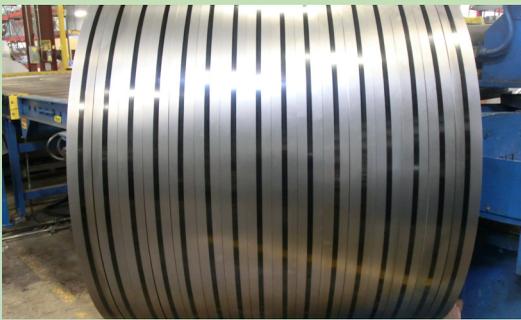




ELECTRICAL  
STEEL



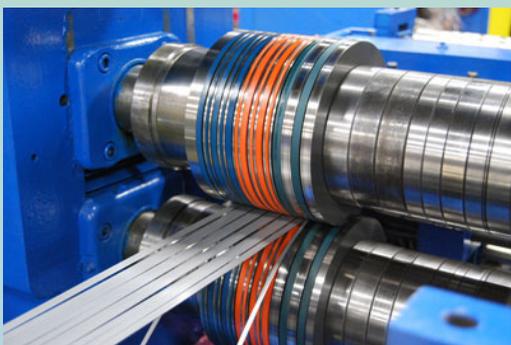
National Kwikmetal Service is one of the fastest growing metal service centers in the USA. Our expertise and inventory are focused on high valued materials including stainless steel, aluminum and electrical steel. Established in 1989, NKS started as a small order specialist, handling orders under 200 pounds. Today, with eight slitters and cut to length capabilities in four strategic locations, NKS can process orders both large and small. We have achieved this growth by offering quality products at a competitive price, as well as providing value added services to meet our customers' most demanding needs.



NKS Electrical Steel is a division of NKS that processes steel to the highest standards. Our Electrical Steel division supplies steel for motors, generators and transformers that meet and exceed the ASTM standards.



NKS Alloys is a division of NKS that serves the nameplate, point-of-purchase display, awards and recognition, and the automotive industries. NKS Alloys provides stainless steel blanks as well as aluminum.



