

**AMETEK®**

**SPECIALTY METAL PRODUCTS**



# INNOVATIVE & ADVANCED METALLURGICAL TECHNOLOGY

**AMETEK®**

**SPECIALTY METAL PRODUCTS**

**WALLINGFORD**

- Strip
- Shaped Wire
- Near Net Shaped Components
- Thermal Management Materials

**HPM®** | **HAMILTON  
PRECISION  
METALS**

**AMETEK®**  
SPECIALTY METAL PRODUCTS

- Strip
- Foil
- Ultra-thin Foil



### METAL STRIP PRODUCTS

- Offering more alloy variations through powder metallurgy than any other producer.
- Tightly controlled chemistries result in high-purity strip with extremely low impurity levels & surface oxides.
- Featuring tight tolerance, high quality surface finish & slit edges.
- Smaller lot sizes at competitive prices.

### STANDARD CAPABILITIES

- **Thickness:**  
0.002" - 0.090" ± 5%
- **Width:**  
0.062" - 14.00" (and up to 22.00" in some cases, depending on gauge & temper) - +/- .005"
- **Coil Size:**  
Up to 200 lbs. PIW, or 6000 lbs, with no welds. 0.062" - 14.00" (and up to 22.00" in some cases, depending on gauge & temper) - +/- .005". Standard arbor dia. of 3", 6", 8", 12", 16" offered. Oscillate-wound coils up to 1,000 lbs.
- **Temper Range:**  
Annealed DDQ to Full Hard, incl. ¼ H, ½ H, ¾ H.

### NICKEL STRIP

High-Purity	Dispersed Phase
AME 270 - 899A	AME 201 - 899E
AME 200 - 899L	AME 233 - 899D
AME 201 - 899M	AME 205 - 899G

ALLOY SYSTEM	AMETEK SMP GRADE	INDUSTRY EQUIVALENT
Nickel Iron Strip	936	Invar®
	942	Alloy 42
	946	Alloy 46
	948	Alloy 48
	952	Alloy 52
	Others Available	
Fe-Ni-Co Strip	515 Sealvar®	F-15 Alloy Kovar®, Rodar®
Nickel Tungsten Strip	891	3% up to 14% W available
	886	3% up to 14% W available
	Others Available	
Cobalt Strip	Ductile Cobalt 580, 591, 595 High Purity Cobalt 599	-
Weld Wire	Co, Ni, NiFe Others available	-
Cu-Ni-Sn	377 Pfinodal®	C72900
Alloy Strip	388 Spinodal	C72650
Ni-Cr	80/20, 70/30 and 65/35	-
High-Purity Fe	900B	HP Iron

### ABOUT WALLINGFORD

Putting metal strip technology to work for you... the grades you need, the quality you expect. As a pioneer in the development of metal strip products with more than 50 years of experience and numerous patents in wrought powder metallurgy, AMETEK SMP is a leading producer of highly engineered metal strip products.



## WIRE PRODUCTS

With our advanced technology of drawing, rolling and shaping, a wide range of wire sizes and shapes are available.





## WE OFFER

- A variety of alloys**  
 Aluminum, Copper, Copper Alloys, Nickel, Nickel Alloys, Stainless Steel and custom engineered alloys.
- A variety of shapes & sizes**  
 Round, square, rectangular, hex, half round, flat wire, bunched and custom shapes... from rod size to fine wire size.
- A variety of packaging**  
 Reels, spools, barrels, pails, coils, cut-to-length, bundles, and layer level wound reels.

## ALLOYS OFFERED

Aluminum family	1000 to 7000 Series
Carbon steels	C1006 to C1060
Copper family	Copper, Cu-Ni-Sn, Bronze, Brass, Leaded Brass, Ni-Silver, Phos Bronze, Silicon Bronze
Nickel family	200, 201, 205, 211, 233, 270, Monel®, Inconel®, Incoloy®
Nickel Iron family	Alloys 36, 42, 46, 48, 52, Kovar (F-15)
Resistance alloys	30-ohm, 60-ohm, 90-ohm, 180-ohm
Stainless steels	300 & 400 Series, 17-4 PH, A-286
Other alloys	High Purity Nickel and Cobalt alloys via p/m. Other alloys based on availability

