Steel

powercore® 035-170Y420

Product information for electrical steel for e-mobility

thyssenkrupp

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Areas of application

The non-oriented electrical steel grade powercore® 035-170Y420 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 420 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.

Content

Magnetic properties

Guaranteed values to DIN EN 10303

Steel grade	Reference grade DIN EN 10303	Max. core loss [W/kg] at 400 Hz 1.0 T	Min. polarization [T] at 2,500 [A/m]	5,000 [A/m]	10,000 [A/m]
powercore® 035-170Y420	NO35-19	17	1,52	1,61	1,73

Mechanical properties

Guaranteed min. yield strength to DIN EN ISO 6892-1 is **420 MPa**.

Typical average values for grade

Test direction in rolling direction at room temperature / Steel grade	Yield strength* $R_{p0.2}$ [MPa]	Tensile strength R_m [MPa]	Elongation A_{80} [%]	Micro-hardness HV5 [–]
powercore® 035-170Y420	433	544	18	207

Physical properties

Steel grade	Density ρ [kg/dm³]
powercore® 035-170Y420	7,60

Insulation types

	IEC 60404-1-1/04	thyssenkrupp
Steel grade		
powercore® 035-170Y420	–	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® 035-170Y420	Narrow strip	0,35	20 – 500	508	max. 1,360
	Wide strip	0,35	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	50	7996	0,29	0,52
0.6	57	8411	0,40	0,70
0.7	65	8572	0,51	0,91
0.8	75	8487	0,64	1,16
0.9	88	8158	0,77	1,48
1.0	**105**	**7580**	**0,92**	**1,87**
1.1	130	6734	1,09	2,41
1.2	172	5560	1,29	3,21
1.3	262	3949	1,52	4,69
1.4	556	2007	1,82	9,02
1.5	**1581**	**756**	**2,15**	**25,80**
1.6	3709	344	2,42	67,99
1.7	6960	195	2,66	142,83
1.8	11775	123	2,89	262,90

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	50	7930	0,36	0,63
0.6	57	8365	0,49	0,85
0.7	65	8556	0,64	1,11
0.8	75	8500	0,79	1,41
0.9	87	8195	0,97	1,79
1.0	**104**	**7627**	**1,16**	**2,26**
1.1	129	6785	1,37	2,90
1.2	171	5599	1,61	3,85
1.3	260	3972	1,91	5,62
1.4	553	2017	2,28	10,78
1.5	**1577**	**758**	**2,71**	**30,86**
1.6	3710	344	3,08	81,60
1.7	6969	195	3,43	171,58
1.8	11799	122	3,84	316,03

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	58	6822	1,72	2,52
0.6	66	7250	2,36	3,39
0.7	74	7546	3,08	4,41
0.8	83	7683	3,88	5,59
0.9	94	7634	4,77	6,99
1.0	**109**	**7322**	**5,75**	**8,71**
1.1	131	6663	6,85	10,94
1.2	172	5562	8,10	14,19
1.3	261	3966	9,59	20,09
1.4	543	2053	11,42	36,73
1.5	**1454**	**822**	**13,40**	**97,28**

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	42	3827	0,87	1,42
0.3	52	4606	1,84	2,67
0.4	61	5197	3,08	4,21
0.5	71	5645	4,58	6,07
0.6	80	5980	6,33	8,23
0.7	90	6214	8,33	10,74
0.8	100	6352	10,59	13,66
0.9	112	6404	13,16	17,07
1.0	**125**	**6358**	**16,07**	**21,15**
1.1	143	6134	19,36	26,24
1.2	177	5393	23,10	33,21
1.3	264	3917	27,44	45,21
1.4	547	2037	32,65	78,10
1.5	**1456**	**821**	**38,33**	**197,55**

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	44	3627	1,20	1,87
0.3	55	4317	2,55	3,55
0.4	66	4839	4,27	5,65
0.5	76	5232	6,36	8,16
0.6	87	5514	8,81	11,12
0.7	98	5703	11,63	14,57
0.8	110	5811	14,86	18,59
0.9	122	5850	18,53	23,30
1.0	**137**	**5821**	**22,72**	**28,89**
1.1	153	5704	27,49	35,78
1.2	184	5200	32,93	45,02
1.3	269	3843	39,19	60,41
1.4	555	2008	46,62	101,71
1.5	**1466**	**815**	**54,71**	**250,73**

