

Electrical Steel
Thin Non-Oriented Grades
American version



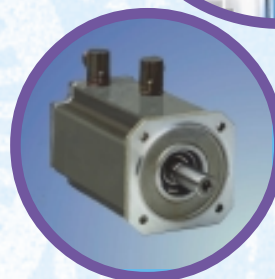
cogent[™]

Electrical Steel, Thin Non-Oriented Grades

Thin non-oriented grades are available at two nominal thicknesses, 0.005 inch and 0.007 inch (which correspond to 0.127 mm and 0.18 mm). Both grades are fully processed non-oriented electrical steel, suited for use at medium to high frequencies (typically 200 – 3000 Hz)

Specific core loss at $\hat{J} = 1,0 \text{ T}$

Frequency	Maximum specific core loss				Typical specific core loss			
	NO 005		NO 007		NO 005		NO 007	
	W/lb	W/kg	W/lb	W/kg	W/lb	W/kg	W/lb	W/kg
60 Hz	-	-	-	-	0.61	1.34	0.60	1.32
60 Hz	-	-	-	-	1.54	3.39	1.50	3.31
400 Hz	6.12	13.5	6.5	14.3	5.05	11.1	5.60	12.3
2500 Hz	69.0	152	81.0	179	60.0	132	73.0	161



Chemical composition, typical

Si 3.0 %, Al 0.4%

Coating SURALAC® 7000

inorganic phosphate based coating with inorganic fillers and some organic resin

AISI type (ASTM A 677)	C-5 ¹⁾
Standard thickness	60 μinch
Number of coated sides	2
Colour	Grey
Temperature capability in air (continuous)	445 °F
Temperature capability in inert gas (intermittent)	1560 °F
Franklin (ASTM A717)	
Typical value per lamination	0.40 Amp
The coating withstands:	Stress relief annealing ²⁾ Burn-out repair Aluminium casting
Chemical resistance to:	Stamping lubricants ³⁾ Transformer oils Freon

Please note that all data are typical, not guaranteed.

1) Suralac® 7000 is classified as a C-5 coating but it can be used as a C-4 coating.

2) Stress relief annealing in inert or preferably in slightly oxidizing atmosphere.

3) Testing includes all lubricants notified to Cogent. New lubricants may need special consideration.

Registered trademarks

SURALAC is a trademark used to describe the insulation coatings applied to fully processed non-oriented electrical steels of Cogent Power Ltd.

Typical physical and mechanical properties



Nominal Thickness in.	Surface coating	Resistivity $\mu\Omega \cdot \text{cm}$	Yield strength psi	Tensile strength psi	Young's modulus (E)	
					TD psi	RD psi
0.005/0.007	C-5 or uncoated	52	59000	74000	$26.8 \cdot 10^6$	$29.0 \cdot 10^6$

TD represents the transverse direction.

RD represents the rolling direction.

Values for **Yield strength** (0.2% proof strength) and **Tensile strength** are given for the rolling direction. Values for the transverse direction are about 2% higher.

Thermal conductivity

28 W/mK in plane of lamination

0.37 W/mK normal to plane of lamination

Dimensions

Max. width for slit coils and sheets is 43.3 inch (1100 mm).

Min. width is 0.4 inch (10 mm).

Rockwell Hardness

B scale 77

Density

7.65 g/cm³ (0.276 lbs/in³)

Thickness tolerance

The variation in nominal thickness is less than ± 0.0005 inch.

Coil width standard tolerances

Over inch	Up to and including inch	Width tolerance inch
0.4	12	± 0.003
12	24	± 0.008
24	43.3	± 0.012

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Typical specific total loss data, W/lb at 60 Hz - 2500 Hz

The measurements are carried out in the 25 cm Epstein frame according to IEC 60404-2 at 60 Hz, and according to IEC 60404-10 at 400 Hz and 2500 Hz. Half of the sample

strips are taken in the rolling direction and half in the transverse direction. Samples are tested as sheared and are not aged or stress relief annealed.

