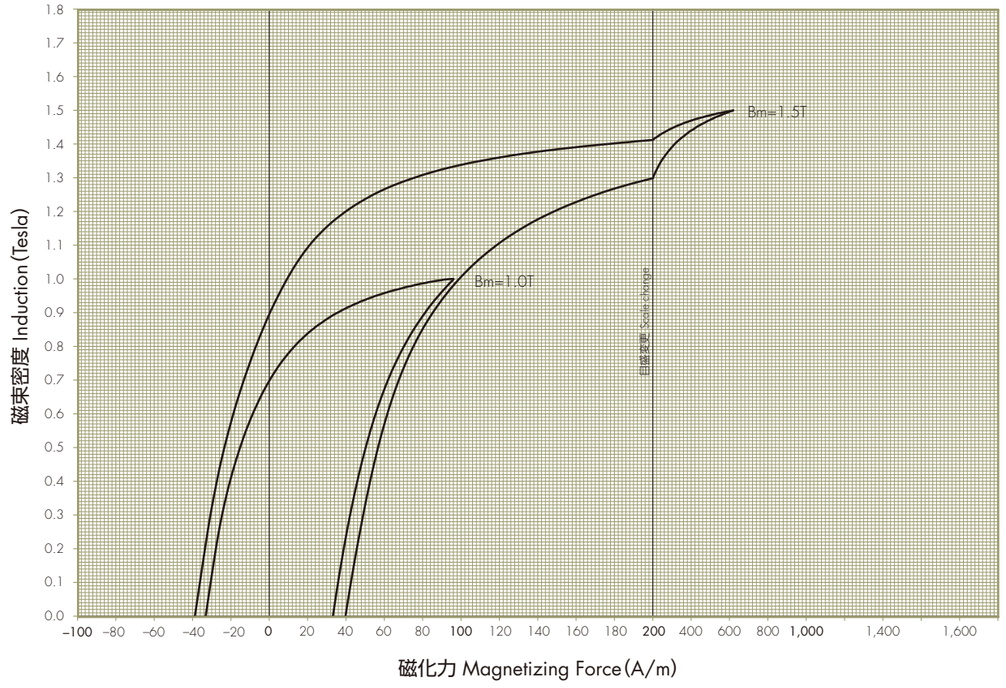
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

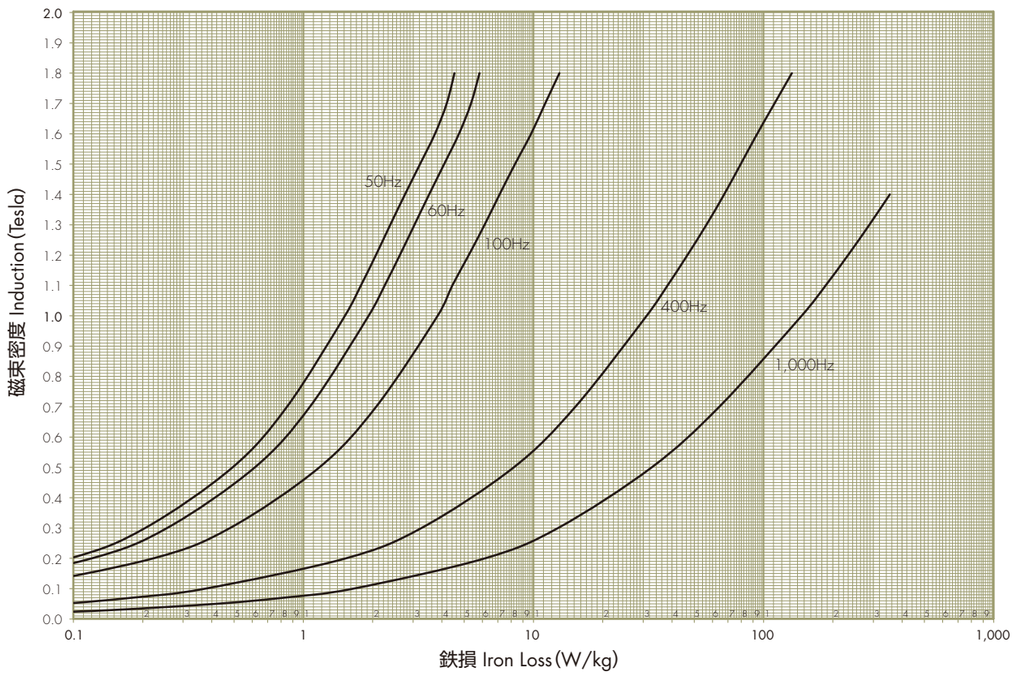


直流ヒステリシス曲線 DC Hysteresis Curve

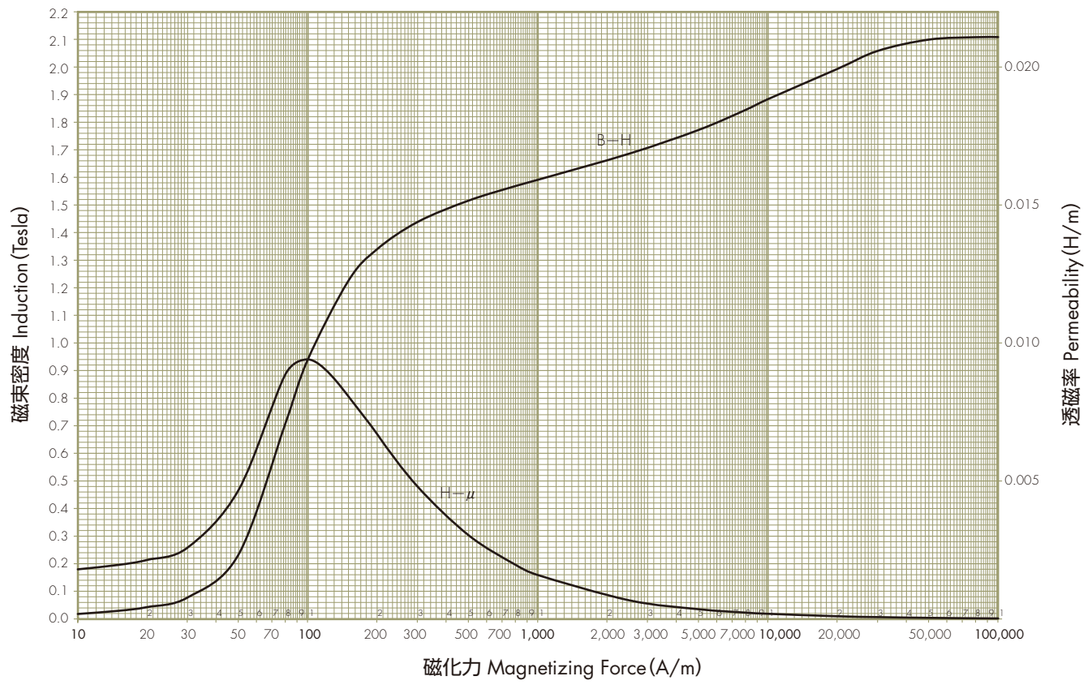


50HX470

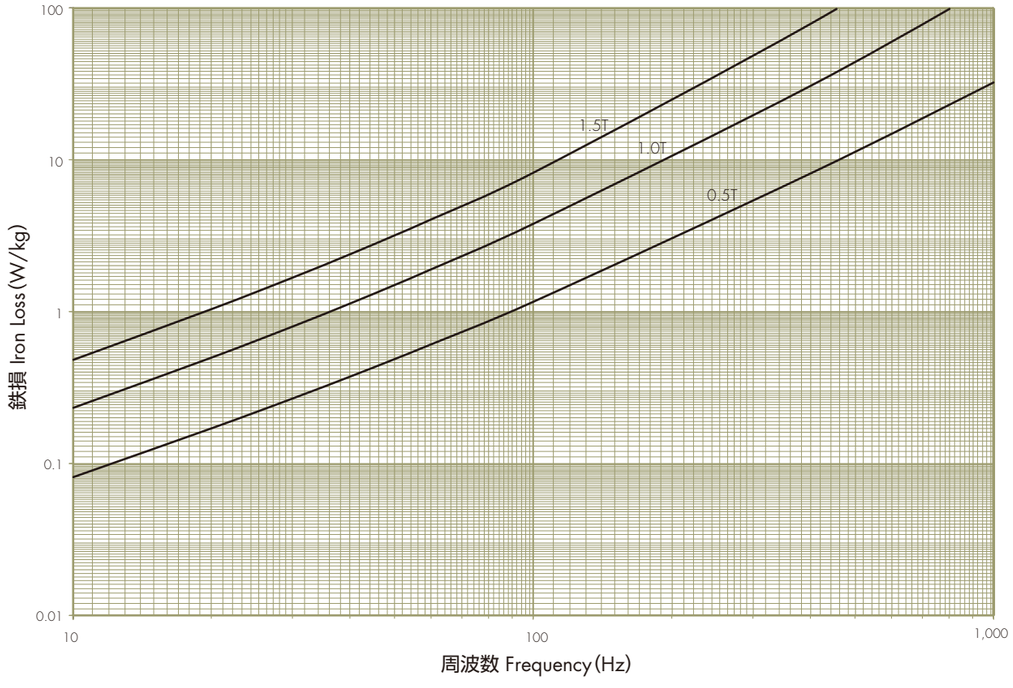
鉄損曲線 Iron Loss Curve



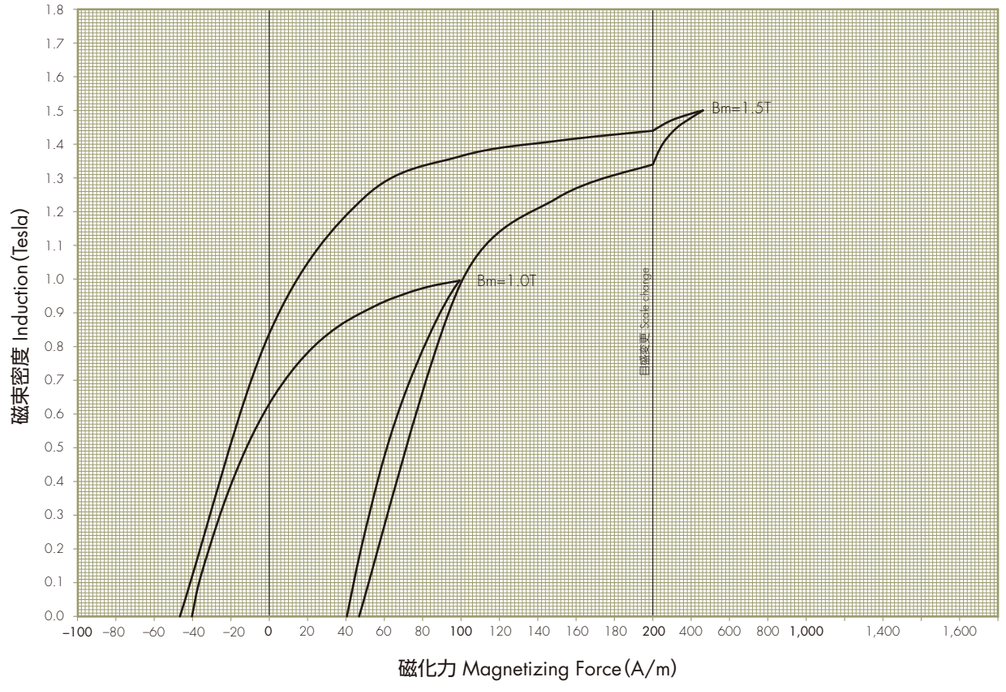
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

