

Electrical Steel Thin Non Oriented



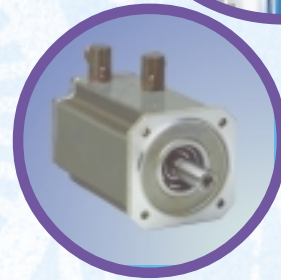
cogent[™]

Electrical Steel, Thin Non-Oriented Grades

Thin non-oriented grades are available at the nominal thicknesses, 0,20 mm, 0,18 mm and 0,12 mm. All grades are fully processed non-oriented electrical steels, especially suited for use at medium to high frequencies (typically 200 – 3000 Hz)

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

Frequency	Maximum specific total loss			Typical specific total loss		
	NO 12	NO 18	NO 20	NO 12	NO 18	NO 20
	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg
50 Hz	—	—	—	1,09	1,07	0,95
400 Hz	13,5	14,3	15,0	11,8	12,3	12,2
2500 Hz	152	179	215	132	161	205



Chemical composition, typical

Si 3.0 %, Al 0.4%

Coating SURALAC® 7000

Inorganic phosphate based coating with inorganic fillers and some organic resin

Class acc. ASTM A976	C-5 ¹⁾
Standard thickness	1 µm
Number of coated sides	2
Colour	Grey
Temperature capability in air (continuous)	230 °C
Temperature capability in inert gas (intermittent)	850 °C
Franklin (ASTM A717) Typical value per lamination	10 Ω·cm ²
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

Grade	Nominal thickness
NO12	0,127 mm
NO18	0,178 mm
NO20	0,20 mm



Grade	Surface coating	Resistivity $\mu\Omega \cdot \text{cm}$	Yield strength N/mm^2	Tensile strength N/mm^2	Young's modulus (E)	
					TD N/mm^2	RD N/mm^2
NO12/NO18/ NO20	C-5 or uncoated	52	400	505	$1,85 \cdot 10^5$	$2,00 \cdot 10^5$

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

Hardness

180 HV

Density

7,65 g/cm³

Thickness tolerance

The typical deviation from nominal thickness is less than $\pm 0,01$ mm.

Dimensions

Max. width for slit coils and sheets is 1100 mm.

Min. width is 10 mm.

Internal coil diameter is 508 mm.

Coil width standard tolerances

Over mm	Up to and including mm	Width tolerance mm
10	300	$\pm 0,08$
300	600	$\pm 0,20$
600	1100	$\pm 0,30$

Typical specific total loss data, W/kg at 50 Hz - 2500 Hz

The measurements are carried out in the 25 cm Epstein frame according to IEC 60404-2 at 50 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.

50 Hz

Grade	Specific total loss, W/kg at 50 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	0,02	0,08	0,16	0,26	0,37	0,48	0,62	0,76	0,92	1,09
NO 18	0,02	0,08	0,16	0,26	0,36	0,47	0,61	0,75	0,90	1,07
NO 20	0,02	0,07	0,14	0,23	0,32	0,42	0,54	0,66	0,80	0,95

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 2500 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	24,4	40,4	58,4	78,4	103	133	166	205	253

Typical specific total loss data, W/kg at 50 Hz - 2500 Hz

50 Hz

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

1,10	1,20	1,30	1,40	1,50	1,60	1,70	1,80	Grade
1,31	1,56	1,89	2,29	2,74	3,14	3,49	3,78	NO 12
1,28	1,52	1,84	2,23	2,67	3,06	3,40	3,69	NO 18
1,14	1,36	1,65	2,00	2,40	2,75	3,06	3,32	NO 20

