COINING®

Global Supplier

of Soldering

and Brazing

Preforms

AMETEK®
SPECIALTY METAL PRODUCTS

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COINING®

Responding quickly, precisely and efficiently to our customers' needs

Yes, we do.

Our primary business at Coining is the fabrication of high-quality metal stampings and preforms for the electronics industry. Our capabilities include casting, rolling, cladding, plating, tool and die making, stamping and custom-automated packaging.

The Coining Quality Commitment

Our fully staffed and highly trained quality control department strives to ensure that our customers always receive the finest parts available anywhere.

Our tight in-process controls allow us to strive continually for zero defects. Special packaging requests such as waffle packs, hermetically sealed and argon-filled jars, and a Class-100 environment are available upon request.

Coining purchases raw materials only from suppliers with a proven ability to provide quality product on time. We do an incoming inspection on all raw materials. Analytics are required and available to our customers on request.

Our quality policy is simple. Coining will produce and deliver quality products on time and provide services that meet or exceed our customers' quality and production goals. To us, this is more than a job. It's an attitude.

All of our departments are specially equipped and staffed to work with maximum efficiency. We typically respond to a request for quotation within a single business day.

We can have samples of standard shapes or those from our open tooling list in a customer's hands within two weeks. It is not uncommon for us to ship within a few days. Prototypes of custom

shapes involving special tooling require more time, especially if the application is particularly challenging. With our specialized staff and customer friendly service, we are dedicated to filling every order on time.

And, to satisfy all of our customers' production needs, we offer these capabilities in house:

- *Extrusion and Continuous Casting*
- *Rolling*
- *Tool and Die Making*
- *Stamping*
- *Deburring*

Casting and Rolling

With our in-house casting and rolling capabilities, we make strip on a daily basis. We stock many alloys with base metals of gold, silver, lead and tin in strip form. We can roll as thin as 0.0003" (7.5 µm). Our typical tolerance on many gauges is +/- 0.0002" (5µm). Our standard alloys always are ready to be punched for delivery.

Cladding and Plating

We stock a wide variety of copper, molybdenum and Kovar multilayer cladded materials. Cladding is a process by which different metal layers are bonded without adhesives or filler materials. Coining specializes in supplying stamped and plated Kovar and molybdenum tabs, covers, terminals and heatsinks. We routinely plate shapes as small as 0.010" (254 µm). If required, we can supply parts stamped from plated strips as an alternative.

Tooling

We can make custom part design a reality. Our fully equipped tool and die department with its wire EDM capability brings craftsmanship and modern technology together to satisfy our customers' every need. All dies are made in house.

Delivery with a new tool is generally between two and six weeks, depending on the complexity of the part.

Our standard tooling list is available upon request.

Stamping

We can produce standard, custom and complex shapes quickly and efficiently. All stamping is done in house in our highly integrated production facility. All jobs, regardless of size, have a lot number and quality control documents that accompany them throughout our process. We routinely do in-process inspections. Our standard tool list (discs, frames, rectangles, squares and washers) is among the most extensive in the industry with shapes ranging from 0.0035" (90 µm) square to shapes over 6" (15 cm). Our custom fabrication capabilities are limited only by the physical constraints of the materials at hand. Essentially, if a shape is possible, it's almost certain that Coining can fabricate it, quickly, precisely and efficiently.