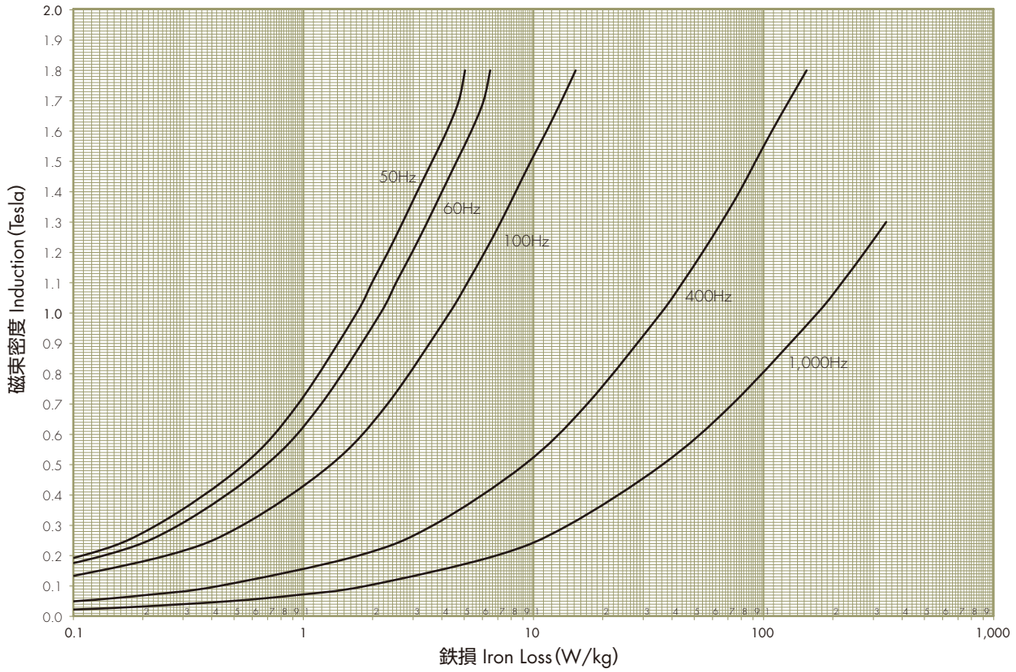


直流ヒステリシス曲線 DC Hysteresis Curve

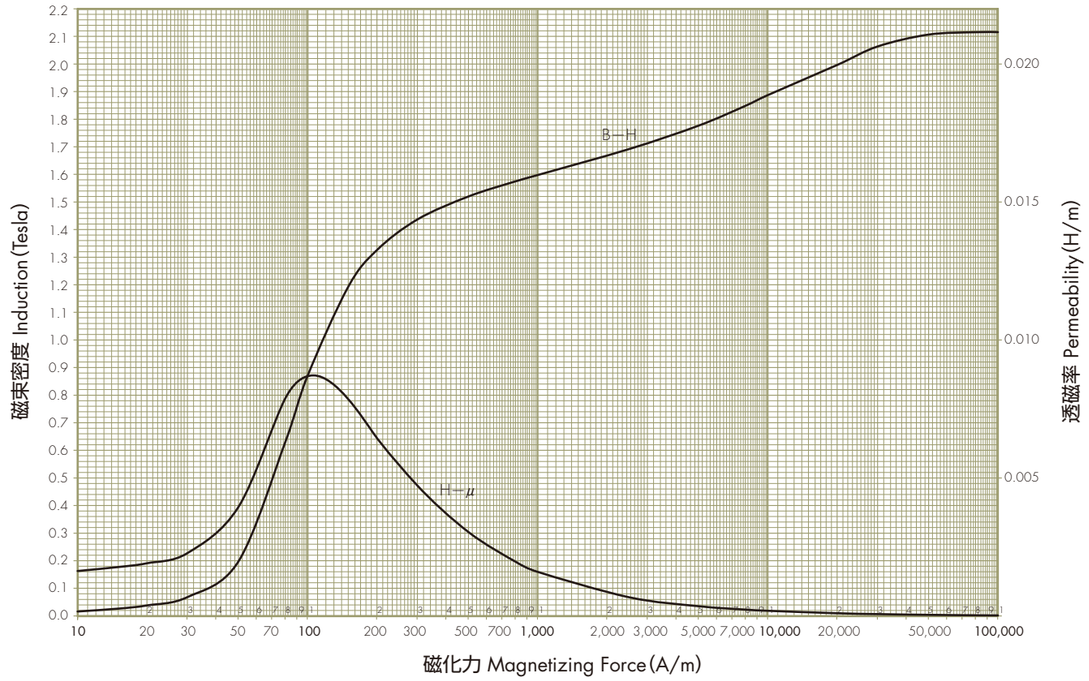


50HX600

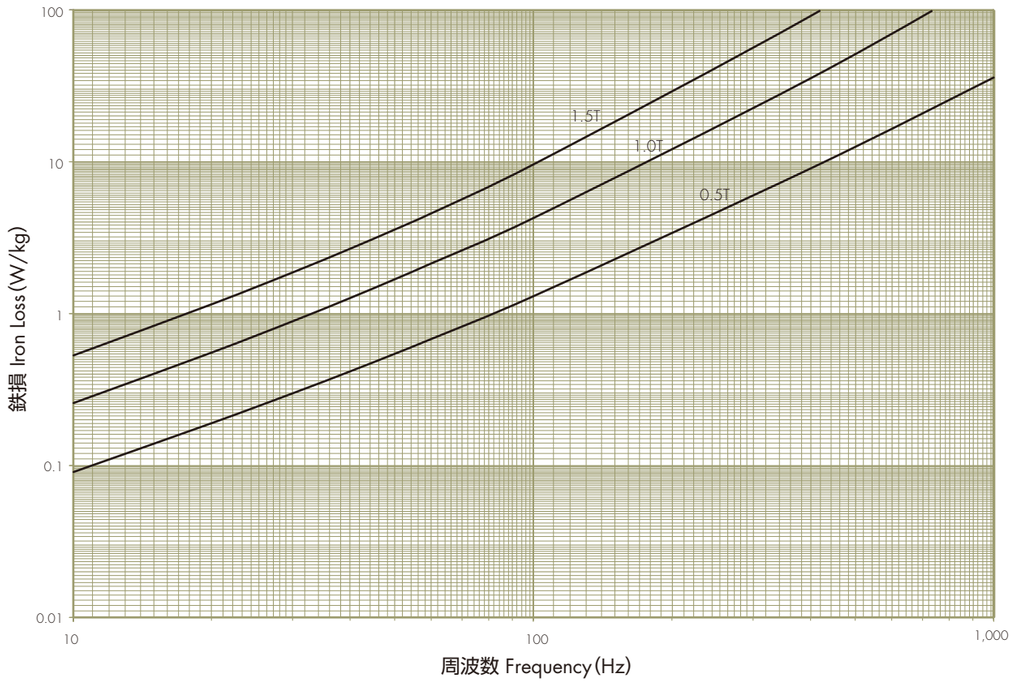
鉄損曲線 Iron Loss Curve



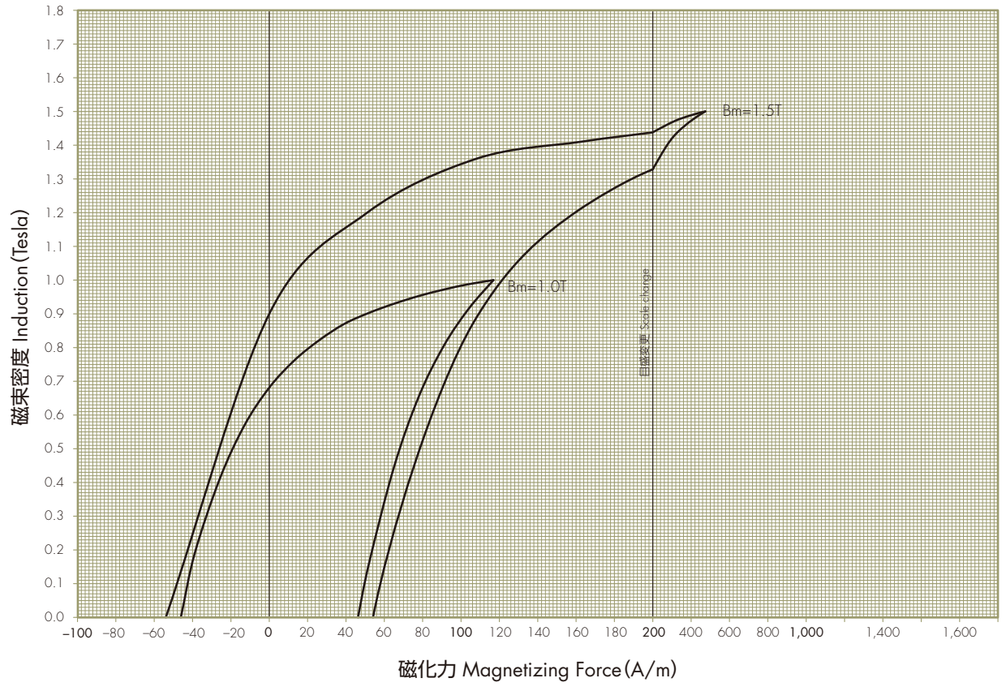
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

