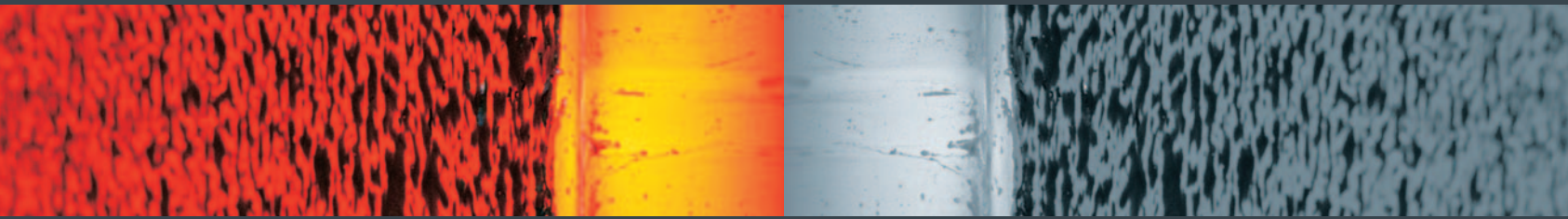


NON-ORIENTED
ELECTRICAL
STEELS



Born from fire,
made to
endure

ACRONI

ACRONI

ACRONI, d.o.o.,
located in Jesenice, Slovenia, is a member
of SIJ - SLOVENIAN STEEL GROUP, D. D



INDUSTRIAL METALLURGICAL
HOLDING

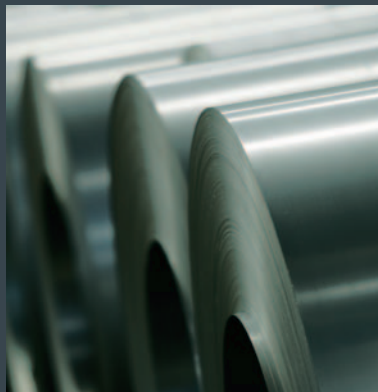
Long years of experience in fields of development and production have enabled us to offer our customers the majority of standard grades of electrical steels being produced in the world today. Constant development, improvement of processes and materials along with the introduction of a quality assurance system in accordance with **ISO 9001**, environmental management systems in accordance with **ISO 14001** and occupational health and safety management systems in accordance with **OHSAS 18001**, are our guarantee for a constant quality level.



Electrical Steels

NON-ORIENTED FULLY-PROCESSED ELECTRICAL STEELS

Electrical steels have special physical properties which make them suitable for application in the manufacture of electric equipments and appliances with rotating magnetic fields. The utilisation of fully processed steels is also widespread for construction of electrical static devices. Without electrical steels the production, transformation and utilisation of electrical energy would not be practical and would prove uneconomic.



COLD ROLLED FULLY-PROCESSED ELECTRICAL STEELS

Cold rolled fully-processed electrical steels may be delivered without insulation or insulated on both sides with insulation in order to achieve desired properties for various fields of application (higher surface insulation resistance, improvement of punchability and corrosion resistance, annealing).

FULLY-PROCESSED ELECTRICAL STEELS-DINAMO (GUARANTEED VALUES)

Grade EN 10106	Nominal thickness (mm)	Specific total loss ^{1), 4)} (max.)		Magnetic polarisation (min.) for field strength A/m ^{2), 4)}			Stacking factor (min.)	Density (assumed) (kg/dm ³)
		at 1.5T (W/kg)	at 1T ³⁾ (W/kg)	2500 (T)	5000 (T)	10000 (T)		
M270-35A	0,35	2,7	1,10	1,49	1,60	1,70	0,95	7,65
M300-35A		3,0	1,20	1,49	1,60	1,70		7,65
M330-35A		3,3	1,30	1,49	1,60	1,70		7,65
M310-50A	0,50	3,1	1,25	1,49	1,60	1,70	0,97	7,65
M330-50A		3,3	1,35	1,49	1,60	1,70		7,65
M350-50A		3,5	1,50	1,50	1,60	1,70		7,65
M400-50A		4,0	1,70	1,53	1,63	1,73		7,70
M470-50A		4,7	2,00	1,54	1,64	1,74		7,70
M530-50A		5,3	2,30	1,56	1,65	1,75		7,70
M600-50A		6,0	2,60	1,57	1,66	1,76		7,75
M700-50A		7,0	3,00	1,60	1,69	1,77		7,80
M800-50A		8,0	3,60	1,60	1,70	1,78		7,80
M350-65A		0,65	3,5	1,50	1,49	1,60		1,70
M400-65A	4,0		1,70	1,52	1,62	1,72	7,65	
M470-65A	4,7		2,00	1,53	1,63	1,73	7,65	
M530-65A	5,3		2,30	1,54	1,64	1,74	7,70	
M600-65A	6,0		2,60	1,56	1,66	1,76	7,75	
M700-65A	7,0		3,00	1,57	1,67	1,76	7,75	
M800-65A	8,0		3,60	1,60	1,70	1,78	7,80	