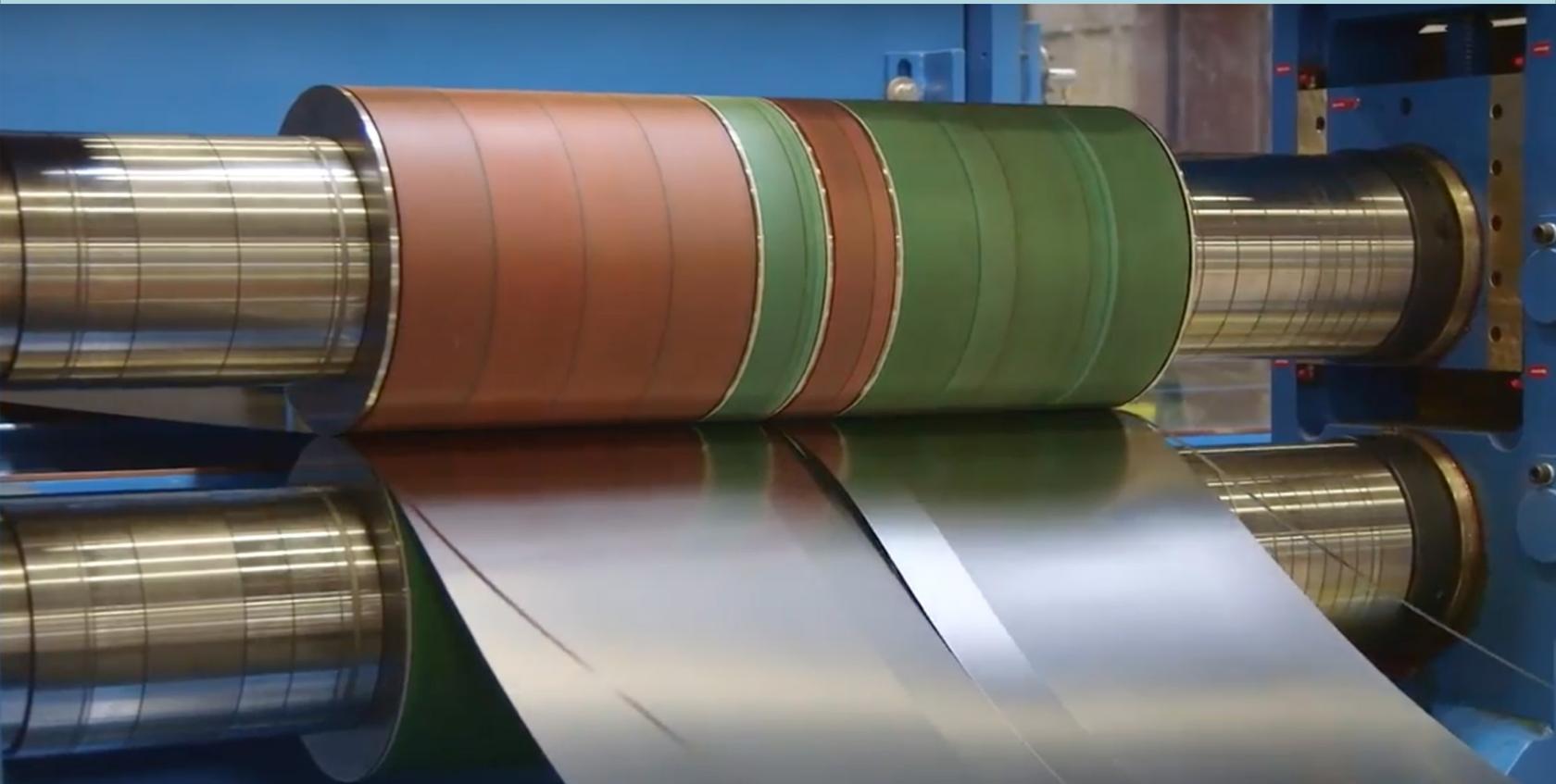
NKS de Mexico opened in 2017 in Queretaro, Mexico with processing capabilities in Monterrey, Mexico. We can slit and store material for local customers in both locations. Our slitting capabilities will allow us to provide small and large quantities to our customers in Mexico.



NKS Stainless Testing uses state-of-the-art equipment in our in-house lab to test for physical and chemical properties of a wide variety of metals.

# Quality Control

NKS has developed a Quality Control System to insure that we supply our customers with the highest quality product that meet all of their specifications. Our Quality Assurance Policy has established guidelines for providing product and services that exceed customer expectations. We are an ISO 9001-2008 certified company. Our management team and all of our employees are committed to constantly improving our service and our quality system.



## NKS Quality Policy

National Kwikmetal Service is committed to...

- 1) Delivering on time products that conform to our customer's requirements.
- 2) Continuously monitoring established goals and objectives including on-time performance, waste/rework, inventory management and customer satisfaction.
- 3) Employing techniques such as training and a systemic approach for corrective action to achieve our goals and continuously improve our processes and quality management system.



## Slitting Capability at NKS Facilities

### Illinois (Des Plaines/Itasca)

<u>Slitter</u>	<u>12" Yoder</u>	<u>18" Reusch</u>	<u>24" Reusch</u>	<u>24" Braner</u>	<u>52" Braner</u>
Max. Coil Weight Un-coiler	5,000 lbs	5,000 lbs	10,000 lbs	10,000 lbs	30,000 lbs
Max. Coil Weight Re-coiler	5,000 lbs	4,000 lbs	10,000 lbs	8,000 lbs	30,000 lbs
Max. Coil Width Entry	12.500"	18.500"	24.500"	24.000"	52.000"
Max. Coil Width Exit	12.000"	18.000"	24.000"	24.000"	52.000"
Max. Coil OD Un-Coiler	60.000"	60.000"	60.000"	72.000"	72.000"
Max. Coil OD Re-Coiler	50.000"	48.000"	48.000"	72.000"	70.000"
Coil ID Range Entry	16-20-24"	16-20-24"	16-20-24"	16-20-24"	20-24"
Coil ID Range Exit	6-12-16-20"	6-12-16-20"	6-12-16-20"	16-20-24"	20-24"
Max. Gauge Thickness	0.030"	0.135"	0.030"	0.0750"	0.120"
Min. Gauge Thickness	0.001	0.004"	0.001"	0.0070"	0.100"
PVC Applicator	Yes	Yes	Yes	Yes	Yes