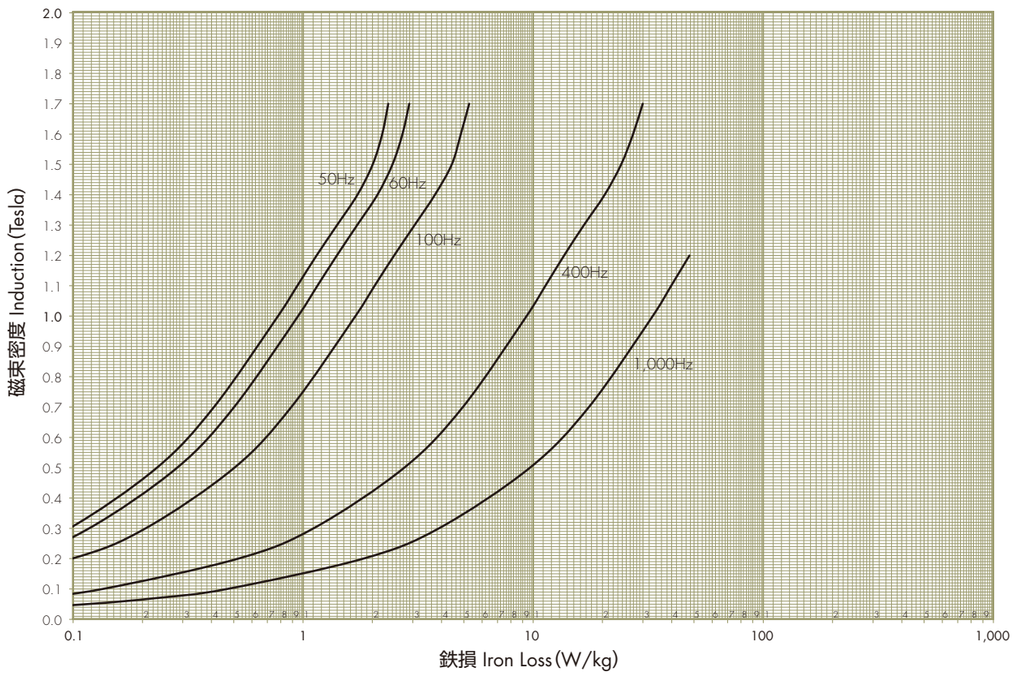


直流ヒステリシス曲線 DC Hysteresis Curve

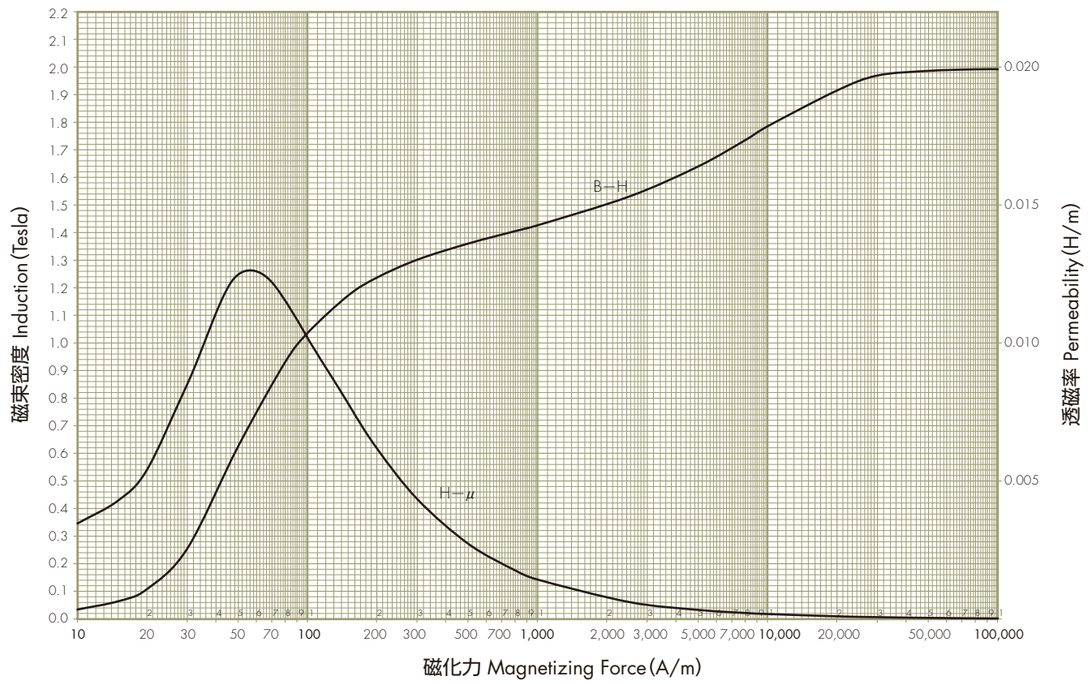


15HX1000

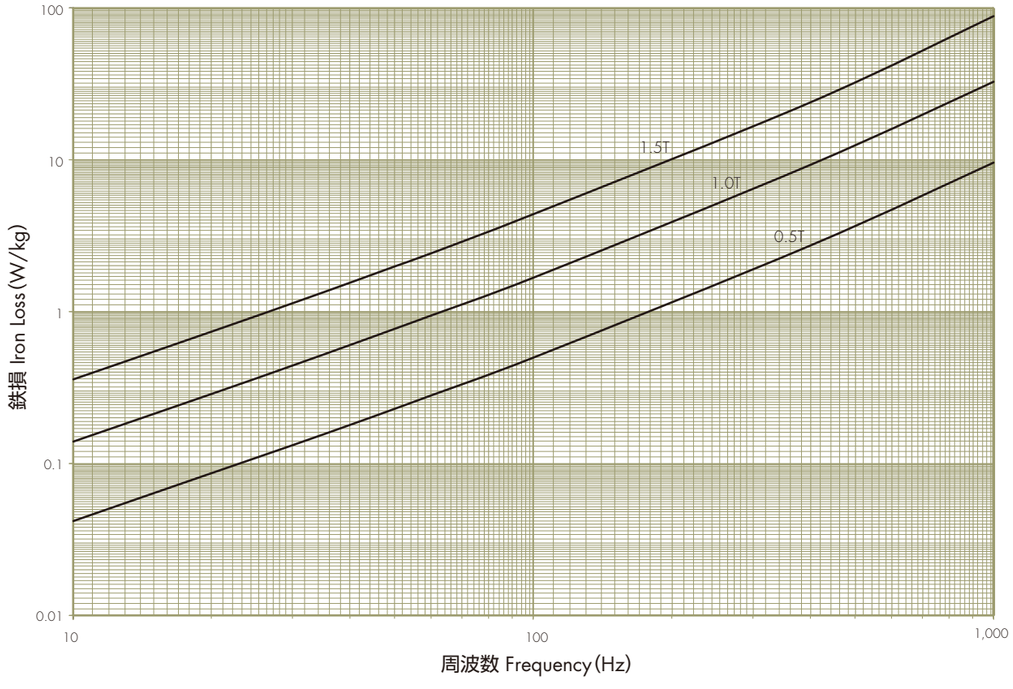
鉄損曲線 Iron Loss Curve



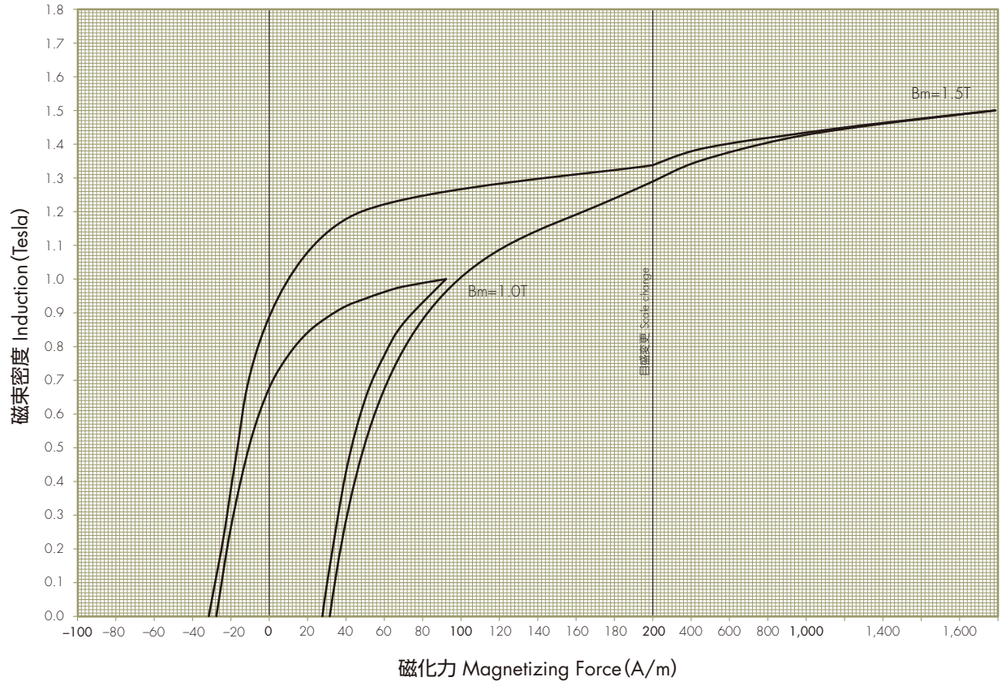
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance