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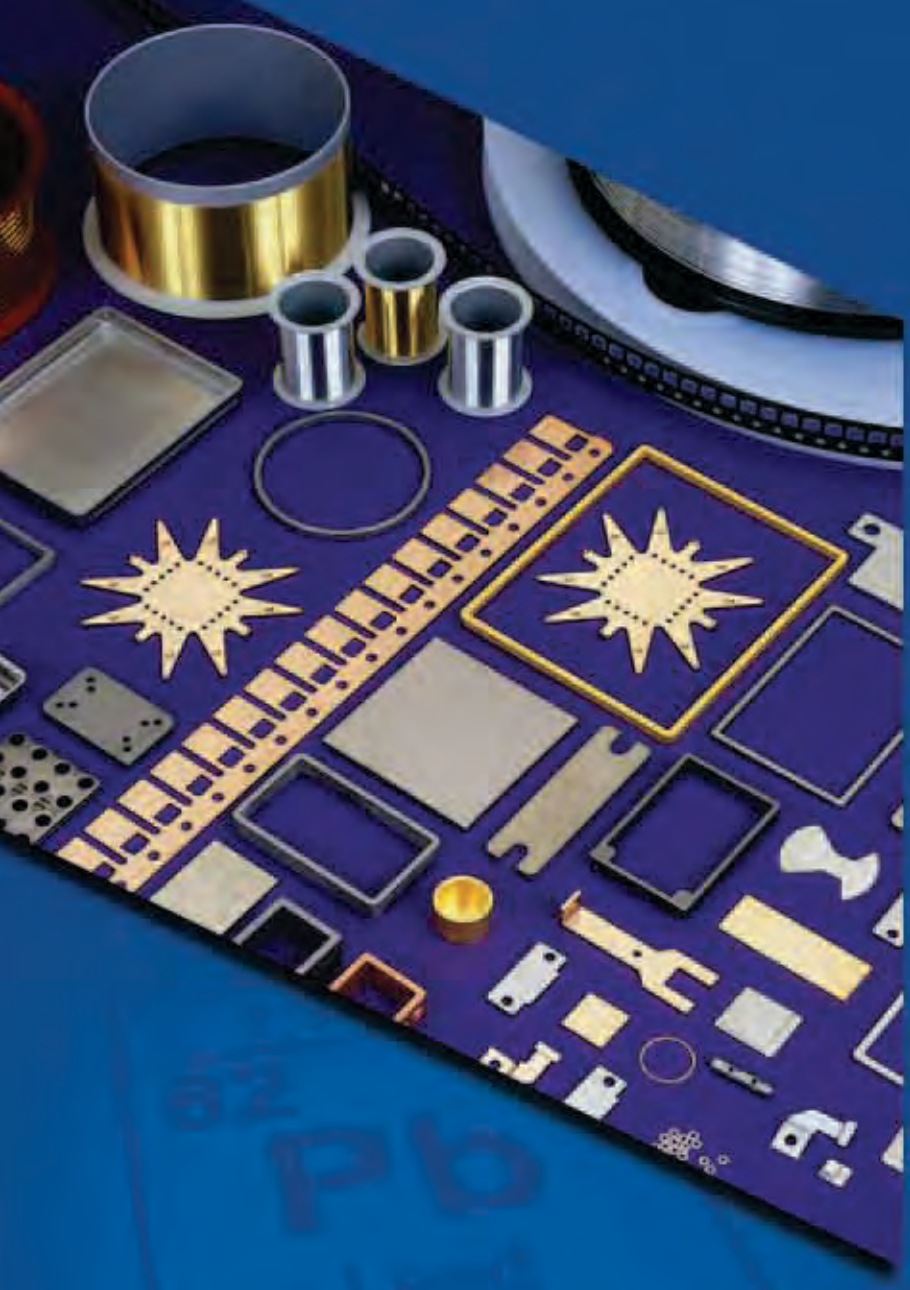

COINING®

Lead Free

What is Affected?

- ***Household appliances***
- ***IT and telecommunications equipment***
- ***Consumer electronics***
- ***Lighting equipment***
- ***Electrical and electronic tools***
- ***Medical devices and equipment***
- ***Monitoring and control instruments***
- ***Automatic dispensers***
- ***Automotive electronics***

Lead-Free Alloys

Drawing on its extensive industry experience and expertise in lead-free technology, Coining is able to provide a comprehensive array of lead-free alloys and preforms. Advantages include:

\\\ More than one hundred 100% lead-free alloys with melting points (both eutectic and non-eutectic) ranging from 90ºC to 1100ºC. Customer requirements typically can be met with one of these alloys.

\\\ Precision stamping capabilities supported by an extensive inventory of standard tools, including discs, frames, rectangles, squares and washers. Coining's in-house ability to rapidly build complex dies from micro to macro scale. That ability allows for the expeditious delivery of standard, custom and complex shapes in sizes ranging from 0.0035" (0.09 mm) to over 6" (15 cm), and as thin as 0.0003" (7.5 µm).

\\\ An experienced staff of R&D metallurgists, who work with our customers to develop a custom alloy if an existing alloy does not meet their lead-free needs.

\\\ Completely integrated manufacturing capability that allows Coining to efficiently move from creation of an alloy to the completion of a finished part.

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No single “magic” lead-free alloy can be universally substituted for all existing lead-based soldering alloys. Our customers’ specific needs define the best lead-free substitute. Coining’s experience and expertise ensure that each customer receives the highest quality product quickly and efficiently.

Lead is a well known environmentally toxic element with significant adverse human health effects. As such, it is the focus of a global effort to eliminate or reduce its use wherever possible. European Union directives (WEEE/ RoHS/REACH) ban its use in many applications. Japan also has banned many of its industrial uses with the Americas moving in that direction as well.