1) In accordance with IEC 60404-8-4 and EN 10106, the values are specified and guaranteed for magnetic polarisation at 1.5 T unless otherwise agreed

2) In accordance with IEC 60404-8-4 and EN 10106, the values are specified and guaranteed for field strength at 2500 A/m, 5000 A/m and 10000 A/m unless otherwise agreed

3) These are only informative values

4) Valid for testing in A. C. field in the 25 cm Epstein frame according to IEC 60404-2

FULLY-PROCESSED HIGH PERMEABILITY ELECTRICAL STEELS - PERMAG FP (GUARANTEED VALUES)

ACRONI Grade PERMAG	Nominal thickness (mm)	Specific total loss ²⁾ (max.)		Magnetic polarisation (min.) for field strength A/m ²⁾		
		at 1.5T (W/kg)	at 1T ¹⁾ (W/kg)	2500 (T)	5000 (T)	10000 (T)
M330-35A-HP	0,35	3,30	1,30	1,55	1,64	1,76
M400-50A-HP	0,50	4,00	1,70	1,61	1,70	1,81
M530-50A-HP		5,30	2,30	1,63	1,72	1,83
M600-50A-HP		6,00	2,60	1,64	1,73	1,84
M700-50A-HP		7,00	3,00	1,67	1,76	1,78
M470-65A-HP	0,65	4,70	2,00	1,58	1,67	1,79
M600-65A-HP		6,00	2,60	1,62	1,71	1,82
M700-65A-HP		7,00	3,00	1,65	1,73	1,84
M800-65A-HP		8,00	3,60	1,67	1,76	1,87

1) These are only informative values

2) Valid for testing in A. C. field in the 25 cm Epstein frame according to IEC 60404-2

INSULATION COATINGS ON FULLY-PROCESSED ELECTRICAL STEELS

AISI Designation ASTM A976	C - 6	C - 3	C-5
TYPE OF INSULATION (Acroni designation)	L1	L2	L3
THERMAL CLASS (IEC 60085)	H	H	H
THICKNESS OF LAYER ON EACH SIDE (µm) (ISO 2178)	1 to 6	0,5 to 3	0,5 to 1,5 1,5 to 3,0
COMPOSITION	ORGANIC WITH FILLERS	ORGANIC WITHOUT FILLERS	ORGANIC/INORGANIC WITH FILLERS
SURFACE INSULATION RESISTANCE ¹⁾ (Ohm cm²) (ASTM A717)	40 to 500	up to 15	5 to 70
HEAT RESISTANCE	180 °C ²⁾	180 °C ²⁾	180 °C ²⁾ / 850 °C ³⁾
INFLUENCE ON PUNCHABILITY	FAVOURABLE	VERY FAVOURABLE	VERY FAVOURABLE
INFLUENCE ON WELDABILITY	CONDITIONAL	CONDITIONAL	GOOD
RESISTANCE TO MEDIUM ⁴⁾	GOOD	GOOD	GOOD
COLOUR ⁵⁾	LIGHT GREY TO DARK GREY	YELLOW	COLOURLESS TO GREEN LIGHT GREY TO DARK GREY