60 Hz

Grade	Specific total loss, W/lb at 60 Hz and a peak magnetic polarization $\hat{J}(T)$ of									
	0,10	0,20	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00
NO 005	0,01	0,04	0,09	0,14	0,20	0,27	0,34	0,42	0,51	0,61
NO 007	0,01	0,04	0,09	0,14	0,20	0,26	0,33	0,41	0,50	0,60

400 Hz

Grade	Specific total loss, W/kg at 400 Hz and a peak magnetic polarization $\hat{J}(T)$ of									
	0,10	0,20	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00
NO 12	0,16	0,71	1,55	2,57	3,75	5,05	6,49	8,09	9,84	11,8
NO 18	0,18	0,73	1,50	2,54	3,86	5,22	6,77	8,47	10,4	12,3
NO 20	0,17	0,72	1,49	2,50	3,80	5,17	6,70	8,36	10,3	12,2

2500 Hz

Grade	Specific total loss, W/kg at 400 Hz and a peak magnetic polarization $\hat{J}(T)$ of										
	0,10	0,20	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,10
NO 12	1,65	6,83	15,2	25,4	37,7	52,0	66,1	83,1	103	132	156
NO 18	2,18	8,33	19,1	31,7	45,9	61,5	81,1	104	130	161	198
NO 20	2,79	10,6	24,40	40,4	58,4	78,4	103	133	166	205	253

Typical specific total loss data, W/lb at 60 Hz - 2500 Hz

60 Hz

Specific total loss, W/kg at 50 Hz and a peak magnetic polarization J(T) of

Grade

1,10	1,20	1,30	1,40	1,50	1,60	1,70	1,80	Grade
0,73	0,87	1,06	1,28	1,54	1,79	2,03	2,24	NO 005
0,71	0,85	1,03	1,25	1,50	1,74	1,97	2,18	NO 007

400 Hz

Specific total loss, W/kg at 400 Hz and a peak magnetic polarization J(T) of

Grade

1,10	1,20	1,30	1,40	1,50	Grade
14,1	16,7	19,9	24,0	28,5	NO 12
14,9	18,1	21,6	25,6	30,0	NO 18
14,8	17,9	21,4	25,3	29,7	NO 20

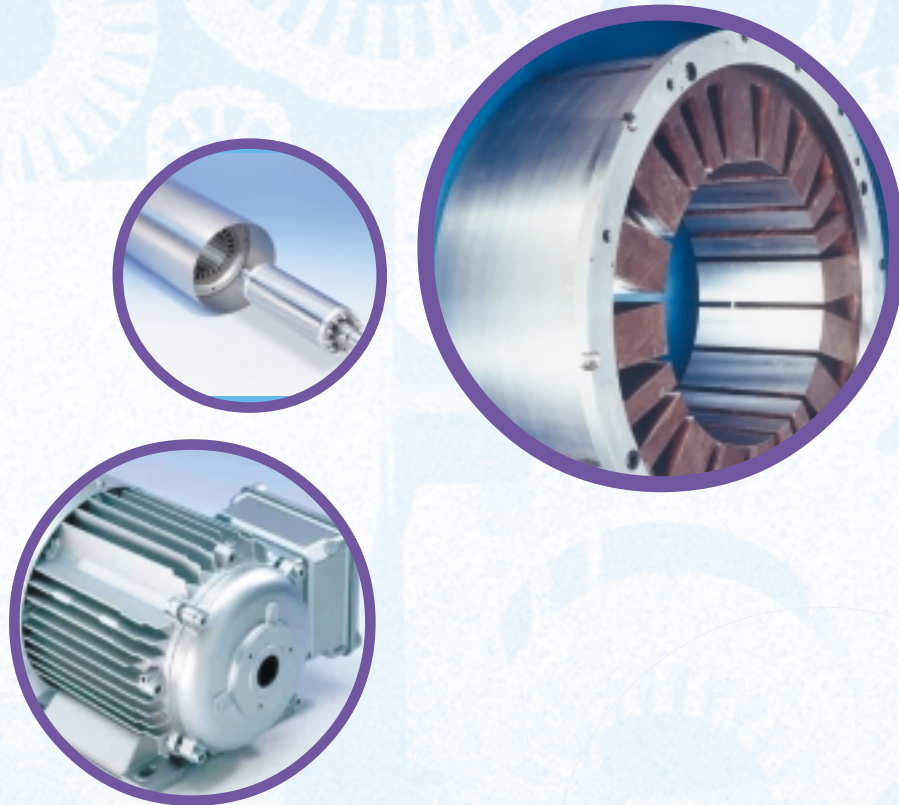


Typical magnetization curve (D.C.)

The measurements are carried out in the 25 cm Epstein frame according to IEC 60404-4 (DC permeameter). Half of the sample strips

are taken in the rolling direction and half in the transverse direction. Samples are tested as sheared and are not aged or stress relief annealed.

