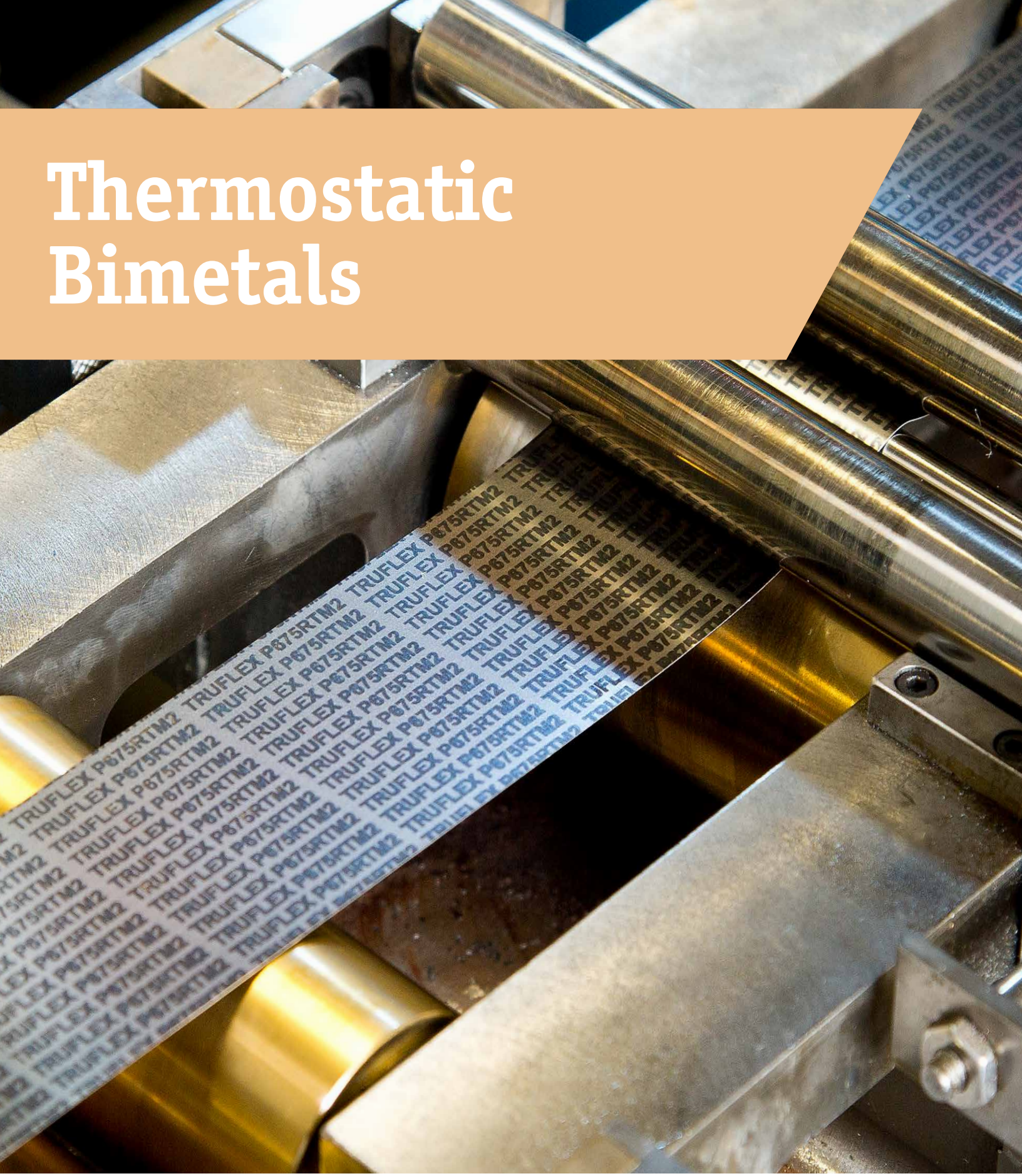
Thermostatic Bimetals



Engineered Materials Solutions
Wickeder Group

A History of Solutions

Engineered Materials Solutions, headquartered in Attleboro, MA (USA) with production sites in Hamburg, PA (USA) and Baoying (China) traces its origins back to 1916. We have been manufacturing Clad Materials since our founding company, General Plate Company, was established 100 years ago.

Today, we are experts in metallurgically bonding dissimilar metals. At EMS, we produce a variety of “laminated” materials that can offer distinctive properties, where one material alone could not; and as part of our specialty product portfolio, EMS produces Thermostatic Bimetal. We are the world’s largest producer of Thermostatic Bimetal, producing more types in strip and parts form, than any other manufacturer worldwide.