### Tennessee (La Vergne)

<u>Slitter</u>	<u>26" Stamco</u>	<u>52" Stamco</u>	<u>Edger</u>
Max. Coil Weight Un-coiler	10,000lbs	40,000 lbs	4,000 lbs
Max. Coil Weight Re-coiler	10,000 lbs	30,000 lbs	4,000 lbs
Max. Coil Width Entry	26.500"	52.500"	6.500"
Max. Coil Width Exit	25.000"	50.000"	6.500"
Max. Coil OD Un-Coiler	61.500"	67.000"	60.000"
Max. Coil OD Re-Coiler	60.000"	60.000"	60.000"
Coil ID Range Entry	20-24"	16-20-24"	16-20"
Coil ID Range Exit	16-20	20-24"	20 Only
Max. Gauge Thickness	0.095"	0.135"	0.130"
Min. Gauge Thickness	0.015"	0.016"	0.027"
PVC Application	Yes	Yes	No

### Mexico (Queretaro)

<u>Slitter</u>	<u>24" Yoder</u>
Max. Coil Weight Un-coiler	12,000lbs
Max. Coil Weight Re-coiler	12,000 lbs
Max. Coil Width Entry	24.000"
Max. Coil Width Exit	24.000"
Max. Coil OD Un-Coiler	51.000"
Max. Coil OD Re-Coiler	51.000"
Coil ID Range Entry	16-20"
Coil ID Range Exit	16-20"
Max. Gauge Thickness	0.075"
Min. Gauge Thickness	0.010"
PVC Application	Yes

# Cut to Length Capability

## Input

Max. Coil Width	48.000 in.	1,220 mm
Min. Thickness	0.0008 in.	0.200 mm
Max. Thickness	0.0400 in.	1.000 mm
Max. Coil Weight	24,000 in.	10,900 kg
Coil Inner Diameter	16-20 in.	410-510 mm
Coil Outer Diameter	61.0 in.	1,550 mm

## Output

Sheet Type	Straight & Multi-Blanks	
Min. Cut Length	7.0 in.	180 mm
Max. Cut Length	121.0 in.	3,070 mm
Edge Trim Per Side	0.50-6.00 in.	13-150 mm
Tolerance	0.010 in.	0.25 mm
Max. Speed	150 ft/min.	50 m/min.





## Core Loss

Core loss and permeability are very important in design of electromagnetic devices. Selection of material is critical to prevent overheating in the core, which can cause damage to the winding insulation. We express the core loss in watts per pound (w/lb.) and this is the amount of energy loss in heat in the core at a certain induction and frequency.

### ASTM A34/A34M-06 (2012): Procurement Testing and Sampling of Magnetic Material.

## Grading

ASTM (American Society for Testing and Materials) is the adopted system of grade identification.

Example: 47F165

The first two digits are the decimal thickness in millimeters. The letter F for Fully Processed. The last three digits are the maximum allowable core loss by 100 times.

However, AISI prefix 'M' letters continue to be used, such as M19.

