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Areas of application

The non-oriented electrical steel grade powercore® 020-150Y320 from thyssenkrupp is ideal for use in highly efficient automotive drive systems. The steel grade is characterized by very good processing properties, providing advantages in final application regardless of whether it is used in hybrid or electric vehicles or other high-speed motors.

All powercore® grades for e-mobility meet requirements for high permeability, high magnetizability and low eddy current losses.

Product advantages

- Application-optimized texture to minimize influence of processing on soft magnetic properties
- Guaranteed yield strengths of up to 320 MPa at room temperature
- Extended magnetic properties beyond standard DIN EN 10303

In addition to the grades for e-mobility and the fully finished standard grades, there are a large number of application-oriented grades for electric motors and generators, such as our high-permeability AP grades and our re-annealable PP grades.

powercore® Explorer

In addition to the figures presented in the product information, the powercore® Explorer gives developers the following possibilities:

- Tabular and graphic presentations of magnetic properties
- Visual comparison of the magnetic properties of different powercore® electrical steel grades based on standard measurements at various frequencies
- Export of material data to common simulation programs for machine design and calculations

We would be pleased to provide you with powercore® Explorer on request.

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Magnetic properties

Guaranteed values to DIN EN 10303

Steel grade	Reference grade DIN EN 10303	Max. core loss		Min. polarization		
		[W/kg] at		[T] at		
		400 Hz	1.0 T	2,500	5,000	10,000
				[A/m]	[A/m]	[A/m]
powercore® 020-150Y320	NO20-15	15	1.48	1.59	1.69	

Mechanical properties

Guaranteed min. yield strength to DIN EN ISO 6892-1 is **320 MPa**.

Typical average values for grade

Test direction in rolling direction at room temperature	Yield strength*	Tensile strength	Elongation	Micro-hardness
	R _{p0.2}	R _m	A ₈₀	HV5
	[MPa]	[MPa]	[%]	[-]
Steel grade				
powercore® 020-150Y320	391	491	13	185

Physical properties

Steel grade	Density
	ρ
	[kg/dm ³]
powercore® 020-150Y320	7.60

Insulation types

IEC 60404-1-1/04 thyssenkrupp		
Steel grade		
powercore® 020-150Y320	–	uncoated
	EC-3	stabolit® 10
	EC-5-P	stabolit® 20
	EC-4	stabolit® 30
	EC-6	stabolit® 40
	EC-5	stabolit® 60
	–	stabolit® 70

Please refer to the product information on stabolit® for more exact data on insulation coatings.

Dimensions

	Form of supply	Thick- ness	Width	Inside diameter	Outside diameter
		[mm]	[mm]	[mm]	[mm]
Steel grade					
powercore® 020-150Y320	Narrow strip	0.20	20– 500	508	max. 1,360
	Wide strip	0.20	500– 1,250	508/610	max. 1,360

Frequency-dependent properties

Typical values for information

50 Hz				
J [T]	H [A/m]	μ_a	P_s [W/kg]	S_s [VA/kg]
	0°/90°	0°/90°	0°/90°	0°/90°
0.5	47	8,383	0,27	0.48
0.6	55	8,648	0,36	0.66
0.7	65	8,613	0,47	0.87
0.8	76	8,376	0,60	1.12
0.9	92	7,811	0,74	1.46
1.0	114	6,993	0,90	1.90
1.1	149	5,859	1,10	2.55
1.2	220	4,346	1,35	3.69
1.3	406	2,550	1,65	6.42
1.4	1.040	1,072	2,06	16.14
1.5	2.620	457	2,51	45.16
1.6	5.199	246	2,92	101.83
1.7	8.880	153	3,30	193.98
1.8	14.016	103	3,59	334.56

60 Hz				
J [T]	H [A/m]	μ_a	P_s [W/kg]	S_s [VA/kg]
	0°/90°	0°/90°	0°/90°	0°/90°
0.5	48	8,236	0.33	0.59
0.6	56	8,562	0.45	0.80
0.7	65	8,598	0.58	1.05
0.8	76	8,348	0.74	1.36
0.9	92	7,816	0.91	1.76
1.0	114	7,001	1.11	2.29
1.1	149	5,863	1.36	3.07
1.2	220	4,348	1.66	4.44
1.3	405	2,556	2.03	7.70
1.4	1,039	1,074	2.53	19.36
1.5	2,611	458	3.06	54.00
1.6	5,204	246	3.59	122.40
1.7	8,888	153	4.04	233.12
1.8	14,074	103	4.41	403.46