1,000 Hz

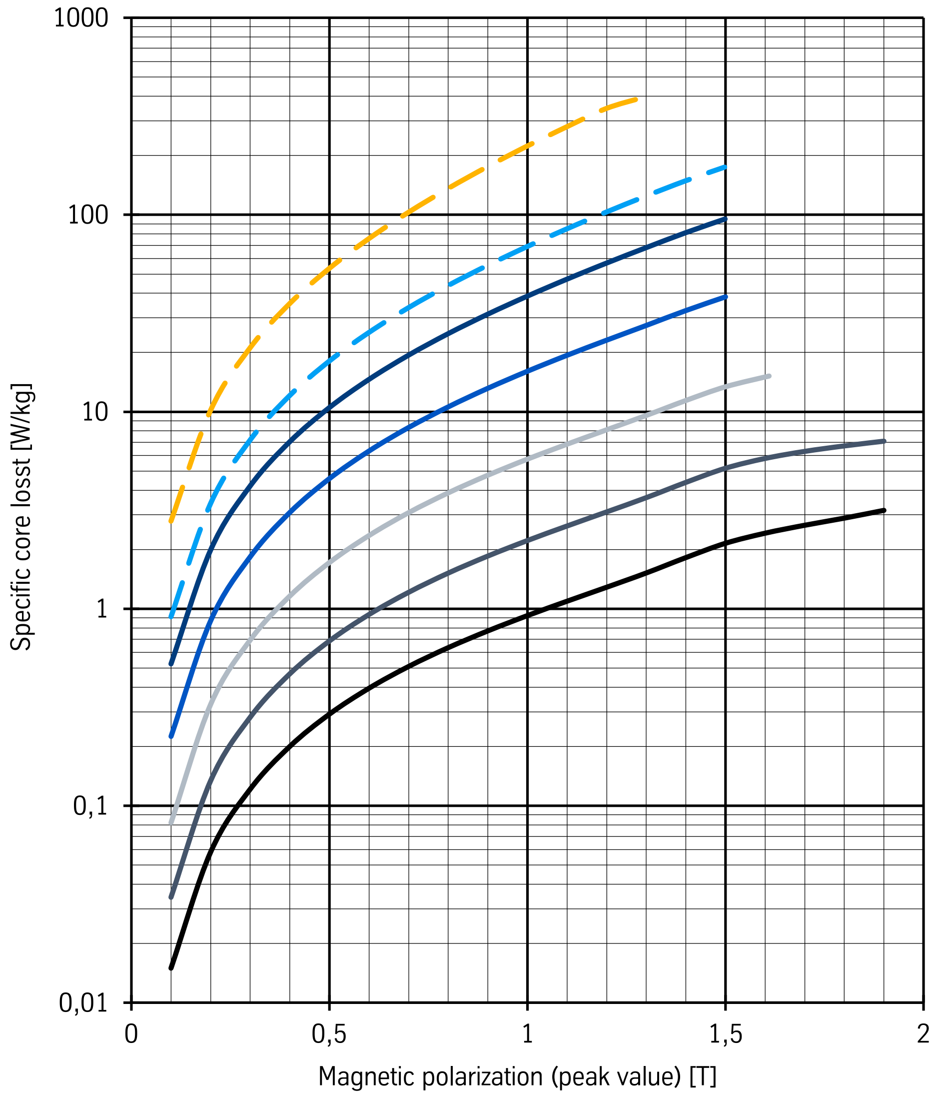
J [T]	H [A/m]	μ_a	P_S [W/kg]	S_S [VA/kg]
	0°/90°	0°/90°	0°/90°	0°/90°
0.2	55	2909	3,43	4,62
0.3	71	3378	7,20	9,00
0.4	86	3686	12,11	14,68
0.5	102	3916	18,11	21,53
0.6	118	4053	25,30	29,75
0.7	136	4109	33,80	39,55
0.8	155	4103	43,80	51,20
0.9	177	4058	55,48	65,01
1.0	**200**	**3978**	**69,10**	**81,38**
1.1	226	3870	84,96	101,02
1.2	255	3741	103,42	125,56
1.3	296	3499	124,69	160,95
1.4	572	1949	149,01	242,84
1.5	**1475**	**810**	**175,13**	**530,18**