# Cold Rolled Magnetic Lamination Semi-Processed (SP)

TRADE NAMES	ASTM TYPE	CORE LOSS BY THICKNESS WATTS/LB 15 KILOGAUSSSES 60HZ*		TYPICAL PERMEABILITY
		THICK	MAXW/LB	
TYPE 6	47D180	.0185	1.80	2100
	64D200	.0250	2.00	2100
M-50 TYPE 5	47D210	.0185	2.10	2200
	64D290	.0250	2.90	2200
M-55 TYPE 4	47D270	.0185	2.70	2600
	64D360	.0250	3.60	2600
M-56 TYPE 2	47D330	.0185	3.30	2400
	64D430	.0250	4.30	2700
	71D480	.0280	4.80	2700
	79D540	.0310	5.40	2700

**ASTM 726-92**  
Specifications for cold rolled magnetic lamination  
(CRML) Semi-processed types.

\*Core Loss Values Based On Annealing



## Grain Oriented Electrical Steel

AISI TYPE	ASTM TYPE	THICKNESS		TYPICAL CORE LOSS @ 60HZ	MAX CORE LOSS	
		IN	MM		60HZ 15KG	60HZ 17KG
M3	23G045	.009	0.23	0.40	0.45	0.70
M4	27G051	.011	0.27	0.46	0.51	0.74
M5	30G058	.012	0.30	0.52	0.58	0.83
M6	35G066	.014	0.35	0.60	0.66	0.94

The above values are after stress relief annealing. Also available are high permeability grain oriented steel.

## Typical Mechanical Properties

TYPE	DENSITY g/cm <sup>3</sup>	TENSILE psi	YIELD psi	ELONGATION % in 2 in.	ROCKWELL HARDNESS
ALL	7.65	50,000	47,000	10	85

### ASTM A876-03

Specifications for flat rolled grain oriented electrical steel

# Coatings For Electrical Steels

## C-0

C-0 Oxide forms on the steel surface during mill processing. This thin coating will withstand normal annealing temperatures.

C-3 This varnish/enamel coating increases die life by providing die lubrication during the stamping operation. This coating will not withstand typical stress relief annealing temperatures. This coating normally is suitable for operating temperatures up to 350 Degree Fahrenheit.

C-3A The same as C-3 but a thinner coating thickness to facilitate welding of rotors/stators.

## C-3

## C-3A

## C-5

## C-5A

C-5 This is an inorganic or mostly inorganic coating. This coating will withstand stress-relief annealing up to 1550 Degree Fahrenheit.

C-5A The same coating as C-5 but a thinner coating to facilitate welding of rotors/stators.

ASTM A717-95

Surface insulation resistivity test method of single-strip specimens.



# Non-Oriented Electrical Steel Fully Processed (FP)

## ASTM A677

FORMER AISI TYPE	ASTM TYPES	CORE LOSS BY THICKNESS WATTS/LB 15 KILOGAUSSSES 60HZ		TYPICAL APPLICATIONS
		THICK	MAX W/LB	
M-12	36F130	.0140	1.30	Small power transformers and rotating machines of high efficiency.
M-15	36F145	.0140	1.45	Small power transformers & rotating machines.
	47F160	.0185	1.60	
M-19	36F155	.0140	1.55	Generators, non-critical transformers and rotating equipment.
	47F165	.0185	1.65	
	64F200	.0250	2.00	
M-22	36F165	.0140	1.65	Generators and rotating equipment.
	47F180	.0185	1.80	
	64F210	.0250	2.10	
M-27	36F175	.0140	1.75	Generators, rotating equipment and relays.
	47F200	.0185	1.90	
	64F235	.0250	2.25	
M-36	36F185	.0140	1.85	Generators, rotating equipment, and motors.
	47F200	.0185	2.00	
	64F235	.0250	2.35	
M-43	36F195	.0140	1.95	Small generators and rotating equipment.
	47F210	.0185	2.10	
	64F250	.0250	2.50	
M-45	36F205	.0140	2.05	Motors and generators.
	47F240	.0185	2.40	
	64F275	.0250	2.75	
M-47	47F280	.0185	2.80	Motors and generators.
	64F320	.0250	3.20	

## ASTM 677-16

Specification for non-oriented electrical steel fully processed type.

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