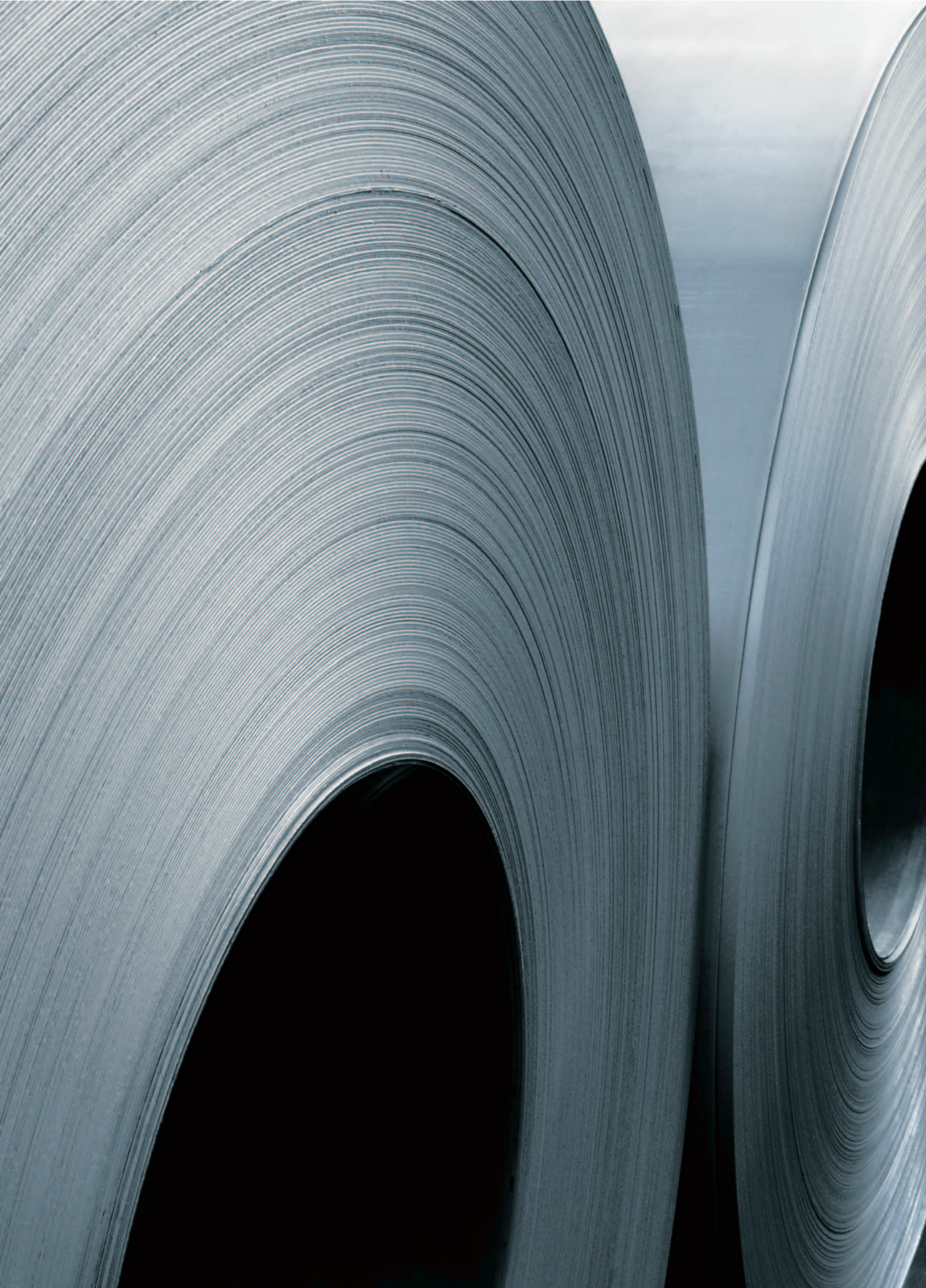
1) Surface insulation resistance depends on coating thickness

2) In air long time (testing for 20000 hours at a given temperature in accordance with IEC 60085)

3) In protective gas atmosphere (as stress-relief annealing)

4) It relates to the resistance to the most of lubricants, refrigerating mediums and oils. The varnish producer tests the resistance to the specific medium only after the customer's requirement