Our product line can present a myriad of advantages including weight savings, increased corrosion resistance, better thermal performance, improved electrical conductivity, or a more appealing cosmetic appearance, all while being cost-effective. With our expertise and technology we can help you reach various desired goals, such as safety, regulation and control solutions for electrical, appliance and many other markets.

Thermostatic Bimetals of EMS - Engineered for your Solutions!

Get started with Bimetal

At work, at home, in an airplane, boat or car – virtually anywhere on earth – you are almost always within reach of a thermostat metal device.

Thermostatic Bimetals comprise one of the most widely applied families of clad metals. Processed in strip form, they are combinations of metals that are selected and joined to best take advantage of the „Bimetal Effect“ - movement caused by their different coefficients of expansion, as they respond to temperature changes.

At Engineered Materials Solutions, we are a start-to-finish resource for materials and parts made from Thermostatic Bimetals. We are a global leader in the production of these materials, which are used in hundreds of different applications worldwide. EMS has created a greater number of component materials yielding a higher number of material combinations, offering a wider range of performance parameters.

Throughout our history we have gained the expertise on all aspects of the technology, from input material selection to measuring end product performance. It is our standard to work closely with you to maximize the performance and minimize the cost of your products.

Advantages

> High reliability

> Easy to use

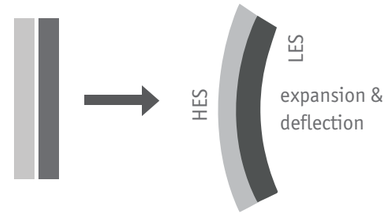
> High dimensional accuracy

> Individual defined internal stress state

> Reproducibility

> Effective Applications

> Small quantities for testing



Open the Doors of Design to an Exciting New World of Possibilities

Do what you thought you couldn't. There are a myriad of ways that Clad can help you increase performance, as well as improve your bottom line.

Thermostaic Bimetals are two or more metals with different coefficients of expansion that are bonded together and change curvature in reaction to temperature changes. As formed parts, spiral coils, or snap acting disks, this movement can be used to make and break electrical circuits, indicate or compensate for temperature changes, release springs, open or close valves and perform many other tasks. Because of its reliability, Thermostatic Bimetal is employed as an economical solution for temperature sensing and control applications in Automotive, Electrical, HVAC, Home Appliance, and a wide range of other industries. Production of these high performance metals and parts, and understanding their innumerable applications and the customized processing parameters critical to their performance, has been at the heart of our business since its inception.

Appliance

RAC / HVAC / Refrigeration

Discgrade Thermostatic Bimetal is an important component of compressors used in room air conditioning and refrigeration applications. These compressors rely on controls containing Thermostatic Bimetal to cycle them on and off reliably and safely to ensure that desired ambient temperatures are maintained.

Home Appliance Controls (White Goods)

Thermostatic Bimetal is an essential part of the protection devices of many household appliances and responsible for the safe running of washing machines, dishwashers or tumble dryers. The consistency, quality and performance of our Discgrade Thermostatic Bimetal is valued by many leading manufacturers of the industry and makes sure that the electric motor controls of your appliances are running smoothly.

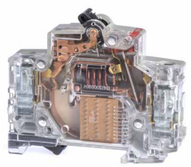
Small Appliance

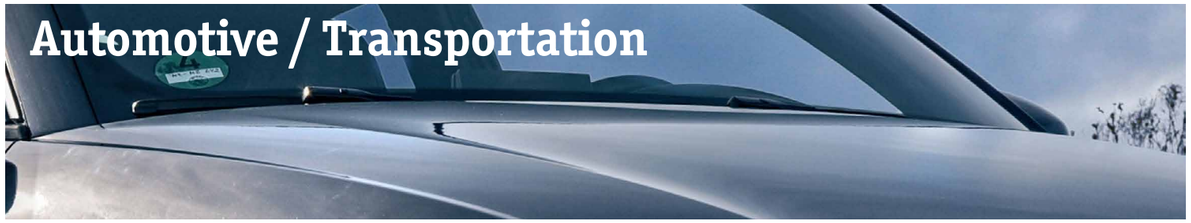
Steam Irons, Hot Plates, and Water Kettles are just a few examples of small household appliances we use in our daily life that rely on Thermostatic Bimetal controls to set and maintain the user desired temperatures.

Electrical Distribution

Circuit Breakers

The world's leading producers of circuit breakers rely on the quality and performance of EMS Thermostatic Bimetal Strip and Parts as the activating element in residential and industrial circuit breakers. When current draw exceeds the circuit's amperage rating the Thermostatic Bimetal will overheat and trip the breaker which interrupts the current flow through the circuit.