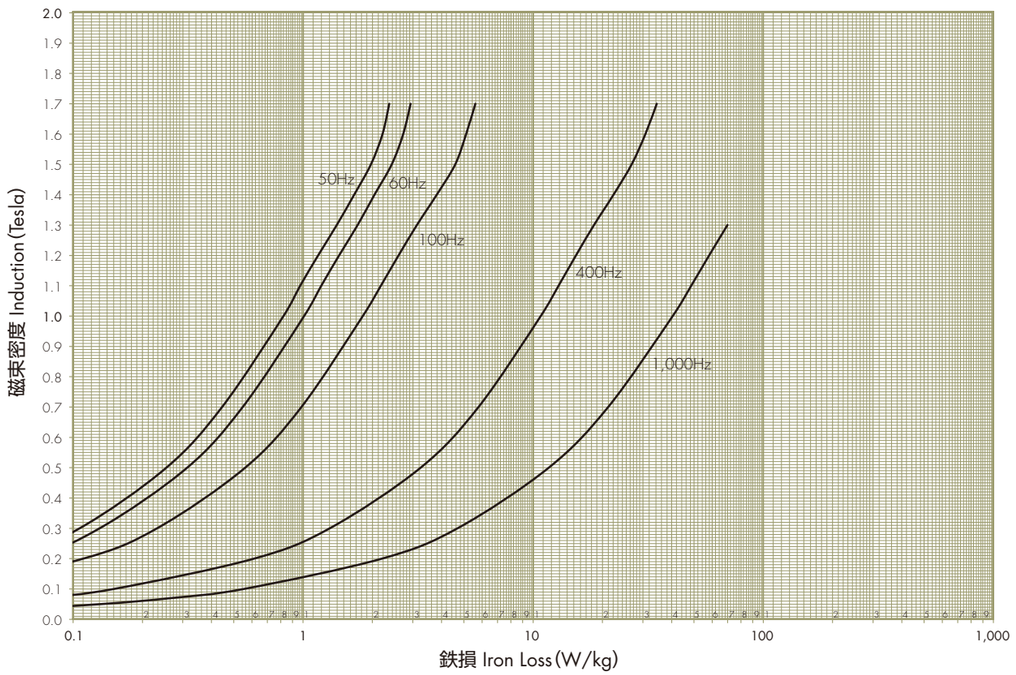
直流ヒステリシス曲線 DC Hysteresis Curve



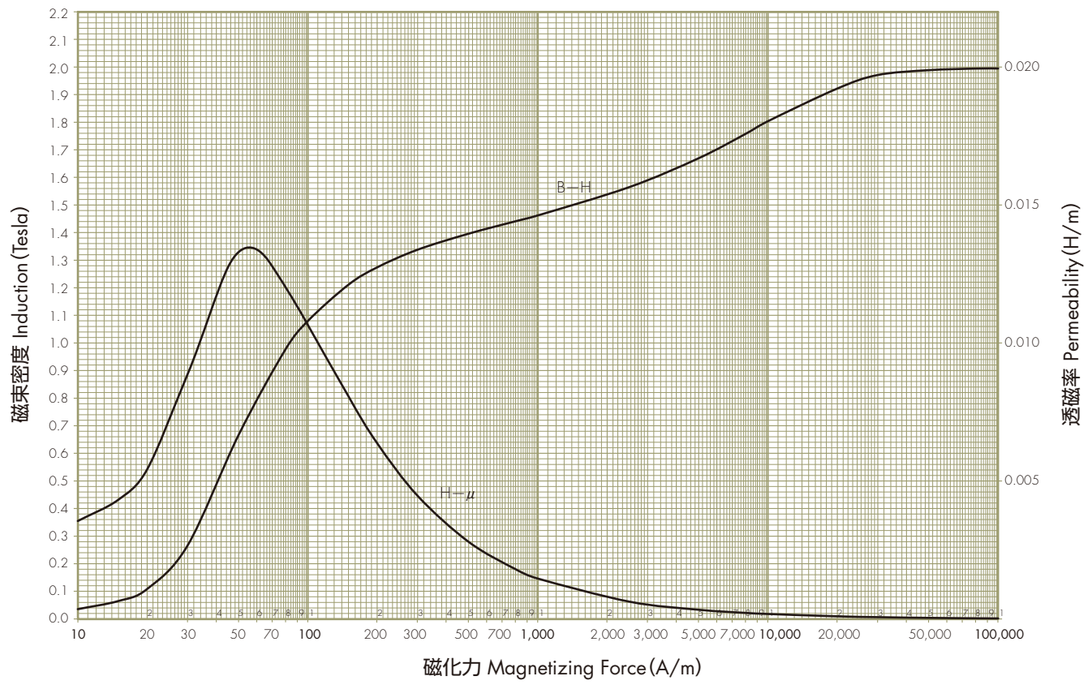
15HX1000

20HX1200

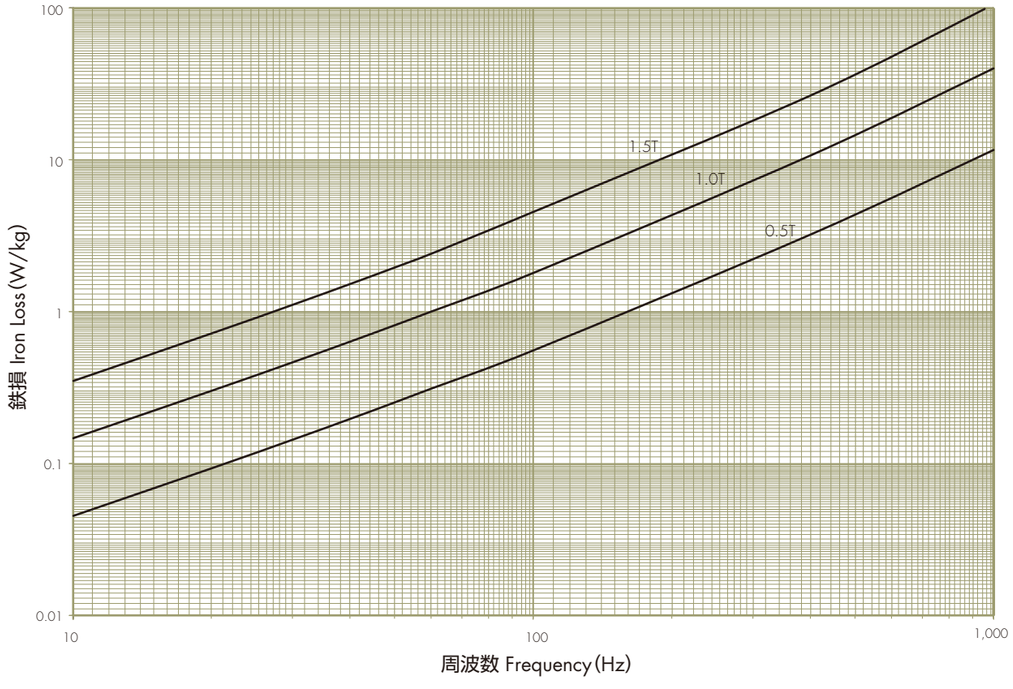
鉄損曲線 Iron Loss Curve



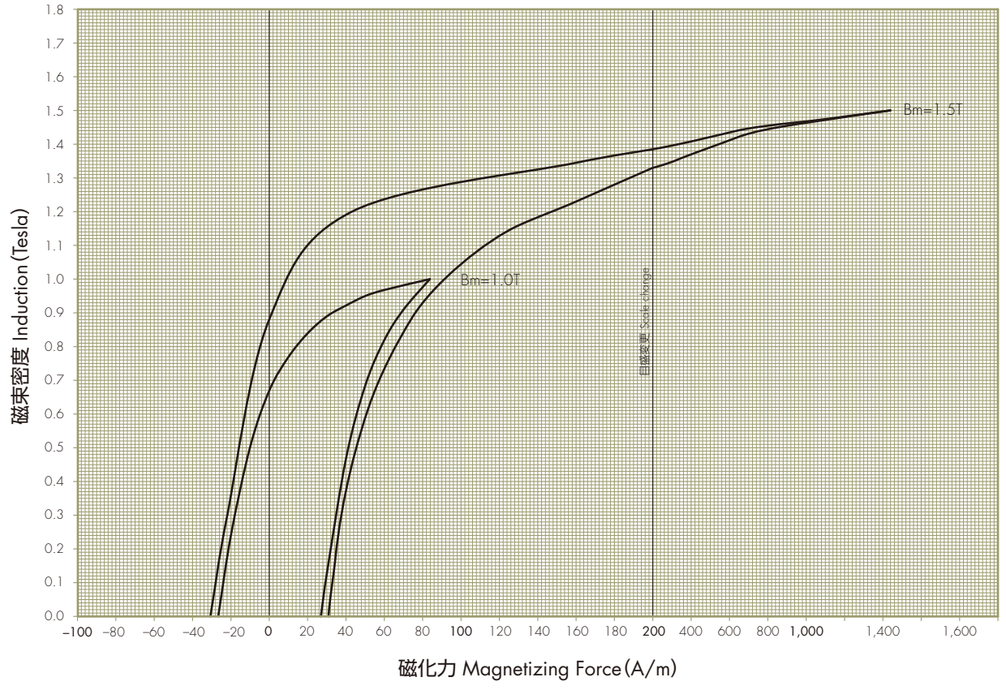
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance



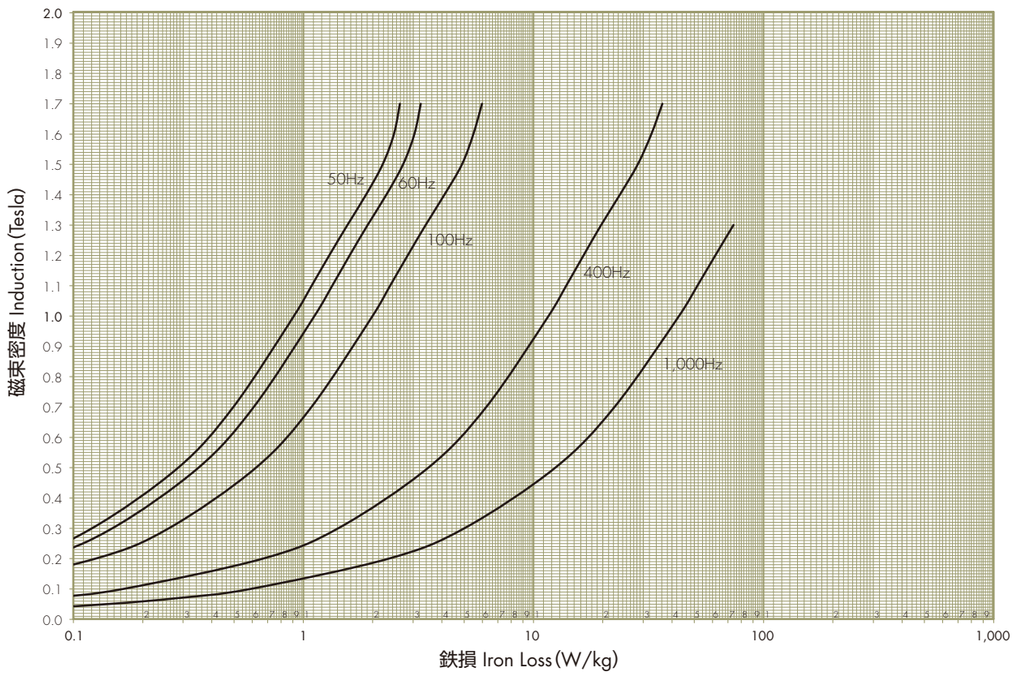
直流ヒステリシス曲線 DC Hysteresis Curve



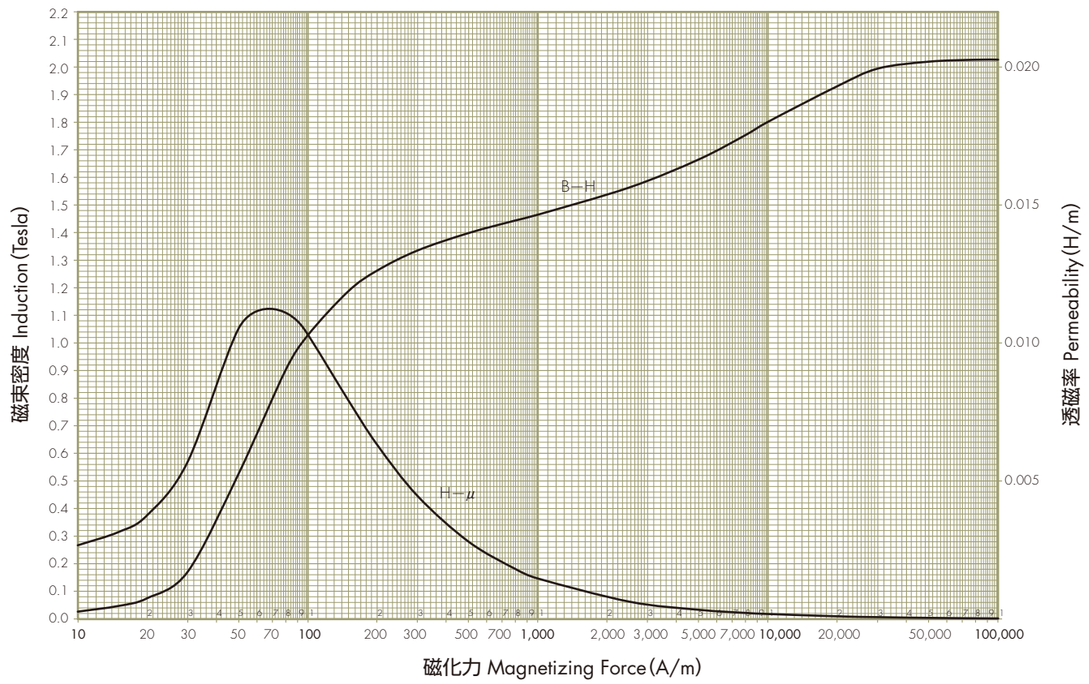
20HX1200

20HX1300

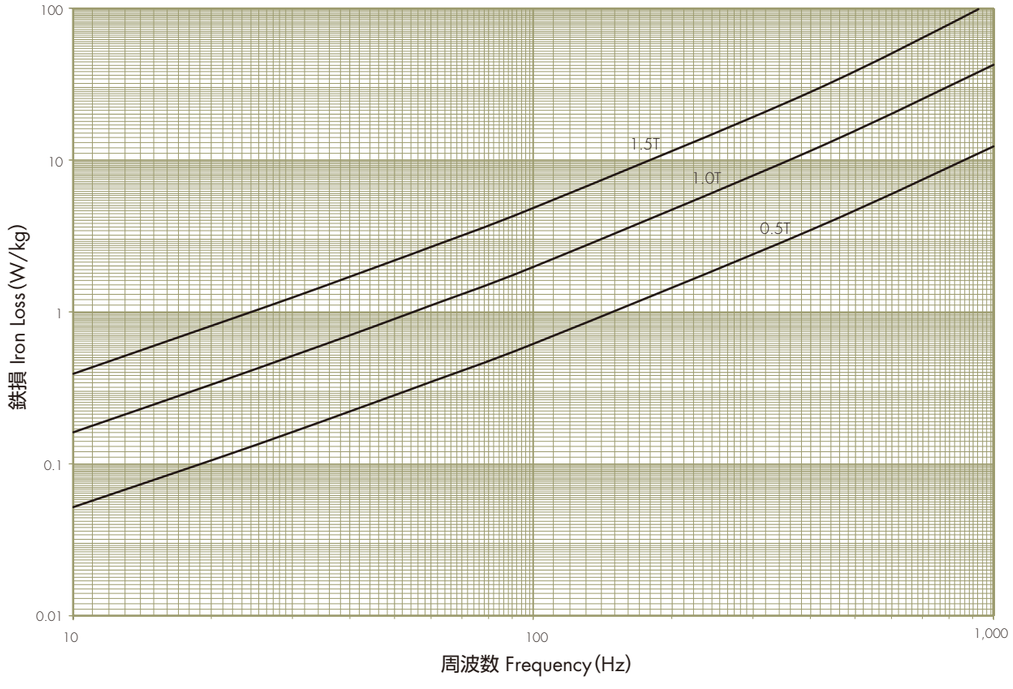
鉄損曲線 Iron Loss Curve



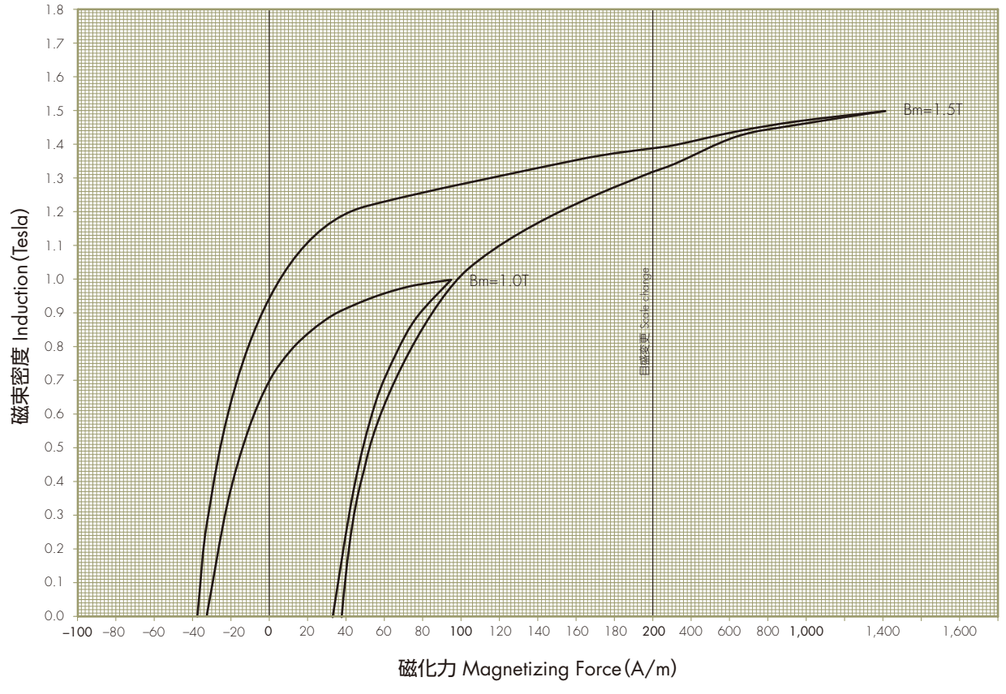
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