200 Hz				
J [T]	H [A/m]	μ_a	P_s [W/kg]	S_s [VA/kg]
	0°/90°	0°/90°	0°/90°	0°/90°
0.5	51	7,754	1.41	2.20
0.6	59	8,159	1.94	2.98
0.7	67	8,293	2.53	3.89
0.8	78	8,158	3.19	4.99
0.9	93	7,735	3.94	6.37
1.0	114	7,008	4.79	8.18
1.1	147	5,939	5.80	10.78
1.2	214	4,472	7.03	15.28
1.3	381	2,713	8.61	25.98
1.4	873	1,278	10.58	60.74
1.5	1,895	631	12.76	151.22

Typical values for information

400 Hz				
J [T]	H [A/m]	μ_a	P_s [W/kg]	S_s [VA/kg]
	0°/90°	0°/90°	0°/90°	0°/90°
0.2	35	4,599	0.68	1.19
0.3	43	5,552	1.44	2.23
0.4	51	6,292	2.42	3.53
0.5	58	6,896	3.59	5.05
0.6	65	7,348	4.93	6.82
0.7	73	7,610	6.46	8.88
0.8	83	7,627	8.16	11.32
0.9	97	7,356	10.07	14.30
1.0	117	6,774	12.21	18.09
1.1	150	5,829	14.71	23.41
1.2	214	4,461	17.73	32.28
1.3	380	2,722	21.60	53.40
1.4	871	1,281	26.51	121.82
1.5	1,897	630	32.17	301.86