5) Colour shades depend on the coating thickness and type of varnish applied



COMPARISON OF GRADE DESIGNATIONS

FULLY-PROCESSED ELECTRICAL STEELS

EN 10106 (2007)	IEC 60404-8-4 (1998)	AISI*	JIS C 2552 (2000)	GOST* 21 427 0-75
M250-35A	M250-35A 5	M 15	35A250	2411
M270-35A	M270-35A 5	M 19	35A270	2412
M300-35A	M300-35A 5	M 22	35A300	2411
M330-35A	M330-35A 5	M 36	---	---
M330-50A	M330-50A 5	M 27	---	---
M350-50A	M350-50A 5	M 36	50A350	2411
M400-50A	M400-50A 5	M 43	50A400	2312
M470-50A	M470-50A 5	---	50A470	2311
M530-50A	M530-50A 5	M 45	---	2212
M600-50A	M600-50A 5	---	50A600	2112
M700-50A	M700-50A 5	M 47	50A700	---
M800-50A	M800-50A 5	---	50A800	2111
M400-65A	M400-65A 5	M 27	---	---
M470-65A	M470-65A 5	M 43	---	---
M530-65A	M530-65A 5	---	---	2312
M600-65A	M600-65A 5	M 45	---	2212
M700-65A	M700-65A 5	---	---	2211
M800-65A	M800-65A 5	---	65A800	2112

GRADES OF NON-ORIENTED ELECTRICAL STEELS SUITABLE FOR VARIOUS APPLICATIONS

	APPLICATION	M270-35A to M330-35A M310-50A to M400-50A M350-65A to M400-65A	M470-50A to M600-50A M470-65A to M600-65A	M700-50A to M800-50A M700-65A to M800-65A
ROTATING MACHINES	Large rotating machines (2 and 4 poles)	•		
	Large rotating machines (many poles)	•		
	Small generators Medium rotating machines	•	•	
	Hermetic motors	•	•	•
	General duties A.C. electric motors, domestic appliance motors		•	•
	Small D.C. intermittent motors, compressor motors	•	•	•
STATIC MACHINES	Audio transformers	•	•	•
	Saturable reactors and magnetic amplifiers	•	•	
	Voltage regulator transformers, distribution transformers	•		
	Power transformers	•		
	Current transformers	•		
	Welding transformers	•	•	•
	Fluorescent lamp ballasts	•	•	•
	Magnetic switches	•		
Pole pieces and relay cores			•	

GENERAL INFORMATION

STRIPS

Width of coil	30 do 1000 mm
Inside nominal diameter	508 mm (20")
Outside nominal diameter	1300 mm (max)

Dimensions and weights

	Coil weight (kg/mm of width)	Outside diameter (mm)
Entire coil	6 to 8,6	1100 to 1300
1/2 coil	3 to 4,5	870 to 1000
1/3 coil	2 to 2,9	770 to 850