Companies that fail to heed these regulations and eliminate the use of lead wherever possible face dire consequences, ranging from loss of customers and applications to outright prohibition from participating in certain markets. Manufacturers and consumers worldwide increasingly demand lead-free products.

Coining uses a variety of elements to manufacture a broad range of compositions for use as lead-free soldering and brazing alloys. Combined with its extensive tool list and precision stamping capabilities, Coining is able to expedite the completion of an order. When necessary, its in-house metallurgists will work with customers to provide a customized solution tailored to their specific needs.

E-mail sales@coininginc.com or phone customer service at +1 201-791-4020 for a complete list of lead-free alloys.

Partial List of Lead-Free Alloys

Solidus °C	Liquidus °C	E = Eutectic	Solidus °F	Liquidus °F	Alloy #	Element 1 and Wt%		Element 2 and Wt%		Element 3 and Wt%		Element 4 and Wt%		Density Gr/cc
93	93	E			3024	In	44	Sn	42	Cd	14			7.96
95	95	E			3033	In	51.5	Bi	32	Sn	16.5			7.31
120	122				3003	In	52	Sn	48					7.3
138	140		280	284	361	Bi	57	Sn	42	Ag	1			8.59
139	139	E			349	Bi	57	Sn	43					8.59
144	144	E	291	291	3006	In	97	Ag	3					7.38
156	156	E	313	313	3000	In	100							7.31
195	201				2147	Sn	88.5	In	8	Ag	3	Cu	0.5	7.43
199	199	E			2165	Sn	91.2	Zn	8.8					7.28
200	225				340	Sn	93.5	Bi	5	Ag	1.5			7.29
209	212				2155	Sn	93.3	Ag	3.1	Bi	3.1	Cu	0.5	7.43
210	215				2156	Sn	92	Bi	4.7	Ag	3.3			7.46
210	216				2128	Sn	96.3	Ag	2.5	Cu	0.7	Sb	0.5	7.38
215	222		419	432	2010	Sn	95	In	5					7.29
217	218				2136	Sn	96.5	Ag	3	Cu	0.5			7.37
217	218				2138	Sn	95.5	Ag	3.9	Cu	0.6			7.39
217	218				2133	Sn	96	Ag	3.5	Cu	0.5			7.38
221	221	E	430	430	2005	Sn	96.5	Ag	3.5					7.37
221	240				2009	Sn	95	Ag	5					7.4
227	227	E			2112	Sn	99.3	Cu	0.7					7.31
227	300		441	572	2061	Sn	97	Cu	3					7.33
232	232	E	450	450	2000	Sn	100							7.3
232	240		450	464	2067	Sn	97	Sb	3					7.28
233	233	E			2024	Sn	65	Ag	25	Sb	10			7.81
278	278	E	532	532	10004	Au	80	Sn	20					14.52
278	290				10121	Au	79	Sn	21					14.34
280	303		536	577	10013	Au	78	Sn	22					14.18
356	356	E	673	673	10003	Au	88	Ge	12					14.67

Coining works with a wide variety of brazing and soldering alloys. It most commonly works with alloys of gold, silver, lead, tin, zinc, antimony, copper, indium, iron, molybdenum, nickel, tungsten and Kovar. It also works with special alloys, such as those that include germanium, palladium and platinum. In addition, Coining's expertise covers working with additives of gallium, silicon and phosphorus, and it will work with any new customer alloy specification, even when only limited quantities are required.