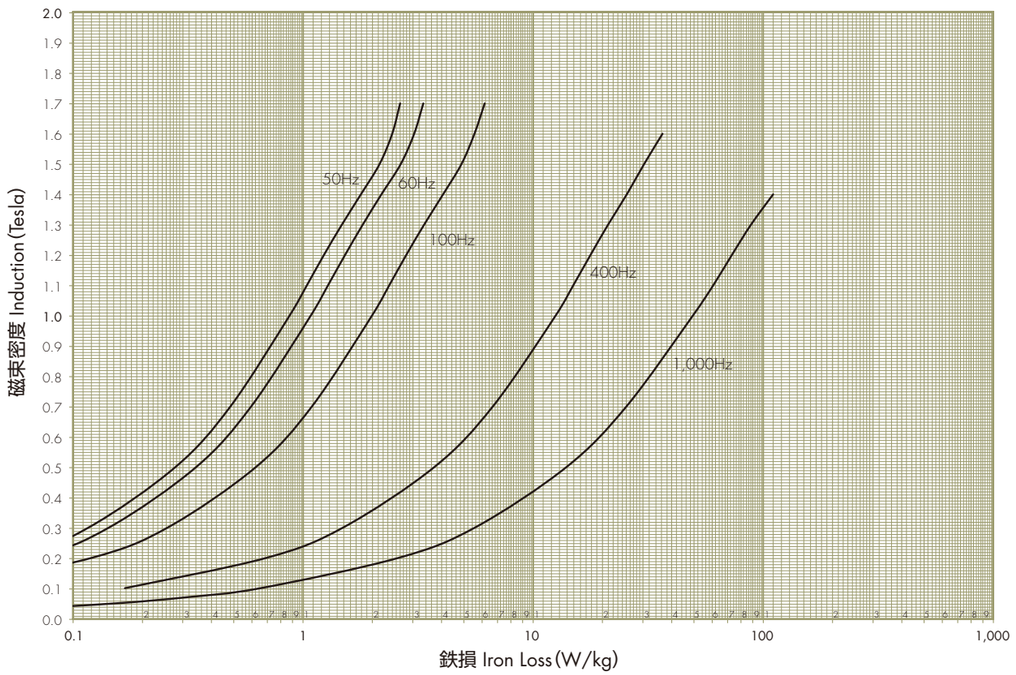


直流ヒステリシス曲線 DC Hysteresis Curve

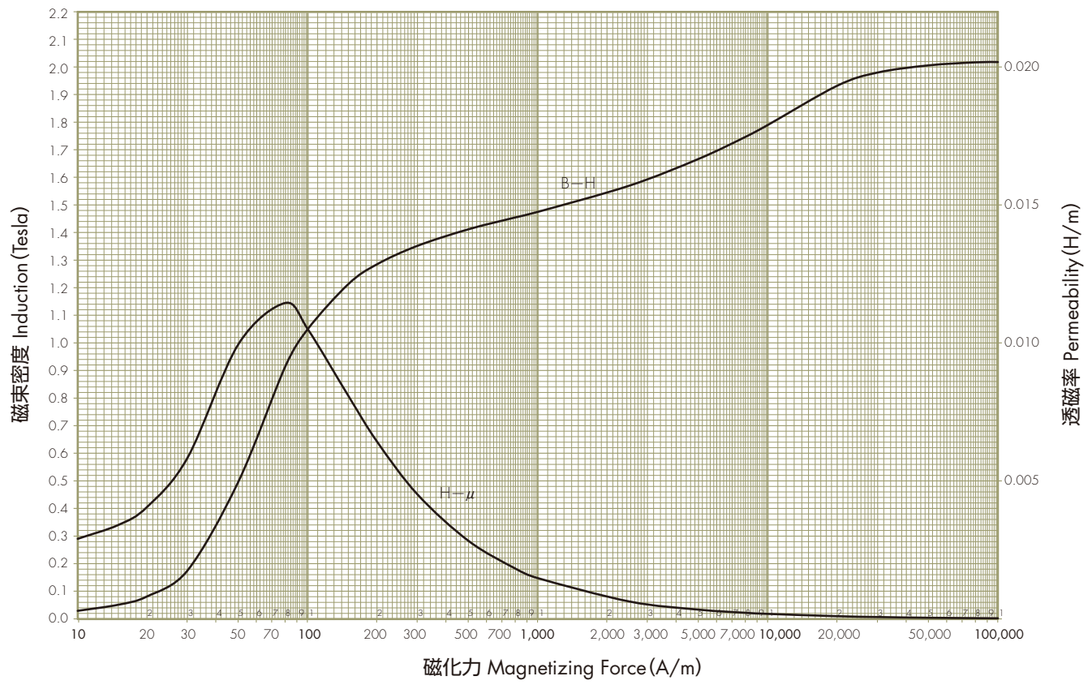


25HX1400

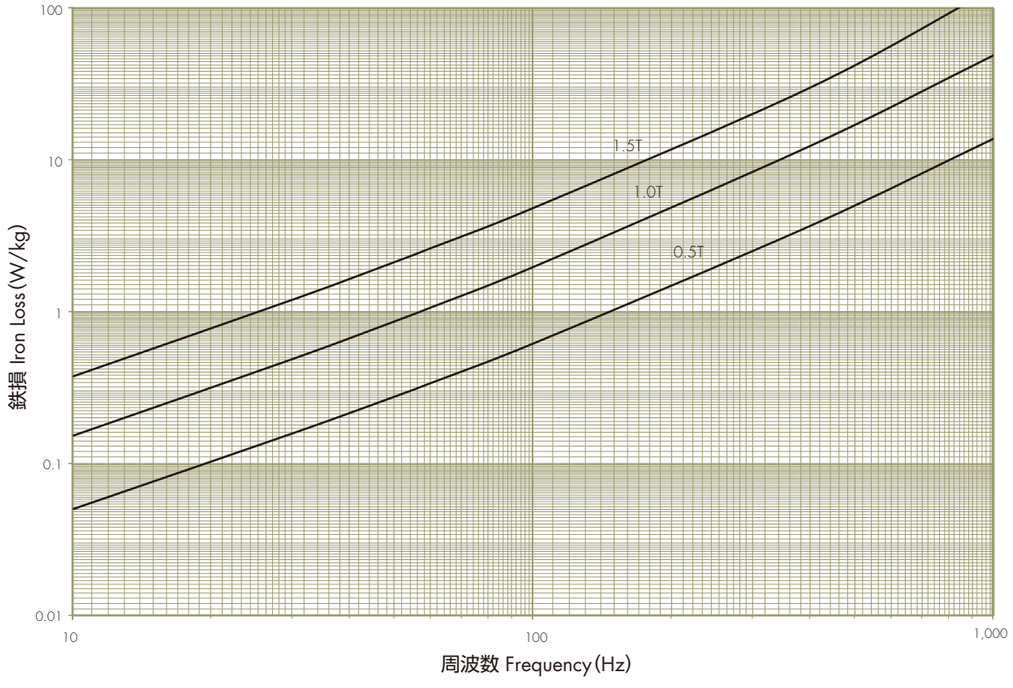
鉄損曲線 Iron Loss Curve



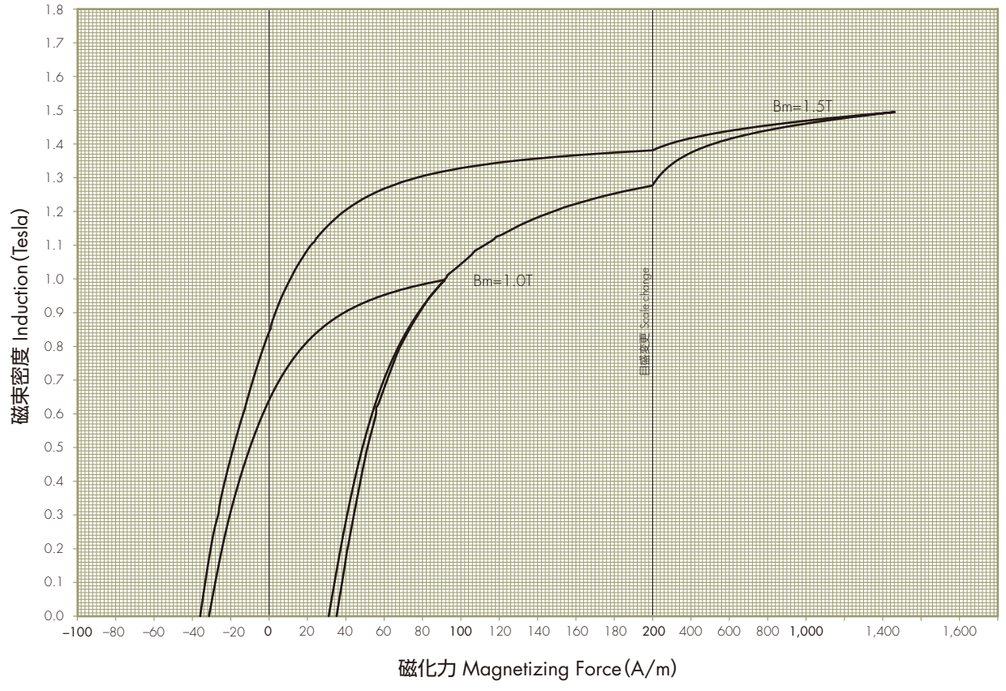
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