Automotive / Transportation

Transmission Thermal Management / Flow Control Applications

Thermostatic Bimetal is a simple, cost effective, highly reliable solution to many automotive thermal management problems.
It is used to control transmission temperature within a specific range which then can have a significant impact on automotive performance and fuel efficieny. Moreover, is it used to control oil levels in front wheel drive automotive transmissions at optimal levels over all temperature ranges. It can also be used in oil cooler bypass functions to quickly heat transmission oil to optimal temperature and control it with a desired range. Regardless of the application, we have the materials and applications expertise to help you with material selection, part design, and manufacturing.

Engine Thermal Management

Viscous fan drives also rely on Thermostatic Bimetal to engage and disengage cooling fans depending on the engine compartment temperatures in order to ensure that your engine keeps operating at optimal temperatures.

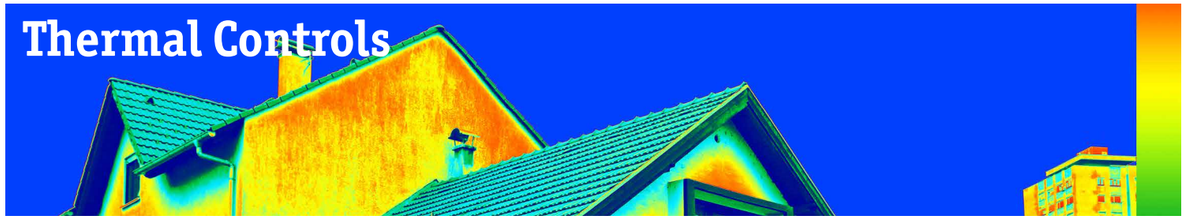
Circuit Protection

Fuses have long been used to protect delicate automotive circuitry. Thermostatic Bimetal is a convenient alternative to these single fuses as it can be used in miniature automative circuit breakers.

Accessory Motor Protection

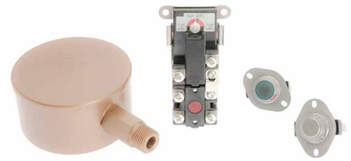
Today's automobiles are heavily reliant on electrical subsystems. Thermostatic Bimetal is an important component to ensure the reliable operation of electric motors running windshield wipers, power seats, window lifts, and other safety and convenience systems to make sure you and your passengers arrive at your destination safely and comfortably every time.

Thermal Controls



Home Heating

Whether you realize it or not, your home heat system is heavily reliant on Thermostatic Bimetal to keep your home warm, comfortable, and safe. It is an important component of thermostats that signal your furnace when to turn on or off and also part of the controls that help maintain temperature in electric water heaters. It is even used in steam traps and air eliminators that make sure that steam and water are flowing properly to radiators.



Ventilation

Proper ventilation is an important task for homeowners. Vent dampers that use Thermostatic Bimetal to open and close at prescribed temperatures can help fulfil this task in order to prevent moisture and thus the formation of mold and mildew.

Temperature Indicators

Dial thermometers, instant read meat thermometers, probe thermometers, and even temperature chard recorders are applications that rely on the accuracy and repeatability of Thermostatic Bimetal. It offers is a simple and cost effective solution for these thermometers and temperature indicators.

We support you

It's simple. We want you to have precisely the combination of metallurgical properties you require for your application. We will work closely with you to achieve it, until we reach the best solution for you.

Variety of forms:

- Master Coils
- Slit Coils
- Sheets
- Parts
- Assemblies
- Cookware Discs
- Coils

Variety of Clad designs:

- Overlay Clad Materials
- Inlay Clad Materials
- CoreLok Clad Materials
- Edgelay Clad Materials

Variety of Bimetal designs:

- Disgrade
- Electrical Grade
- Stamped Parts, Coils, & Assemblies

Variety of production service :

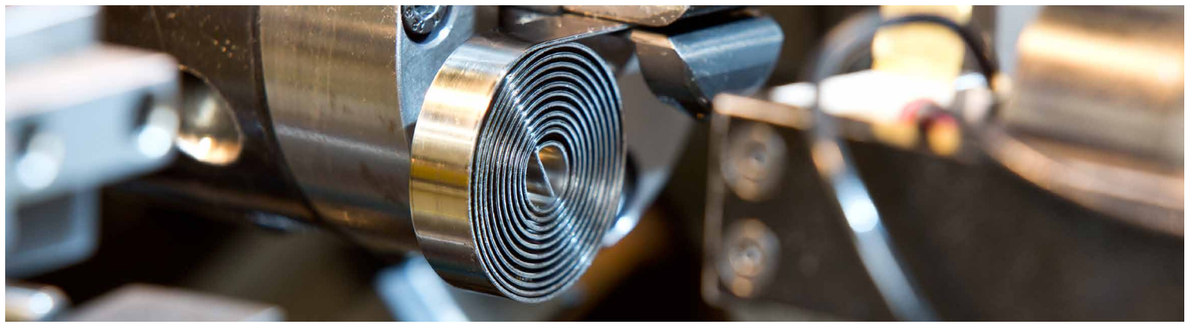
- Cladding
- Rolling
- Annealing
- Strip Cleaning
- Slitting
- Brazing
- Parts Fabrication