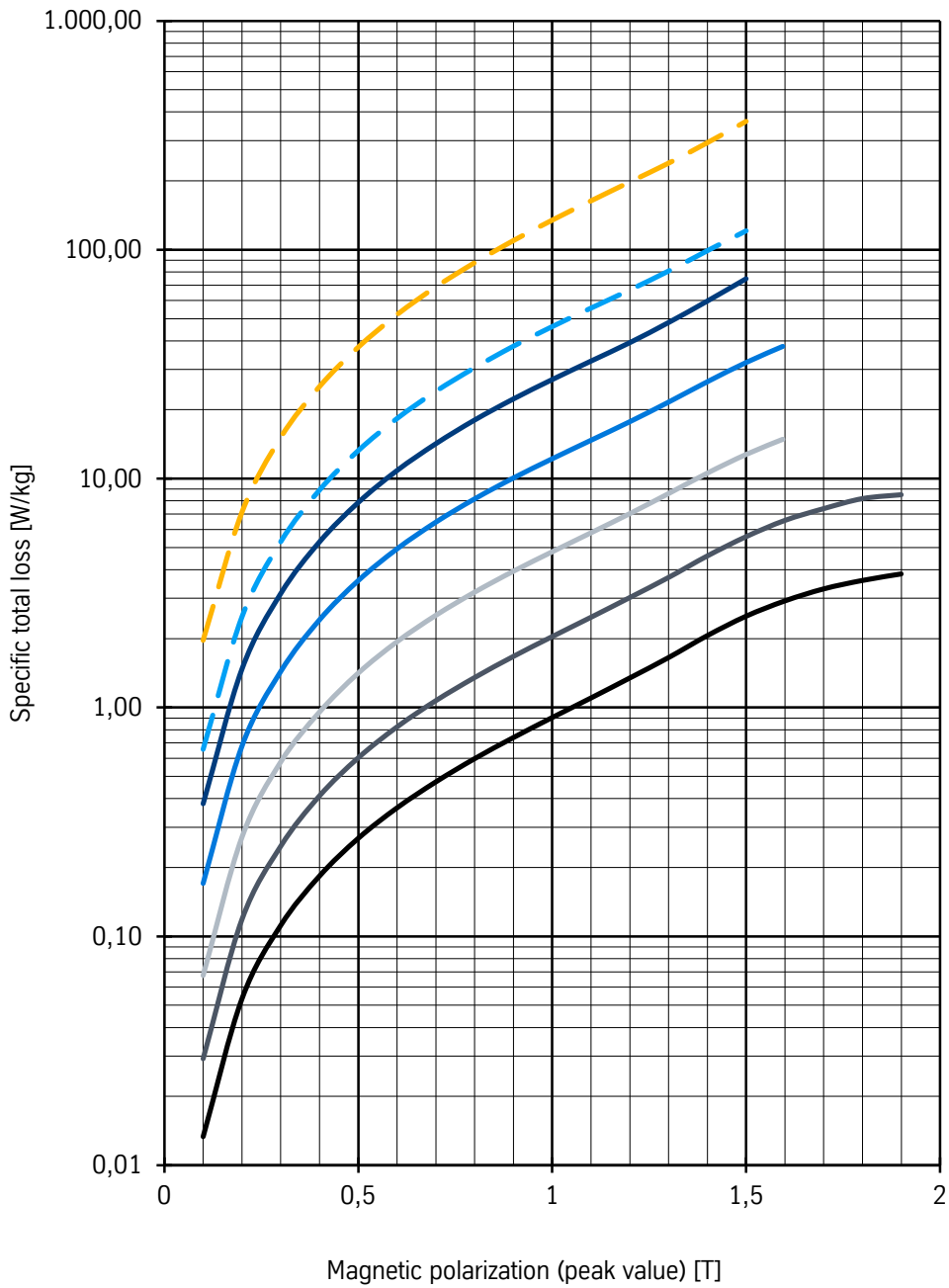
500 Hz				
J [T]	H [A/m]	μ_a	P_s [W/kg]	S_s [VA/kg]
	0°/90°	0°/90°	0°/90°	0°/90°
0.2	36	4,414	0.93	1.54
0.3	45	5,285	1.96	2.93
0.4	53	5,970	3.29	4.65
0.5	61	6,537	4.89	6.67
0.6	68	6,980	6.74	9.01
0.7	77	7,281	8.82	11.73
0.8	87	7,357	11.15	14.94
0.9	100	7,169	13.76	18.81
1.0	120	6,653	16.73	23.71
1.1	152	5,766	20.14	30.47
1.2	215	4,438	24.23	41.57
1.3	382	2,711	29.44	67.74
1.4	874	1,276	36.22	154.31
1.5	1,897	630	43.79	379.52

1,000 Hz				
J [T]	H [A/m]	μ_a	P_s [W/kg]	S_s [VA/kg]
	0°/90°	0°/90°	0°/90°	0°/90°
0.2	43	3,716	2.49	3.65
0.3	56	4,293	5.30	7.16
0.4	67	4,785	8.91	11.49
0.5	76	5,207	13.26	16.61
0.6	86	5,561	18.32	22.54
0.7	95	5,843	24.08	29.36
0.8	106	6,034	30.52	37.26
0.9	118	6,094	37.91	46.59
1.0	134	5,940	46.17	57.96
1.1	163	5,378	55.62	72.90
1.2	224	4,272	66.76	96.07
1.3	388	2,667	80.75	148.16
1.4	887	1,257	99.08	319.83
1.5	1,921	622	120.98	776.54

2,000 Hz				
J [T]	H [A/m]	μ_a	P_s [W/kg]	S_s [VA/kg]
	0°/90°	0°/90°	0°/90°	0°/90°
0.2	56	1,433	7.13	9.38
0.3	73	2,167	15.14	18.71
0.4	89	2,692	25.25	30.30
0.5	103	3,101	37.55	44.10
0.6	116	3,423	52.10	60.17
0.7	130	3,662	68.82	78.91
0.8	145	3,830	87.82	100.56
0.9	162	3,930	109.71	125.97
1.0	181	3,967	134.76	156.07
1.1	201	3,957	163.62	193.50
1.2	243	3,599	197.87	246.98
1.3	401	2,385	239.02	351.76
1.4	912	1,136	293.73	694.69
1.5	1,971	566	364.02	1613.50