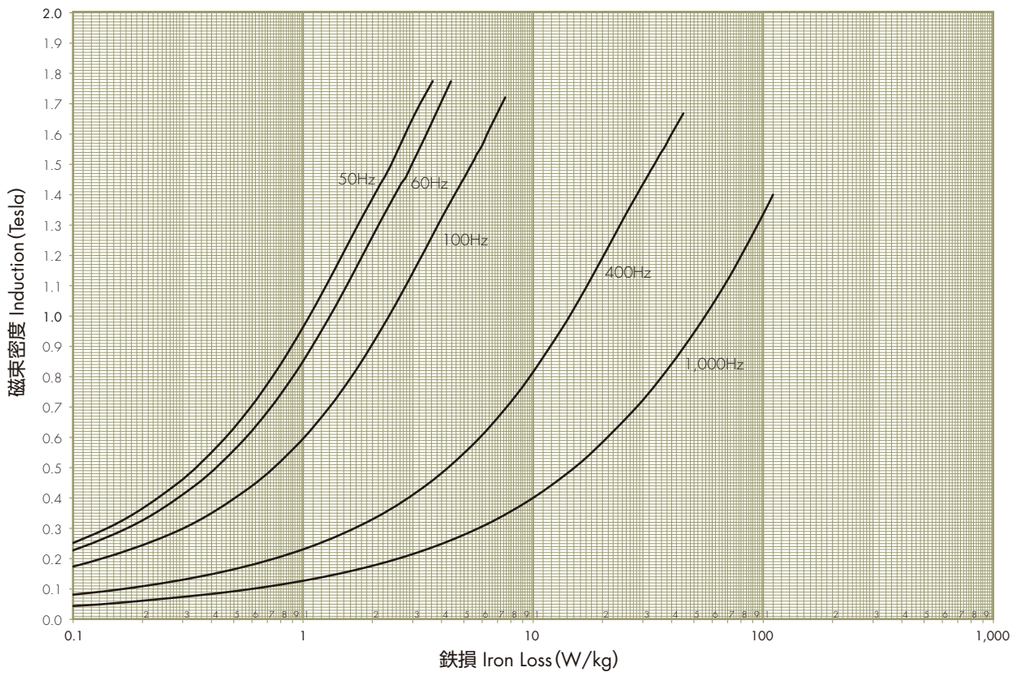


直流ヒステリシス曲線 DC Hysteresis Curve

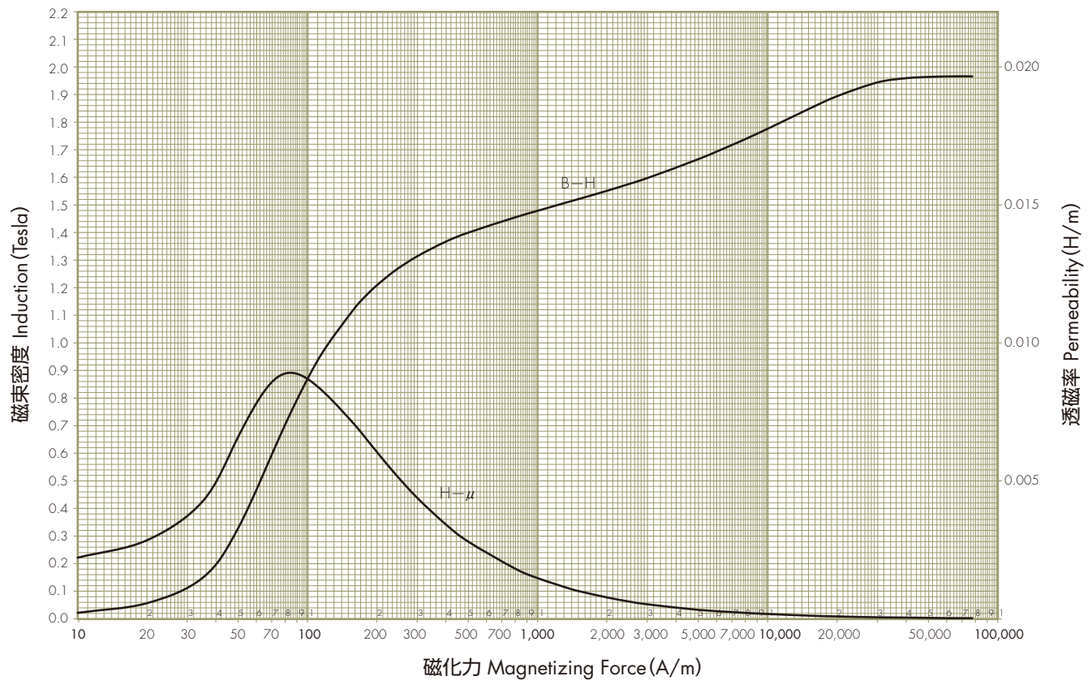


27HX1500

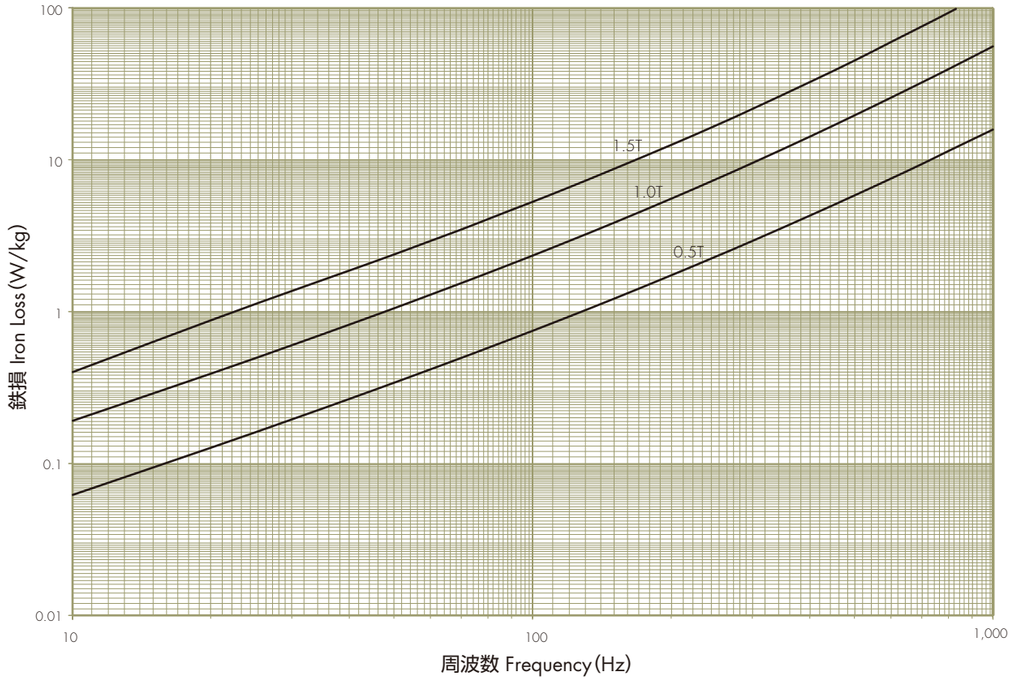
鉄損曲線 Iron Loss Curve



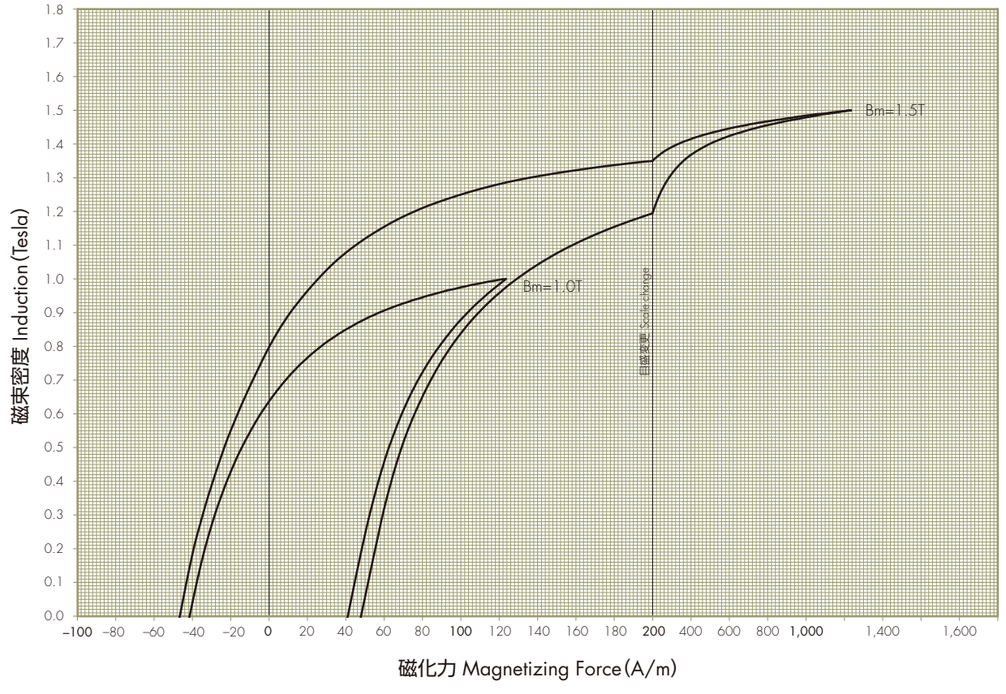
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