Sense. Control. Protect.

What can Thermostatic Metal devices do?

- Regulate and control temperature on clothes irons, toasters, toaster ovens, coffee makers, ovens, clothes dryers, hair dryers, deep fat fryers, electric blankets, electric frying pans and tea kettles, rice cookers, griddles, grills, and waffle irons, etc.
- Protect fluorescent light ballasts from overheating
- Regulate room temperature
- Turn automotive fans on or off
- Record the temperature of sensitive cargo in transport to assure it has not varied from the desired range
- Protect home, office, factory electrical circuits
- Protect aircraft electrical circuits
- Open/close crawl space and attic vents
- Regulate electric range burner temperatures
- Protect electric motors from overloading
- Protect circuitry in computer and peripheral surge protectors
- Provide anti-scald protection in hospital and nursing home showerheads
- Keep self-adjusting drum brakes from over adjusting at elevated temperatures
- Compensate for ambient temperature variations in car and SUV hatch and hood struts
- Compensate for viscosity variations due to temperature changes in automatic transmissions

...And much more... **How can we help?**

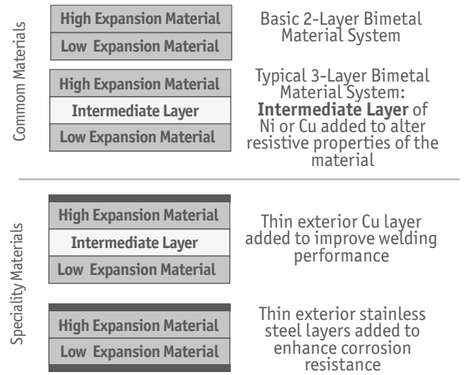


Thermostatic Bimetal

Reliability you can count on

Alloy Composition

High Expansion Alloys (HES)		Low Expansion Alloys (LES)	
B	22 Ni, 3 Cr, Bal Fe	10	36 Ni, Bal Fe
C	19.4 Ni, 2.25 Cr, 0.5 C, Bal Fe	11	38.65 Ni, Bal Fe
F	Copper	14	38 Ni, 7 Cr, Bal Fe
GB	19 Ni, 7 Cr, Bal Fe	20	40 Ni, Bal Fe
LA	20 Ni, 6Mn, Bal Fe	30	42 Ni, Bal Fe
M	18 Cr, 8 Ni, Bal Fe	40	45 Ni, Bal Fe
N	Nickel	50	50 Ni, Bal Fe
P	72 Mn, 18 Cu, 10 Ni	70	17 Cr, Bal Fe



Standard Tolerances

Strip Thickness (t)		Tolerance	
in	mm	in	mm
t ≤ 0.005“	t ≤ 0.127	+/- 0.0003“	+/- 0.0076
0.005“ < t ≤ 0.010“	0.127 < t ≤ 0.254	+/- 0.00035“	+/- 0.0089
0.010“ < t ≤ 0.015“	0.254 < t ≤ 0.381	+/- 0.0004“	+/- 0.0102
0.015“ < t ≤ 0.020“	0.381 < t ≤ 0.508	+/- 0.0005“	+/- 0.0127
0.020“ < t	0.508 < t	+/- 2,5 %	+/- 2,5 %

Strip Width (w)		Tolerance	
in	mm	in	mm
w ≤ 0.005“	w ≤ 12.70	+/- 0.003“	+/- 0.006
0.5“ < w ≤ 1“	12.70 < w ≤ 25.4	+/- 0.004“	+/- 0.102
1“ < w ≤ 3“	25.4 < w ≤ 76.2	+/- 0.008“	+/- 0.203
3“ < w ≤ 6“	76.2 < w ≤ 152.4	+/- 0.010“	+/- 0.254
6“ < w	152.4 < w	+/- 0.030“	+/- 0.762

Edgewise Camber

Strip Width	Test Length	Max. Camber	Strip Width	Test Length	Max. Camber
in	ft	in	mm	M	mm
w < 0.125“	1	0.312“	----	---	---
0.125“ ≤ w	3	0.281“	3.18 ≤ w	1	8.5