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	73	1087	10,19	12,31
0.3	98	1629	21,17	24,71
0.4	121	1978	35,49	40,63
0.5	146	2186	53,51	60,69
0.6	174	2288	75,81	85,69
0.7	206	2321	103,08	116,48
0.8	241	2310	136,16	154,09
0.9	281	2268	176,00	199,63
1.0	**325**	**2201**	**223,64**	**254,54**
1.1	376	2120	280,30	320,48
1.2	432	2029	347,07	400,44
1.3				

Specific core loss

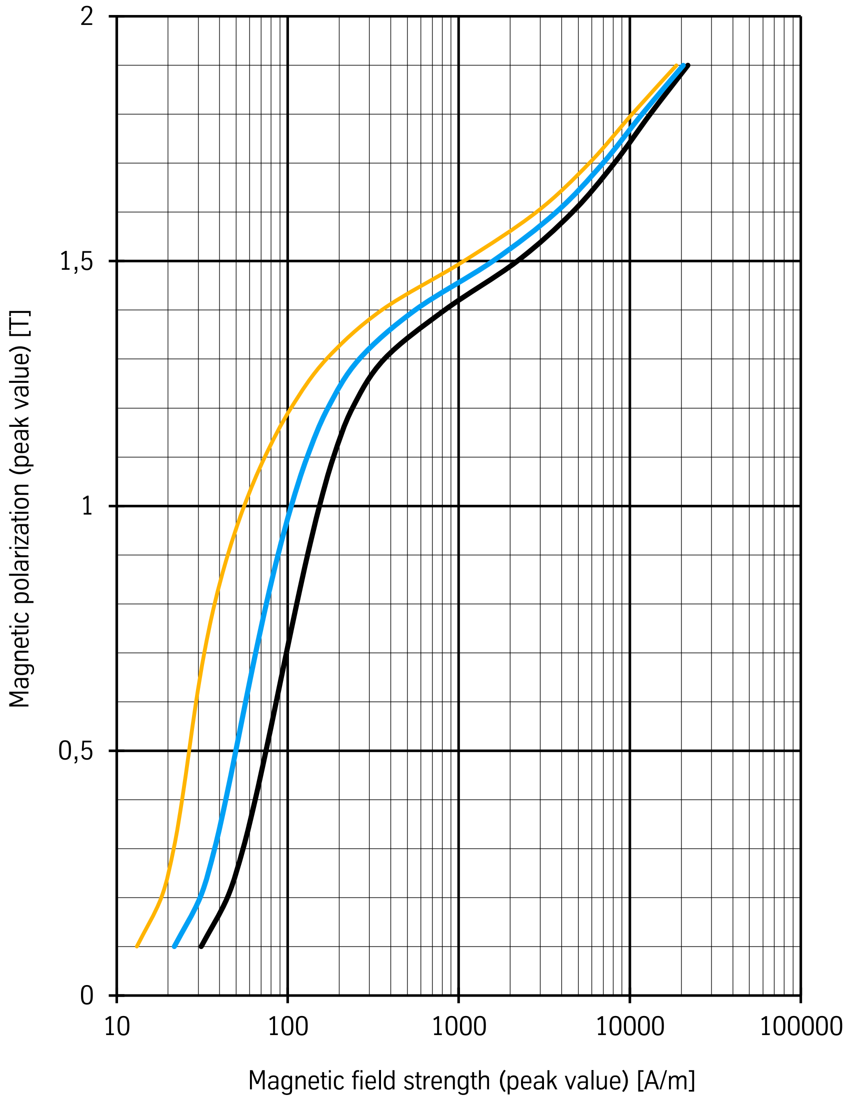
P_S versus J, directional (L/Q/M)



- 035-170Y420/M/50
- 035-170Y420/M/100
- 035-170Y420/M/200
- 035-170Y420/M/400
- 035-170Y420/M/700
- 035-170Y420/M/1000
- 035-170Y420/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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