Typical Alloys

Solidus °C	Liquidus °C	E = Eutectic	Solidus °F	Liquidus °F	Alloy #	Element #1 and Wt%		Element 2 and Wt%		Element 3 and Wt%		Element 4 and Wt%		Density Gr/cc
120	120	E	248	248	3025	In	50.9	Sn	49.1					7.31
127	127	E	261	261	3026	In	74.7	Cd	25.3					7.73
134	181		273	358	1059	Sn	37.5	Pb	37.5	In	25			8.42
138	138	E	280	280	349	Bi	57	Sn	43					8.54
138	140		280	284	361	Bi	57	Sn	42	Ag	1			8.59
144	144	E	291	291	3006	In	97	Ag	3					7.38
144	163		291	325	1058	Sn	43	Pb	43	Bi	14			8.99
149	150		300	302	3002	In	80	Pb	15	Ag	5			7.85
150	168		302	334	2129	Sn	53	Pb	37	Bi	10			8.65
153	163		307	325	2021	Sn	70	Pb	18	In	12			7.79
156	156	E	313	313	3000	In	100							7.31
160	174		320	345	3008	In	70	Pb	30					8.18
174	185		345	365	3004	In	60	Pb	40					8.52
175	248		347	478	2023	Sn	65	Pb	30	Ag	5			8.31
176	189		349	372	2035	Sn	60	Pb	38	Ag	2			10.71
179	179	E	354	354	2031	Sn	62	Pb	36	Ag	2			8.42
179	232		354	450	1054	Pb	60	Sn	37	Ag	3			9.39
179	232		354	450	2036	Sn	60	Pb	37	Ag	3			8.49
179	242		354	468	2037	Sn	60	Pb	36	Ag	4			8.48
180	209		356	408	3005	In	50	Pb	50					8.89
183	183	E	361	361	2030	Sn	62	Pb	38					8.37
183	185		361	365	2044	Sn	63	Pb	37					8.4
183	188		361	370	2032	Sn	60	Pb	40					8.51
183	192		361	378	2020	Sn	70	Pb	30					8.16
183	218		361	424	2017	Sn	90	Pb	10					7.56
183	222		361	432	2012	Sn	95	Pb	5					7.42
183	238		361	460	1053	Pb	60	Sn	40					9.28
195	225		383	437	1052	Pb	60	In	40					9.29
215	222		419	432	2010	Sn	95	In	5					7.29
217	217	E	423	423	10008	Sn	90	Au	10					7.77
221	221	E	430	430	2005	Sn	96.5	Ag	3.5					7.37
221	226		430	439	2004	Sn	97	Ag	3					7.36
221	226		430	439	2007	Sn	96	Ag	4					7.38
221	227		430	441	2003	Sn	97.5	Ag	2.5					7.35
227	300		441	572	2061	Sn	97	Cu	3					7.33
230	294		446	561	1036	Pb	85	Sn	15					10.47
232	232	E	450	450	2000	Sn	100							7.3
232	240		450	464	2067	Sn	97	Sb	3					7.28
234	236		453	457	2002	Sn	99	Sb	1					7.28
240	250		464	482	2016	Sn	90	Sb	10					7.22
250	264		482	507	1042	Pb	75	In	25					9.97
251	295		484	563	1068	Pb	92.5	Sn	4	Ag	3.5			11.08
268	290		514	554	1033	Pb	88	Sn	10	Ag	2			10.73
270	280		518	536	1038	Pb	81	In	19					10.27
275	302		527	576	1027	Pb	90	Sn	10					10.74
278	278	E	532	532	10004	Au	80	Sn	20					14.52
280	285		536	545	1017	Pb	93.5	Sn	5	Ag	1.5			11.02
280	303		536	577	10013	Au	78	Sn	22					14.18
287	296		549	565	1019	Pb	92.5	Sn	5	Ag	2.5			11.01
232	232	E	450	450	2000	Sn	100							7.29
290	310		554	590	1028	Pb	90	In	5	Ag	5			10.99
292	292	E	558	558	1029	Pb	90	Sn	5	Ag	5			10.99
292	314		558	597	1010	Pb	95	In	5					11.04

See our Web site:

www.coininginc.com

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For some of Coining's most commonly used alloys