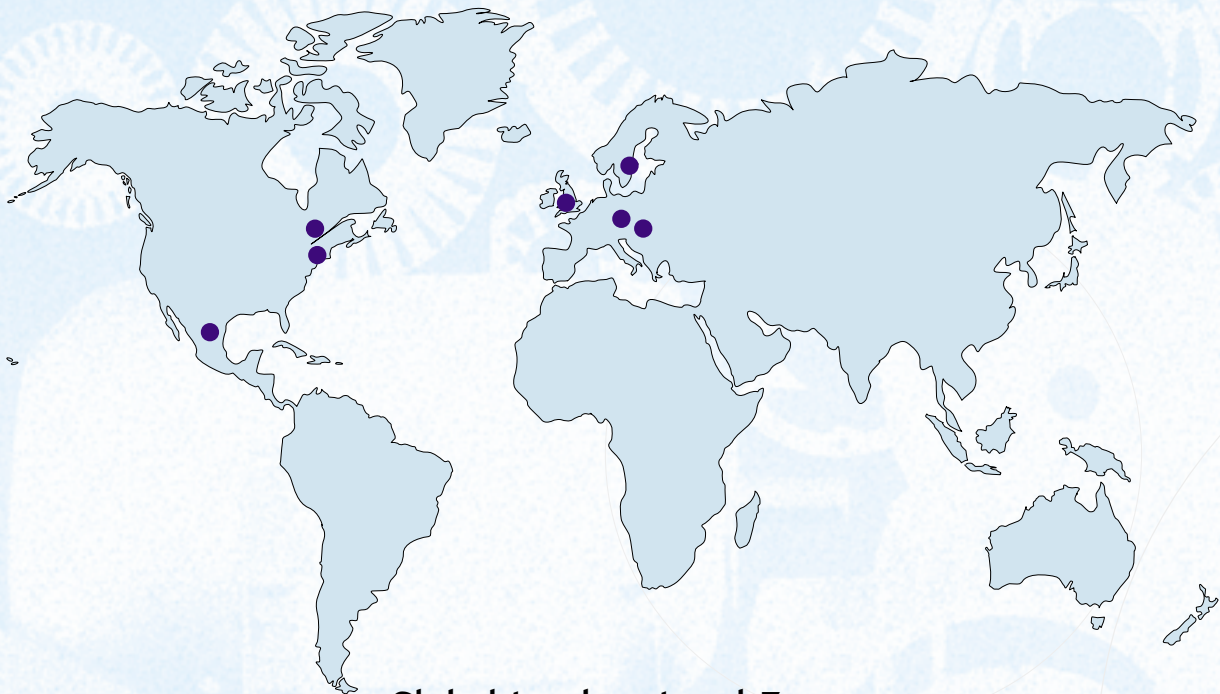
Grade	Magnetic field strength, A/m at a magnetic polarization $\hat{J}(T)$ of									
	0,10	0,20	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00
NO 005/007	25	32	39	44	51	57	64	73	84	99



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Typical magnetization curve (D.C.)

Magnetic field strength, A/m at a magnetic polarization $\hat{J}(T)$ of								Grade
1,10	1,20	1,30	1,40	1,50	1,60	1,70	1,80	
124	160	248	470	1290	3550	7070	13000	NO 005 / 007



Global Leader : Local Expert

Cogent Power Ltd has been a leading supplier to North American motor and transformer manufacturers for over thirty years. Cogent's focus and expertise continues to be standard and speciality electrical steels. Now with plants in Canada, USA and Mexico, Cogent is the largest independent supplier in North America, and in conjunction with eight additional operations in Europe, Cogent forms the largest and most diverse electrical steel and components supplier in the world.

A strong focus on service, technical leadership and exceptional product quality has made Cogent the exclusive supplier to many local and international motor and electrical steel clients.

Cogent Power Ltd

Cogent Power Ltd is a multinational group comprising electrical steels, laminations, transformer products, precision engineering and electric motor design businesses which form a unique company that offers the customer complete solutions, from steel through to components, design to delivery.

Comprehensive Steel Product Range

The specialist product range of Cogent electrical steels extends from the high permeability grain oriented electrical steel for large transformers to fully processed silicon steels for large rotating machines and special non-alloyed semi-processed grades for smaller motors. Cogent is backed by internationally renowned steelmakers.

Product Information

This publication is part of a range of brochures that cover the following products from Cogent, on electrical steel:

- Grain Oriented electrical steels
- Non-Oriented fully processed electrical steels
- Non-Oriented semi-processed electrical steels
- Thin Non-Oriented fully processed electrical steels
- Magnetic Shielding

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