## SIZE, SHAPE, FINISH

Round		.0005" - 0.100"
Square		.010" - 0.200"
Flat		008" x .018" to .125" x .500"
Custom engineered shapes upon request		
Edges		Square, rounded corners (.003" - .005" radius), natural rolled, full round / blended.
Finish		Plating ready bright & clean. Pre-plated wire upon request.
Stranding & Bunching		.005" to .062" diameter x 7 to 65 strands

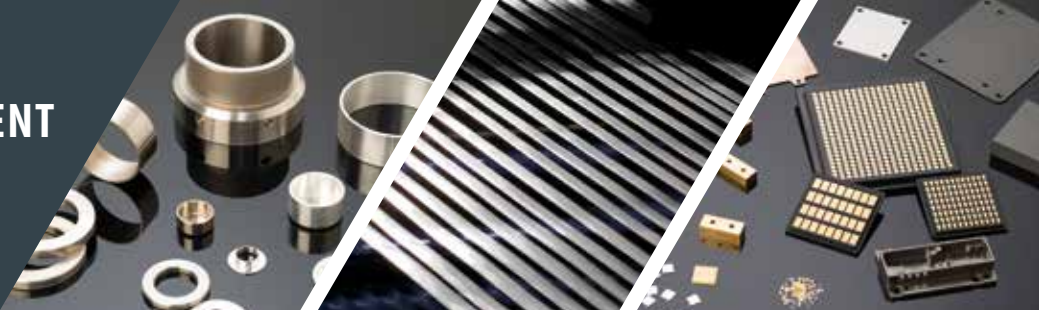
## PACKAGING

Spools	3 to 30 lbs.
Pails	30 lbs.
Reels	30 to 1500 lbs.
Coils	30 to 200 lbs.
Barrels	175 to 500 lbs.
Straights	6 in. to 6 ft. lengths

## QUALITY ASSURED

AMETEK SMP is certified ISO 9001 and continually upgrades its processes, equipment and operator training to produce high-quality wire products. TQM & statistical methodologies are incorporated into our manufacturing process to provide products that will consistently meet your critical specifications.

# THERMAL MANAGEMENT AND ENGINEERED SHAPED PRODUCTS



## THERMAL MANAGEMENT COMPOSITE MATERIALS

### Moly Copper • Tungsten Copper

With excellent thermal conductivity, matched thermal expansion to semi conductors (G<sub>2</sub>As, GaH) these composite materials provide maximized performance for high power electronic device applications.

- Chip mounting
- Circuit board cores
- Heat sinks
- Lids or covers
- Thermal spreaders

This series of composite materials is available as finished parts with sizes up to the following dimensions (depending on material and overall size):

- Thickness: 0.500" (12.7 mm)
- Width: 6.000" (152 mm)
- Length: 24.00" (610 mm)

## ENGINEERED SHAPED COMPONENTS

From bulk rod, bar, tube & plate to fully machined finished parts, AMETEK SMP offers its wrought metal powder manufacturing technology for the production of net and near-net shape geometries as fully dense components.

- Net shape geometries with controlled microstructure and specific mechanical properties.
- High purity materials with low gas content suitable for applying platings & coatings.
- Full density achieved via proprietary Pneumatic Isostatic Forging (PIF) process.
- Wide range of materials including custom compositions.
- Small lot sizes at competitive pricing.
- One-stop sourcing from raw stock to finished product configurations.

## IDEAL FOR APPLICATIONS SUCH AS

- Bearings
- Thrust Washers
- Bushings
- Sleeves
- Spacers
- and many, many others

### MOLYBDENUM-COPPER COMPOSITES (AMC SERIES)

THERMAL CONDUCTIVITY		
	W/mK <sup>3</sup>	BTU/hr. ft.°F
AMC 6040	215	125
AMC 6535	205	119
AMC 7525	185	108
AMC 8020	175	102
AMC 8515	165	96

THERMAL EXPANSION (in./in. x 10 <sup>-6</sup> /°C)			
	30-1500°C	30-400°C	30-800°C
AMC 6040	9.5	10.2	10.5
AMC 6535	9.0	9.4	9.8
AMC 7525	7.8	8.0	8.4
AMC 8020	7.2	7.5	7.9
AMC 8515	6.8	7.0	7.4