400 Hz

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

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

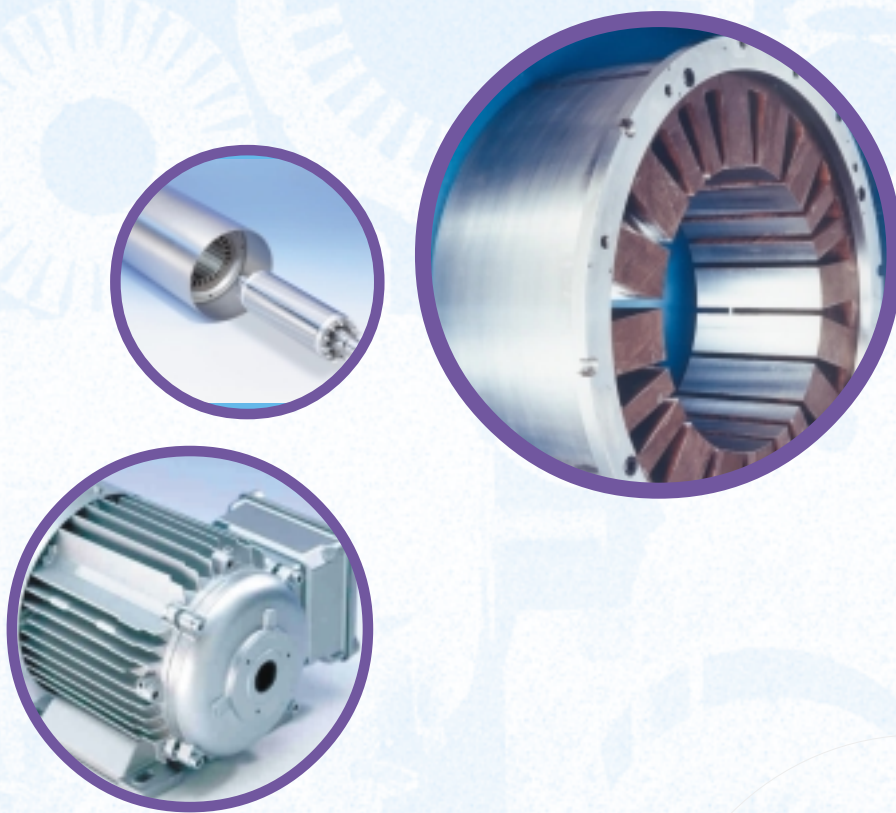


Typical magnetization curve (D.C.)

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.

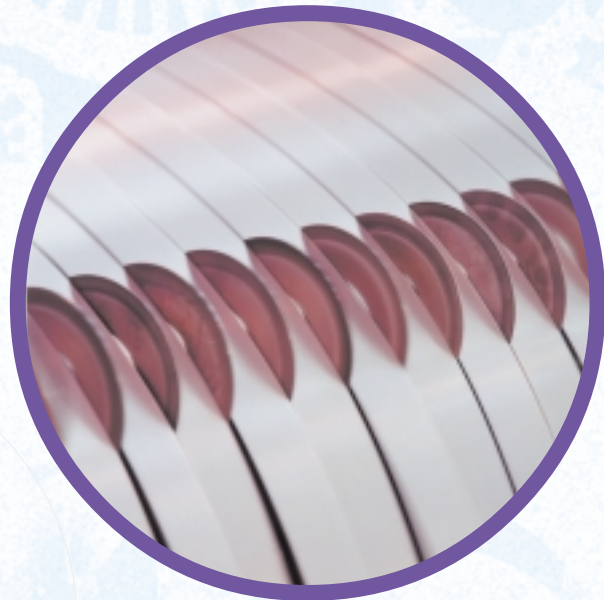
Grade	Magnetic field strength, A/m at a magnetic polarization J(T) of									
	0,10	0,20	0,30	0,40	0,50	0,60	0,70	0,80	0,90	1,00
NO12 / 18 / 20	25	32	39	44	51	57	64	73	84	99



The information and data in this brochure are accurate to the best of Cogent's ability, but are intended for general information only. Applications suggested for the materials are described only to help the reader make his/her own evaluation and decision, and are neither guarantees nor to be construed as expressed or implied warranties of suitability for these and other applications. Cogent and its subsidiaries accept no liability in respect thereof.

Typical magnetization curve (D.C.)

Magnetic field strength, A/m at a magnetic polarization 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	NO12 / 18 / 20



Cogent Vision

Cogent will be the leading producer and preferred supplier of a wide range of electrotechnical materials and products, dedicated to supporting our customers around the world.

We will encourage innovation at all levels, promote a team working culture and work with our customers to develop cost effective, profitable and long term business relationships.

We are firmly committed to achieving the highest safety and environmental standards.

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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