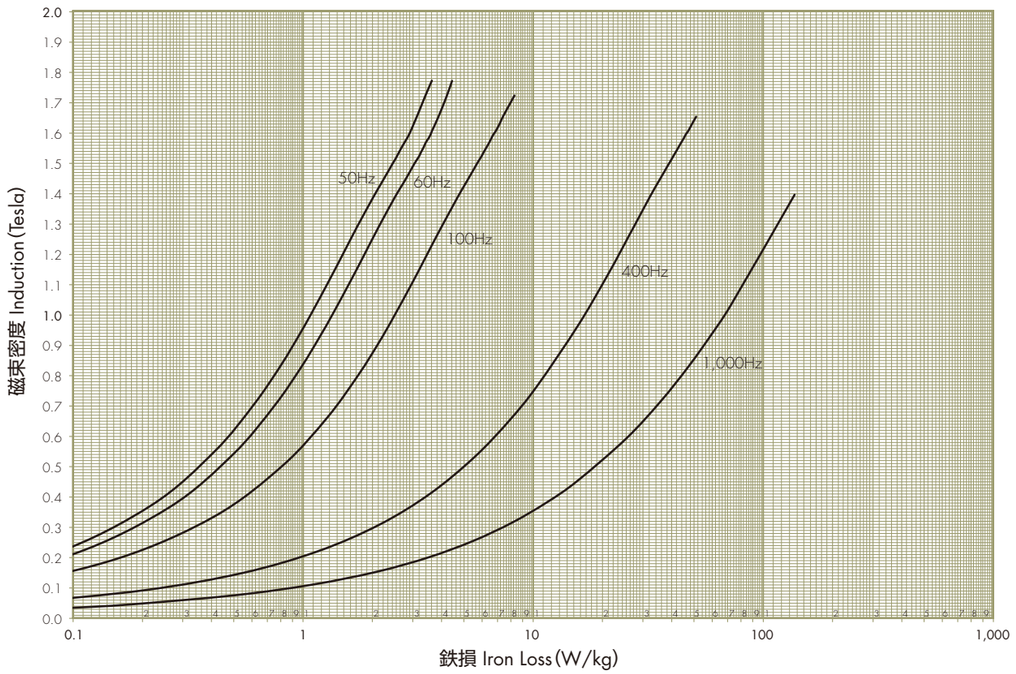


直流ヒステリシス曲線 DC Hysteresis Curve

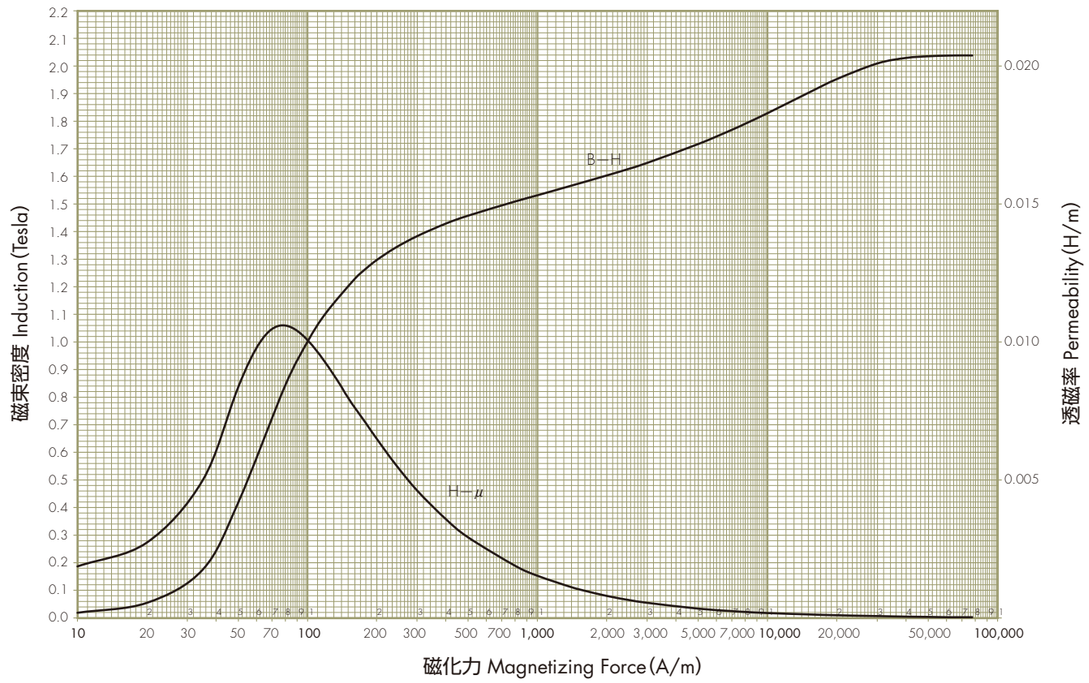


27HX1800

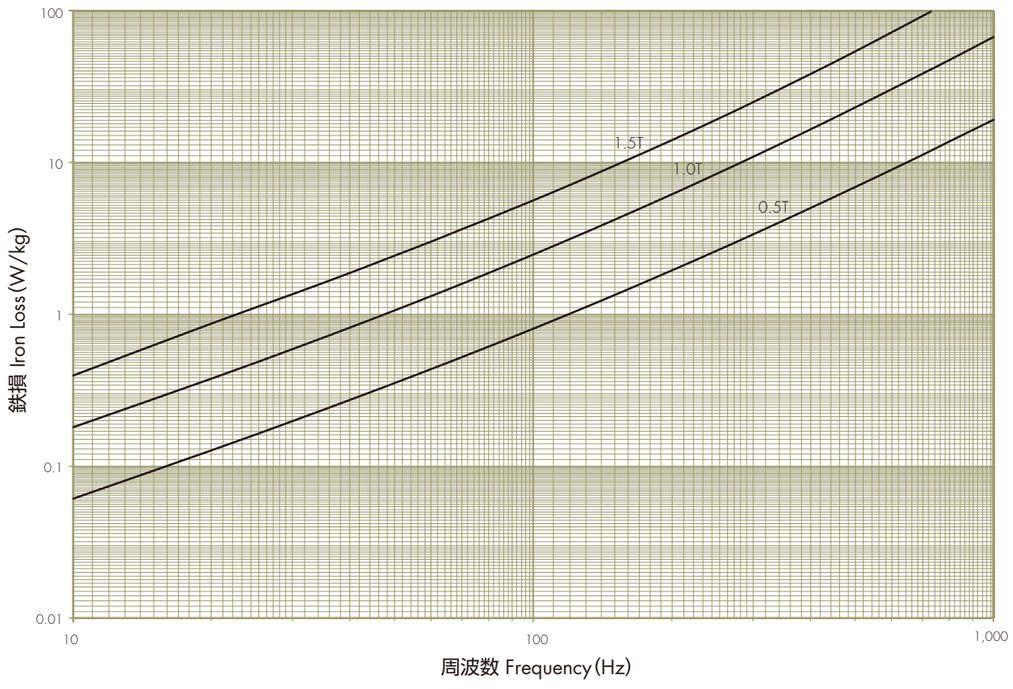
鉄損曲線 Iron Loss Curve



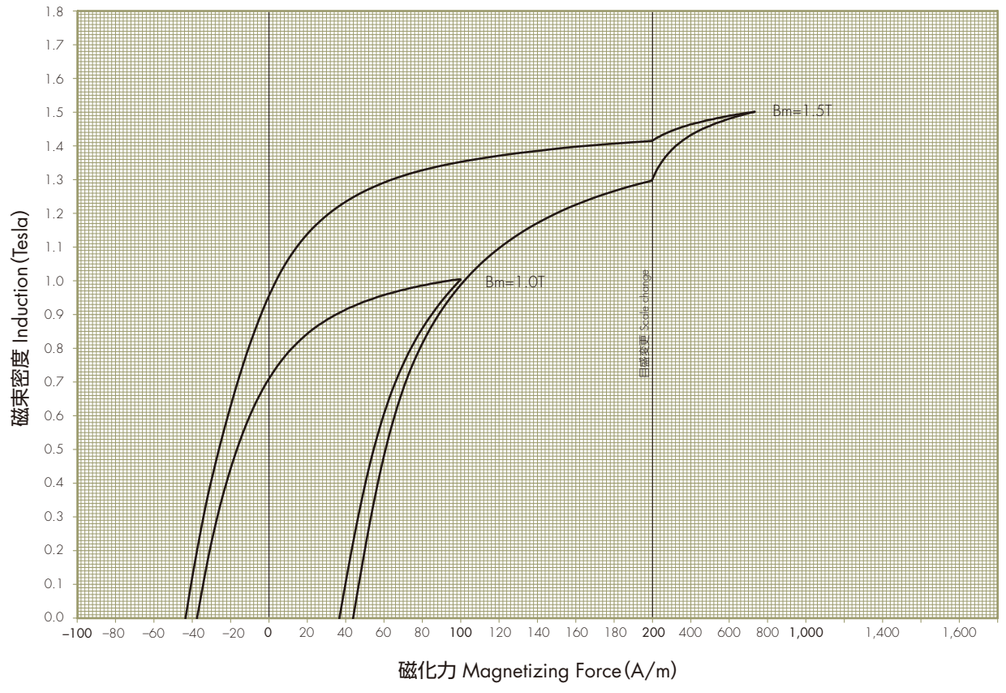
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance

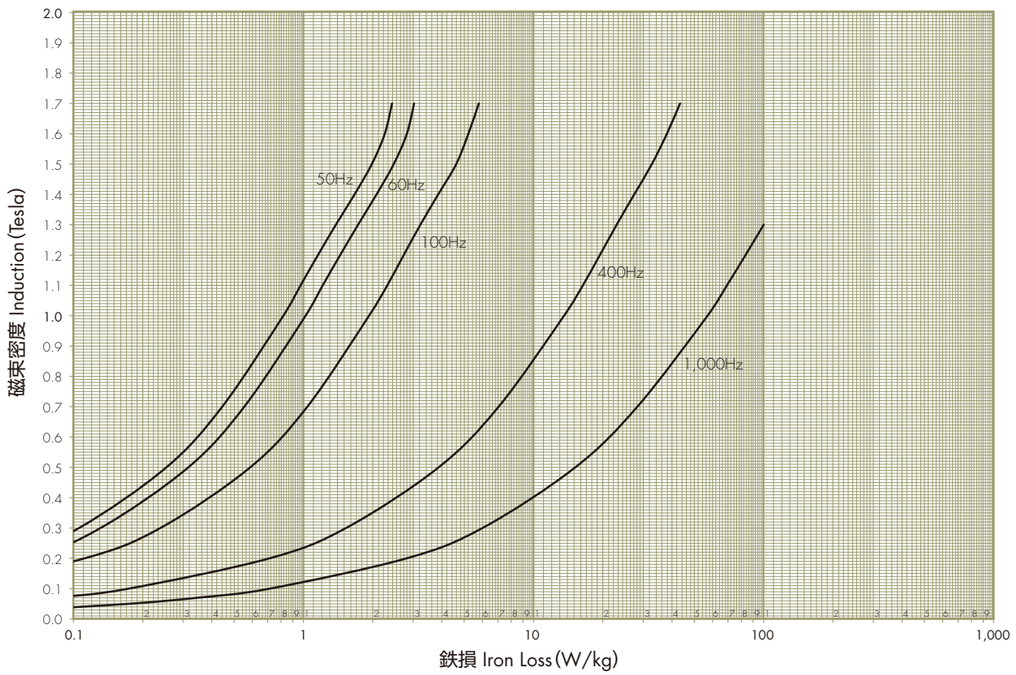


直流ヒステリシス曲線 DC Hysteresis Curve

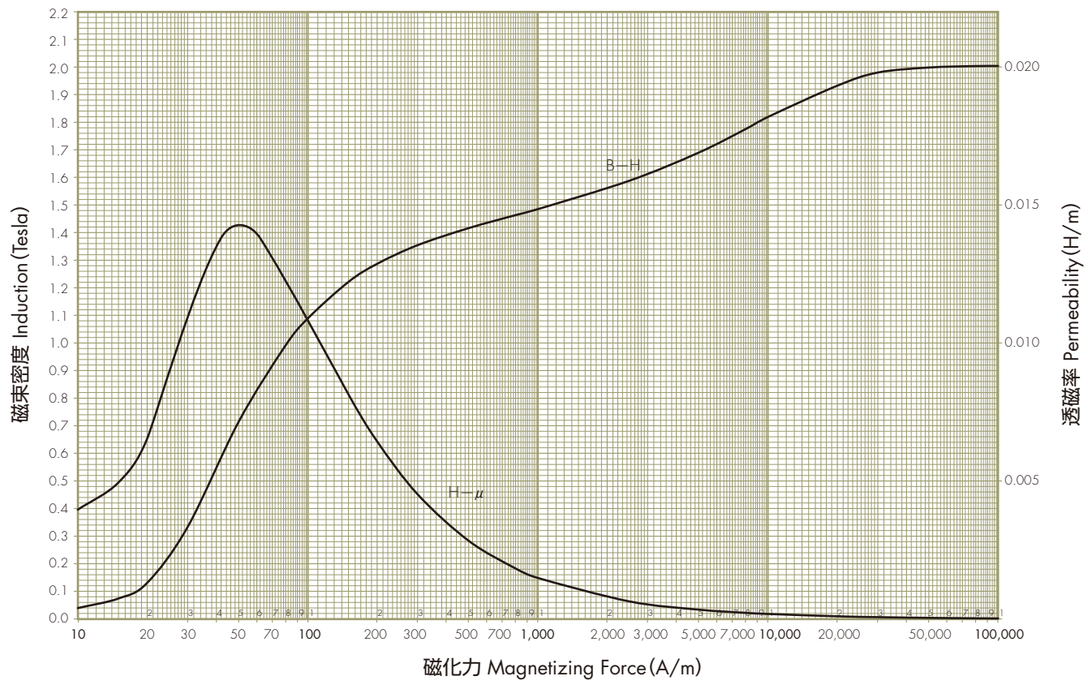


30HX1600

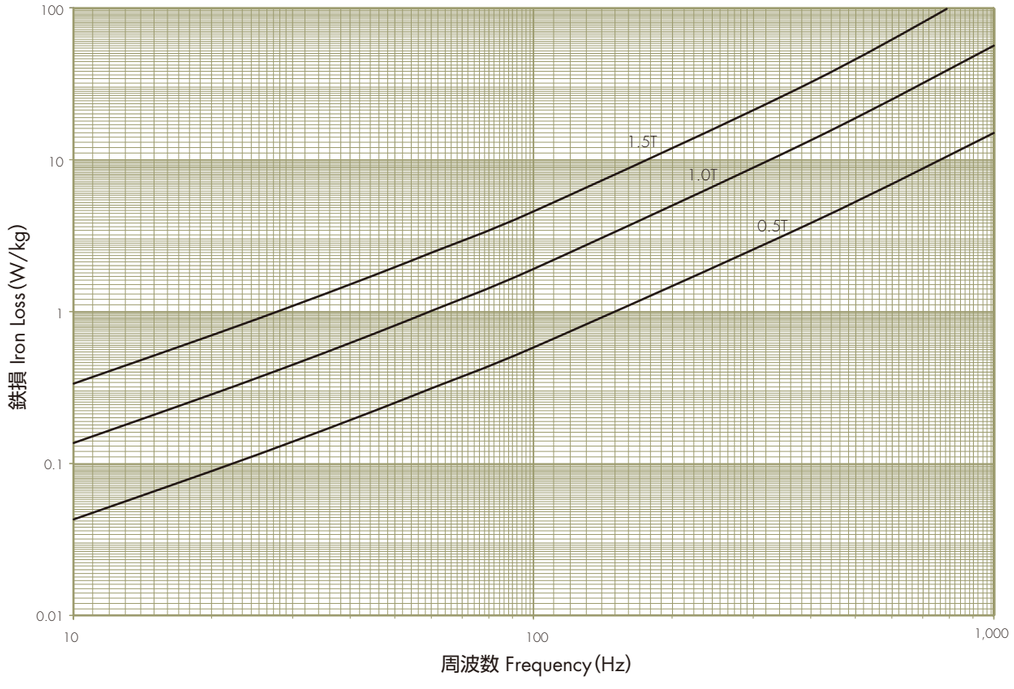
鉄損曲線 Iron Loss Curve



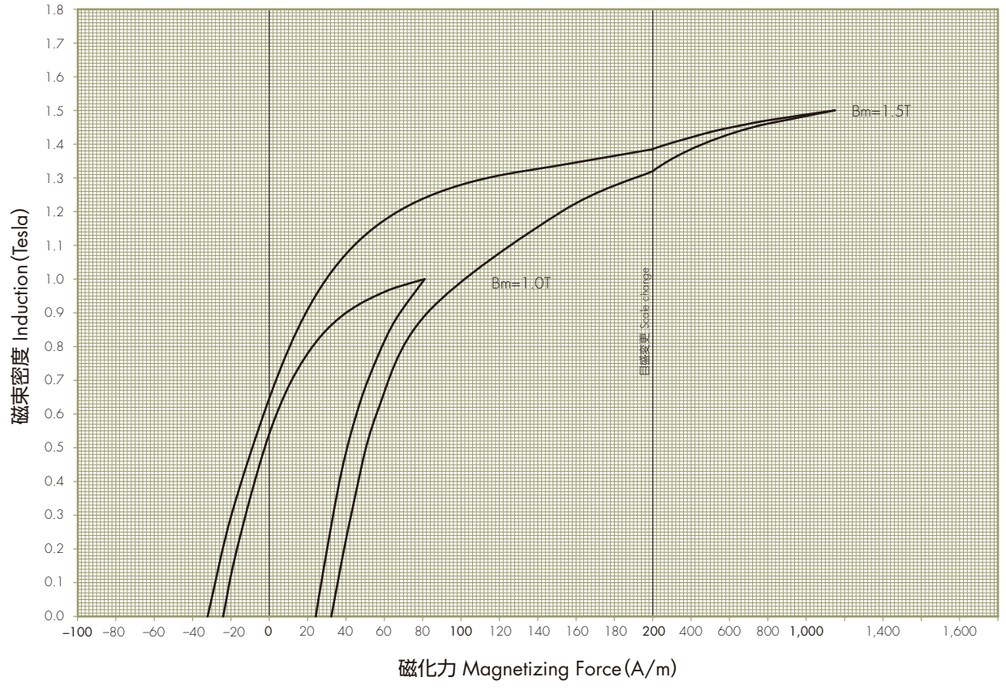
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance



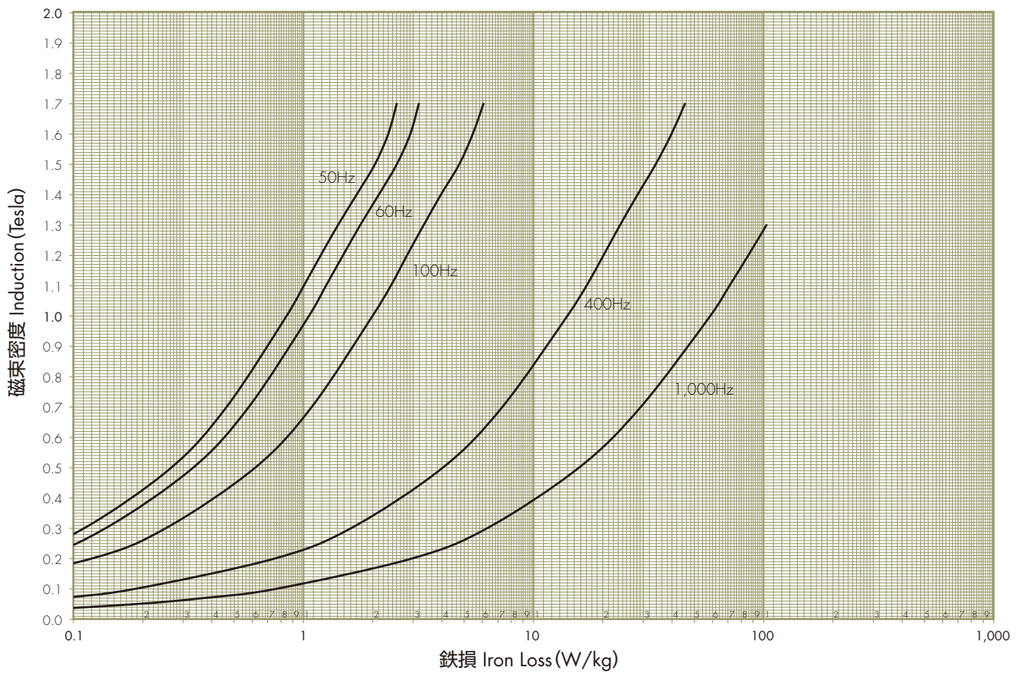
直流ヒステリシス曲線 DC Hysteresis Curve



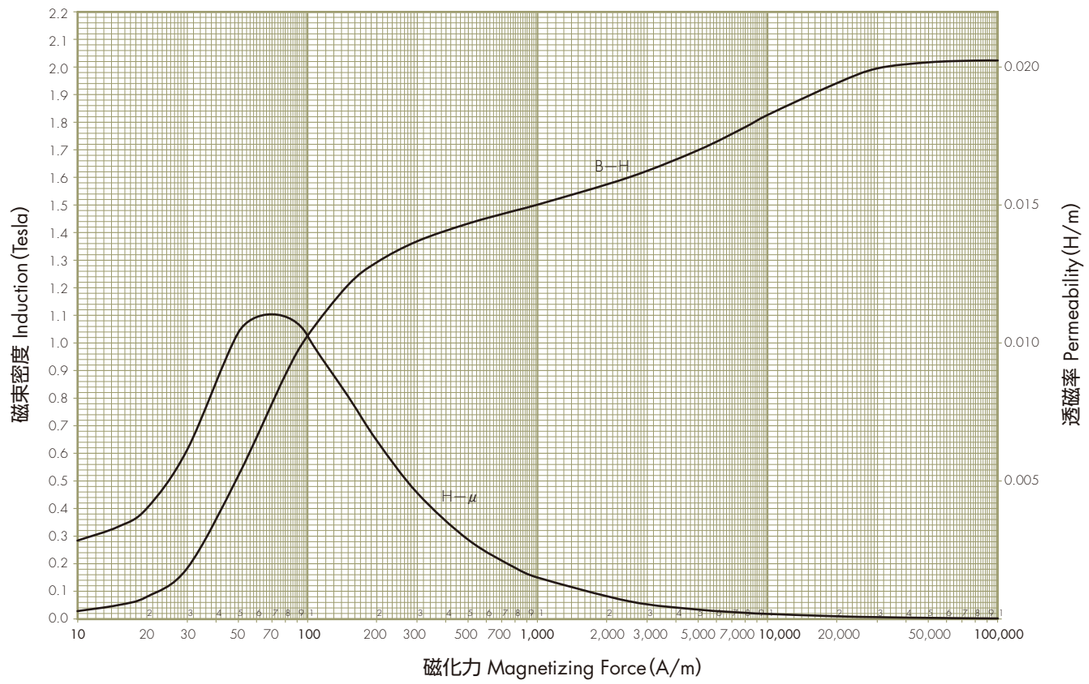
30HX1600

30HX1800

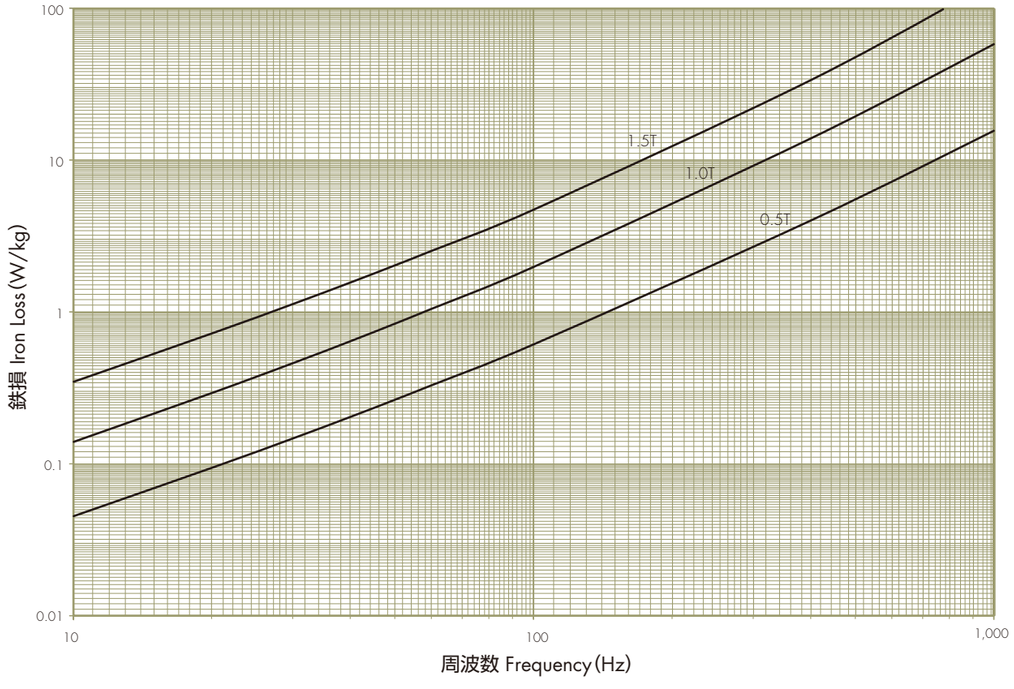
鉄損曲線 Iron Loss Curve



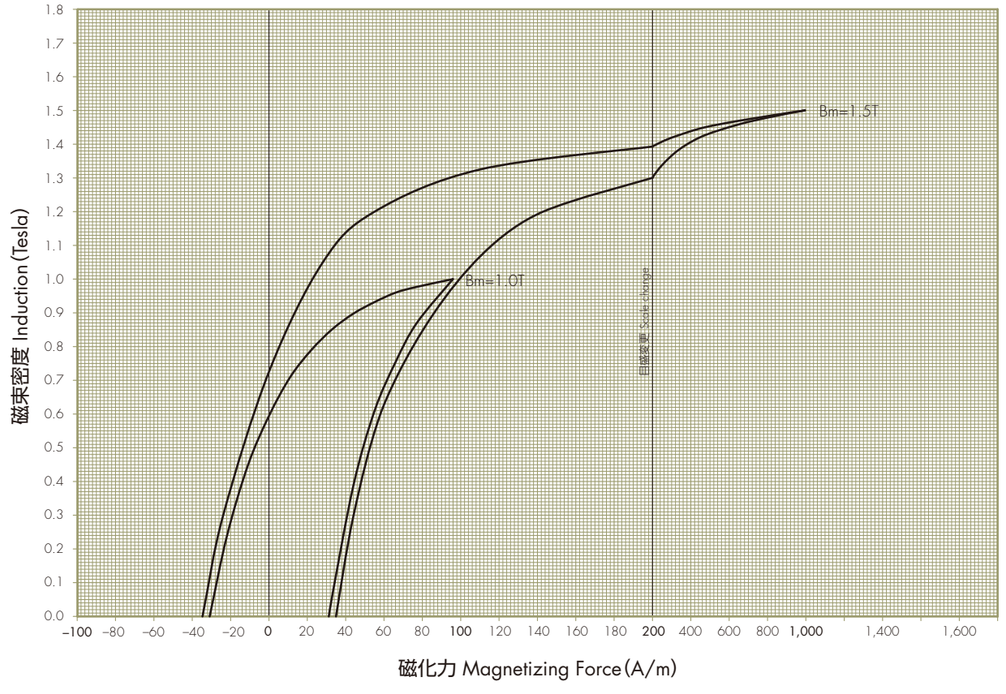
直流磁化曲線 DC Magnetization Curve
直流透磁率曲線 DC Permeability Curve



交流周波数特性 Frequency Dependance



直流ヒステリシス曲線 DC Hysteresis Curve



30HX1800

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