Specific core loss

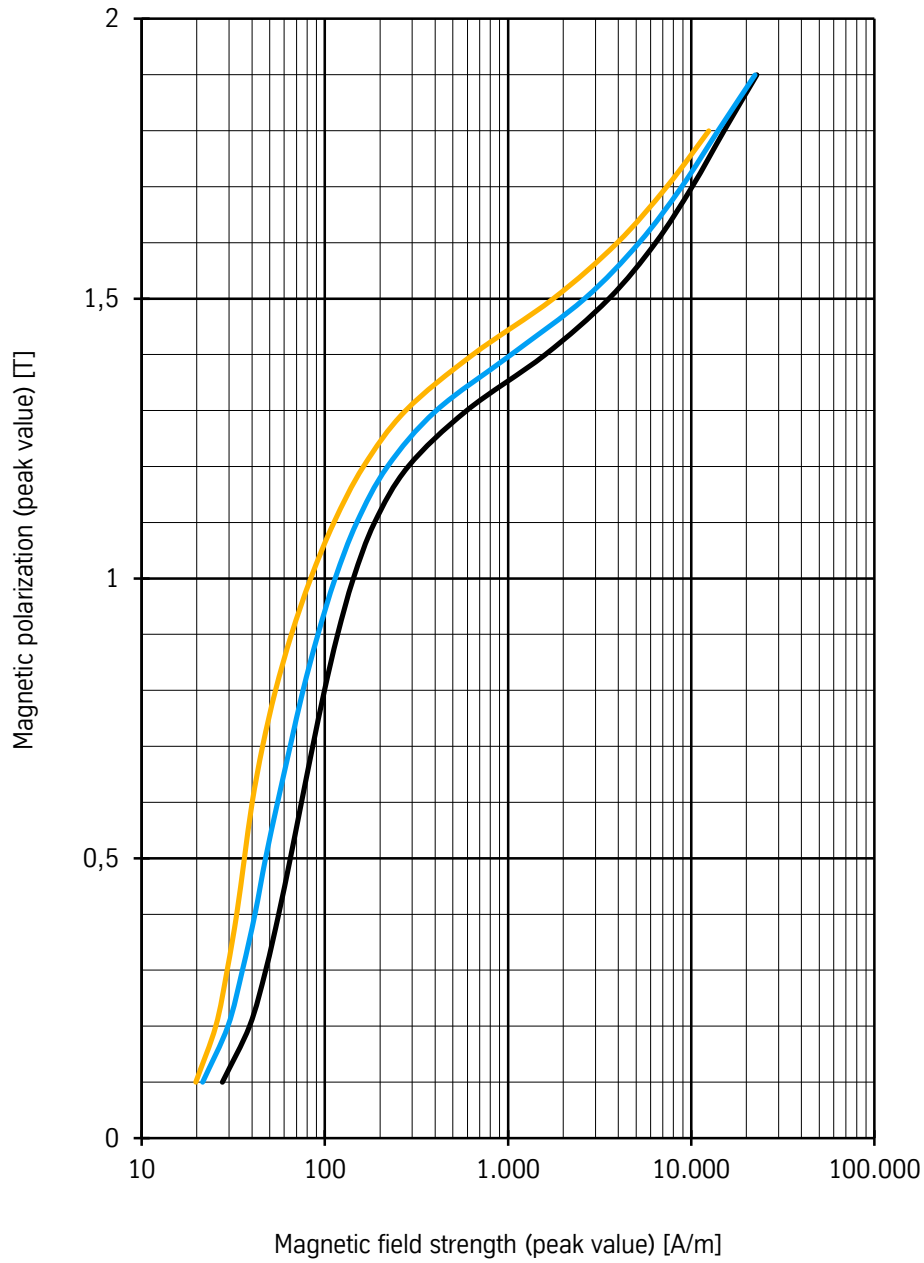
P_s versus J , directional (L/Q/M)



- 020-150Y320/M/50
- 020-150Y320/M/100
- 020-150Y320/M/200
- 020-150Y320/M/400
- 020-150Y320/M/700
- 020-150Y320/M/1000
- 020-150Y320/M/2000

Magnetic polarization

J versus H, directional (L/Q/M), 50 Hz



Angle to rolling direction

- 0°
- 0°/90°
- 90°

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