Metal Identification

Type	Thickness	Width
Chemical Marking	All gages	All widths
Mechanical Marking	0.012“ and thicker	All widths
Engraving	0.040“ and thicker	Less than 0.500“

If not specified by the customer, the low expansion side (LES) is identified by chemical or mechanical marking with the word “Truflex“ followed by the metal type designation

Edge Conditions

› As slit ASTM #3
› As flattened ASTM #5
› Burr < 10 % t
for t ≤ 0.020“ (0.508 mm)
› Burr = 0.002“ Max (0.05 mm max)
for t > 0.020“ (0.508 mm)
› Edge rounding available upon request

Cross Curvature

H = 0.10 t + (0.00025w2/t)

Where H = chord height in inches
t = material thickness in inches
w = width of stock in inches

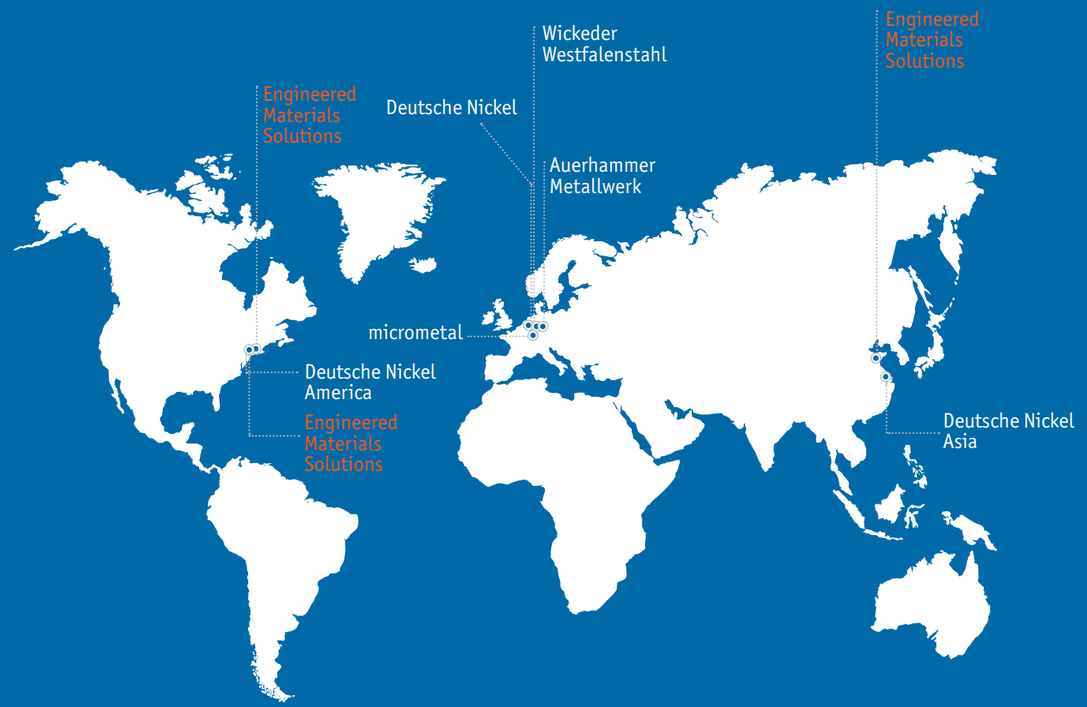
Coiling & Packaging

ID	Thickness	Sleeve Type	Packaging Options
16“ to 20“	< 0.005“ 0.005“ to 0.0119“ 0.012“ to 0.025“ > 0.025“	Plastic Plastic or Cardboard No ID core unless specified No ID Core	Radial wrap: 1-2 coils @ 55 lb max Vacuun Pack: 55 lbs and 27“ OD max Gift wrap or plastic bags Corrugated cardboard or wooden box

Note: Traverse spool winding available upon request.

Best of metal.

The metal specialists of Wickeder Group combine their expertise to offer you the best of metal. On three continents (Europe, America, and Asia), there is a wide range of standard and customized solutions. We can guarantee highest quality standards, flexibility, and fast response times by our product- and service- oriented business model. Ultra-modern production lines, extensive knowledge, and innovative solutions have always been the success of Wickeder Group.



// Portfolio EMS

› Clad Materials
› Thermostatic Bimetals
› Nickel strip

// Product Groups of Wickeder Group

› Clad Materials
› Thermostatic bimetal strip
› Metal strip & foil
› Nickel alloy bars and wire
› Precision-etched metal components

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