### TUNGSTEN-COPPER COMPOSITES (AWC SERIES)

THERMAL CONDUCTIVITY		
	W/mK <sup>3</sup>	BTU/hr. ft.°F
AWC 7525	186	107
AWC 8020	175	101
AWC 8515	162	93
AWC 8812	155	90
AWC 9010	150	86

THERMAL EXPANSION (in./in. x 10 <sup>-6</sup> /°C)			
	30-1500°C	30-400°C	30-800°C
AWC 7525	9.06	9.55	9.68
AWC 8020	8.21	8.60	8.63
AWC 8515	7.36	7.65	7.58
AWC 8812	6.78	7.00	6.86
AWC 9010	6.51	6.70	6.53

# STRIP, FOIL AND ULTRA-THIN FOIL

## WE OFFER

- **Tightest tolerances and thinnest gauges in the industry – from 1.5 mm (.060") to 1.5 microns (.000060") in thickness.**
- Tolerances
- Specified for applications wherever quality, precision and consistency are critical to performance.
- Custom produced to meet specific mechanical, physical, electrical and magnetic properties in a variety of surface finishes from ultra-smooth to roughened matte.

## A BROAD RANGE OF METALS AND ALLOYS

- Titanium
- Stainless and heat-resisting steels
- Nickel and high-nickel alloys
- Nickel-base superalloys
- Cobalt-base superalloys
- Precision resistor alloys
- Strain-gage alloys
- Copper and copper alloys
- Controlled-expansion alloys

TITANIUM		
Titanium Commercially Pure / Implant Grades	Ti-Gr 1, 2, 4 (ASTM B265 & F67)	
Alloyed Grades	Ti-Gr 9 (3Al/2.5V), Ti-Gr 23 (6Al/4V ELI)	
NI-BASE & CORROSION RESISTANT		
Havar®	MP35N® - LTi	HPM® X-750
HPM® 400	HPM® Nickel 200, 201, 270	Precision C
HPM® C-276	HPM® 625	
ELECTRICAL RESISTOR & HEATER		
Constantan	Evanohm® R	HPM® 965
Copper 102	HPM® 600	Manganin
Cu-Ni 715	HPM® 80/20	-
STAINLESS STEEL		
SS 301	SS 316	S 420
SS 302	SS 316L	SS 430
SS 304	SS 316LS (medical implant grade)	SS 17-4 PH
SS 304L	HPM® 455	SS 17-7 PH
SS 305	SS 410 S	
CONTROLLED EXPANSION & GLASS SEALING		
HPM® Ni-Fe 36, 42, 52	Rodar® / Sealvar® (F-15 Alloy)	
AND MANY OTHERS, INCLUDING		
Beryllium Copper 25	Moly Permalloy	Tantalum
HPM® Be-Ni	Pfinodal® (Cu-Ni-Sn)	
L-605	Phosphor Bronze A	

## ABOUT HAMILTON PRECISION METALS

What began in 1939 as an outgrowth of the Hamilton Watch Company is now a global presence as a leading specialty re-roller of almost every alloy made today. You'll find HPM metal strip & foil in applications wherever quality, precision and consistency are critical to design and performance.



ADVANCED METALLURGICAL PRODUCTS FOR CRITICAL APPLICATIONS

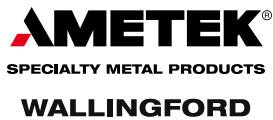
## ABOUT AMETEK SPECIALTY METAL PRODUCTS

AMETEK Specialty Metal Products (SMP) is a business unit of AMETEK, Inc. a leading global manufacturer of electronic instruments and electromechanical devices with annualized sales of approximately \$5.5 billion.

The Specialty Metal Products business unit consists of five businesses and operating facilities in the United States and the United Kingdom.

These businesses are proven experts in the manufacture of advanced metallurgical products including roll bonded clad plate, precision metal strip, ultra-thin foil, shaped wire, engineered components, thermal management materials, water atomized powders and precision tube.

Our high performance metal products are used around the world for critical applications in a range of industries including aerospace, automotive, defense, electronics, industrial, medical, nuclear, oil and gas, and space and satellites.



### AMETEK SPECIALTY METAL PRODUCTS

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Metal Strip, Engineered Shapes,  
Specialty Wire & Thermal Management Products



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Precision Strip & Foil