Typical Alloys

Solidus °C	Liquidus °C	E = Eutectic	Solidus °F	Liquidus °F	Alloy #	Element #1 and Wt%		Element 2 and Wt%		Element 3 and Wt%		Element 4 and Wt%		Density Gr/cc
299	303		570	577	1013	Pb	95	Ag	2.5	Sn	2.5			11.16
299	303		570	577	1066	Pb	95.5	Ag	3	Sn	1.5			11.22
300	304		572	579	1012	Pb	95	Sn	3.5	Ag	1.5			11.11
307	310		585	590	1018	Pb	92.5	In	5	Ag	2.5			11.01
304	304	E	579	579	1004	Pb	97.5	Ag	2.5					11.32
304	327		579	621	1008	Pb	96	Ag	4					11.3
305	314		581	597	1011	Pb	95	Sn	5					11.03
309	309	E	588	588	1005	Pb	97.5	Ag	1.5	Sn	1			11.26
309	310		588	590	1071	Pb	97.5	Sn	1.5	Ag	1			11.24
310	320		590	608	1007	Pb	97	Sn	3					11.15
317	322		603	612	1003	Pb	98	Sn	2					11.22
321	325		610	617	1001	Pb	99	Sn	1					11.28
322	325		612	617	1069	Pb	99	Sb	1					11.26
327	327	E	621	621	1000	Pb	100							11.34
356	356	E	673	673	10003	Au	88	Ge	12					14.67
363	363	E	685	685	10088	Au	96.85	Si	3.15					15.7
370	800		698	1472	10002	Au	98	Si	2					16.85
488	530		910	986	10027	Au	82	In	18					14.9
600	720		1112	1328	20211	Ag	60	Cu	30	Sn	10			9.57
607	618		1125	1144	20221	Ag	45	Cd	24	Zn	16	Cu	15	9.1
620	650		1148	1202	20233	Ag	56	Cu	22	Zn	17	Sn	5	9.2
625	635		1157	1175	20212	Ag	50	Cd	18	Zn	16.5	Cu	15.5	9.18
630	705		1166	1301	20205	Ag	61.5	Cu	24	In	14.5			9.5
643	802		1189	1476	20206	Ag	15	Cu	80	P	5			7.62
646	677		1195	1251	20232	Ag	45	Cu	27	Zn	25	Sn	3	8.91
665	682		1229	1260	20274	Ag	60	Cu	25	Zn	15			9.42
671	718		1240	1324	20256	Ag	65	Cu	20	Zn	15			9.49
688	774		1270	1425	20219	Ag	50	Cu	34	Zn	16			9.25
714	905		1317	1661	40489	Cu	95	P	5					7.5
770	830		1418	1526	20305	Cu	50	Zn	33	Ag	17			8.46
775	785		1427	1445	20213	Ag	71.5	Cu	28	Ni	0.5			10
779	779	E	1434	1434	20204	Ag	72	Cu	28					10.01
779	815		1434	1499	20234	Ag	80	Cu	20					10.14
779	873		1434	1603	20203	Ag	90	Cu	10					10.31
780	795		1436	1463	20249	Ag	71.15	Cu	28.1	Ni	0.75			9.99
780	824		1436	1515	20263	Ag	68.5	Cu	26.8	Pd	4.7			10.09
800	858		1472	1576	20271	Ag	58.5	Cu	31.5	Pd	10			10.08
812	893		1494	1639	20235	Ag	92.8	Cu	7.2					10.36
835	845		1535	1553	10042	Au	60	Ag	20	Cu	20			13.79
850	900		1562	1652	20240	Ag	65	Cu	20	Pd	15			10.33
900	950		1652	1742	20208	Ag	54	Pd	24	Cu	22			10.41
905	920		1661	1688	10009	Au	65	Cu	35					13.76
910	910		1670	1670	10041	Au	80	Cu	20					15.67
955	955		1751	1751	10018	Au	82	Ni	18					15.95
955	970		1751	1778	10007	Au	50	Cu	50					12.22
961	961	E	1762	1762	20200	Ag	100							10.49
990	1010		1814	1850	10011	Cu	65	Au	35					11.01
1030	1050		1886	1922	10033	Cu	75	Au	25					10.35
1040	1115		1904	2039	10098	Au	69	Ag	25	Pt	6			16.04
1063	1063	E	1945	1945	10001	Au	100							19.3
1063	1063		1945	1945	10016	Au	99.98	P	0.02					19.29
1063	1063		1945	1945	10023	Au	99.94	P	0.06					19.21
1083	1083	E	1981	1981	40400	Cu	100							8.96

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Coining, a business unit of AMETEK Specialty Metal Products, manufactures solder preforms and brazing preforms, including popular gold tin preforms, that are used for joining applications in microelectronics packaging and assembly. We are the largest solder preform manufacturer in the world, as measured by both sales volume and units shipped. Coining has the most extensive library of solder preform dies in the industry, with about 15,000 different tools on the shelf, ready to make your parts.

Coining also is a leading producer of gold, aluminum and copper bonding wire as well as jumper chips, bonding pads, tabs, heat sinks, lead frames, solder spheres and cover assemblies for the microelectronics industry. Our small Kovar, molybdenum, copper, tungsten and clad stamped parts, often packaged in tape and reel configuration or in waffle packs, are used by many customers throughout the world.

AMETEK Specialty Metal Products (AMETEK SMP) is a pioneer in the development of metal strip products with more than 40 years of experience and numerous patents in wrought powder metallurgy. AMETEK's proprietary alloying techniques produce metal strip with enhanced mechanical and metallurgical properties.

AMETEK SMP also specializes in shaped wire, fully dense components, thermal management products, metal matrix components, metal powders, metal clad products and precision strip and foil.

AMETEK SMP is a division of AMETEK, Inc., a leading global manufacturer of electronic instruments and electromechanical devices. Visit AMETEK, Inc. on the Web at www.ametek.com.

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