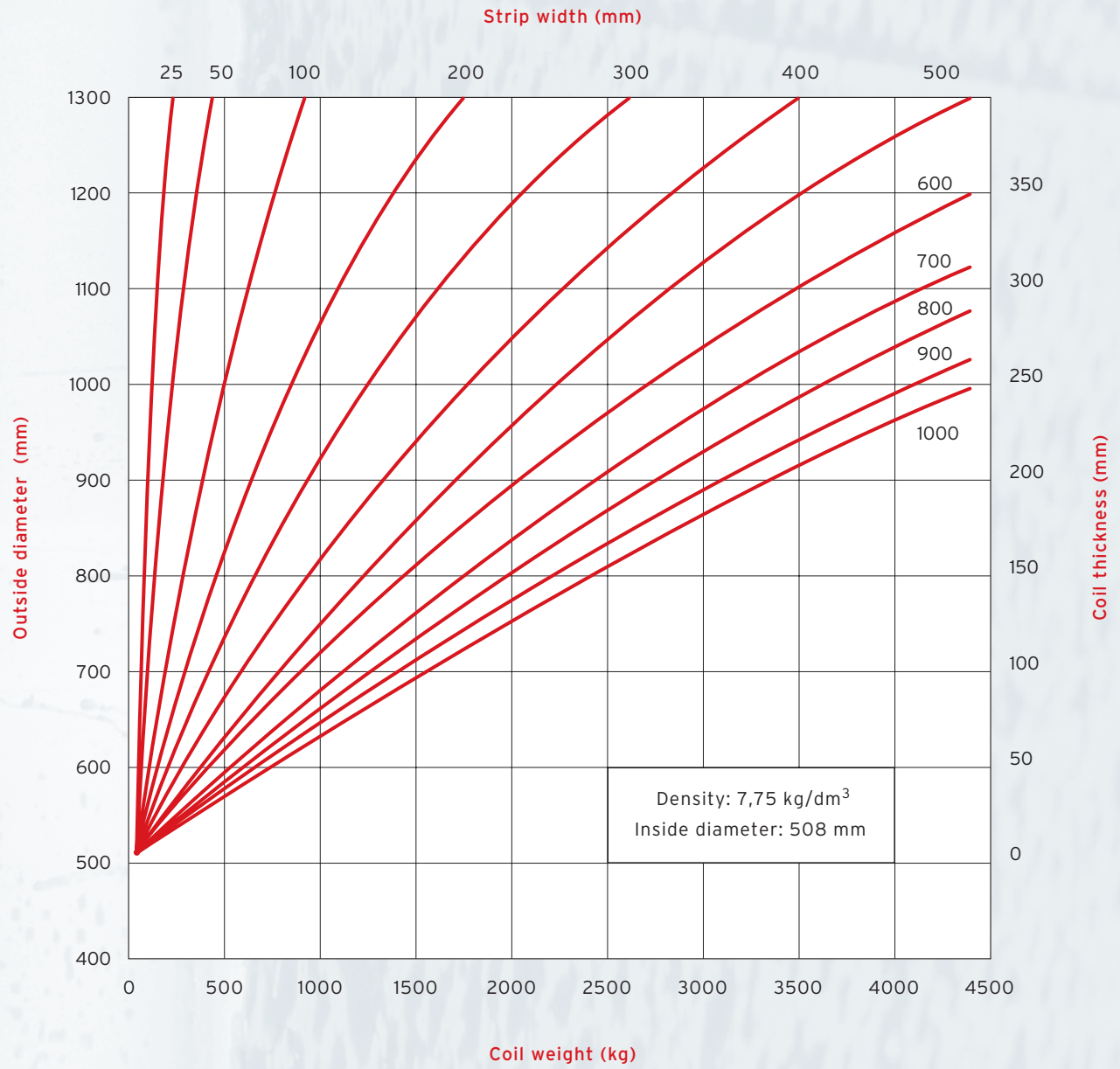
Tolerances

TOLERANCES ON NOMINAL WIDTH		TOLERANCES ON NOMINAL THICKNESS		
Nominal width "w" (mm)	Tolerance (mm)	Nominal thickness (mm)	Tolerance (mm)	%
$w \leq 150$	0 to +0,2	0,35	$\pm 0,03$	± 8
$150 < w \leq 300$	0 to +0,3	0,50	$\pm 0,04$	± 8
$300 < w \leq 600$	0 to +0,5	0,65	$\pm 0,04$	± 6
$600 < w \leq 1000$	0 to +1,0	1,00	$\pm 0,06$	± 6

SHEETS

Cut lengths	600 to 6000 mm
Cut length tolerances	0 do + 0,5%
Widths of sheets	420 do 1000 mm
Package weights	1000 do 2500 kg
Dimensional and geometrical tolerances are in accordance with standards	EN 10106, EN 10341


OUTSIDE DIAMETER IN DEPENDENCE OF COIL WEIGHT



ACRONI

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 **Sij** Slovenska industrija jekla
skupina



INDUSTRIAL METALLURGICAL
HOLDING

ACRONI IS THE LARGEST SLOVENIAN STEEL MANUFACTURER, WHICH IN ORDER TO PRODUCE STEEL RECYCLES SCRAP IN AN ELECTRIC ARC FURNACE, CASTS IT ON CONTINUOUS CASTER AND ROLLS IT INTO QUALITY FLAT-ROLLED STEEL PRODUCTS. THE COMPANY IS SPECIALISED FOR THE PRODUCTION OF FLAT STEEL PRODUCTS, ESPECIALLY STAINLESS, STRUCTURAL, ELECTRICAL AND SPECIAL STEELS, THAT MEET THE DEMANDING REQUIREMENTS OF GLOBAL STEEL MARKET.