


# High-Purity Alloys with Custom Fabrications

**LucasMilhaupt**<sup>®</sup>  
A Handy & Harman Company  
*Global Brazing Solutions*<sup>®</sup>

The image features a variety of precision-machined metal alloy parts. In the foreground, a large, silver-colored ring with several rectangular cutouts is the most prominent. Behind it and to the right, there are several smaller, dark-colored rings and gears of different sizes and designs. The parts are scattered on a dark, highly reflective surface that creates clear reflections of the objects. The background is a soft, out-of-focus gradient of light to dark gray, which emphasizes the metallic textures and geometric forms of the components.

Choose high-purity alloy products  
accompanied by custom fabrication services,  
technical expertise and support.

# Why Lucas-Milhaupt?

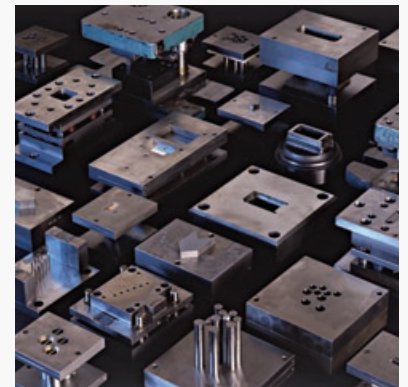
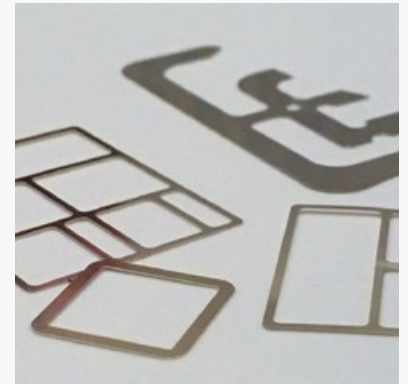
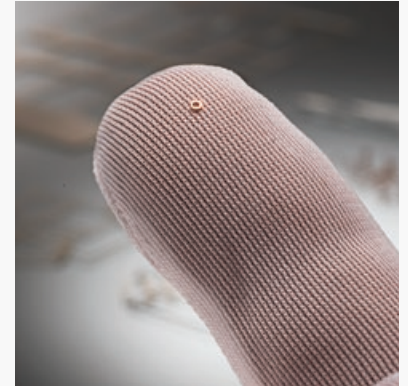
## RAPID PROTOTYPING | IN-HOUSE DESIGN | TOOL & DIE CAPABILITY


Lucas-Milhaupt is a global supplier of brazing and soldering filler materials offering a complete selection of metal joining products across multiple industries. What makes Lucas-Milhaupt unique is our comprehensive custom fabricating services, superior customer service and technical expertise.

By choosing us as your premier supplier of high-purity alloys, you will have access to the best technical support in the industry. Our knowledgeable highly trained staff can assist with any special needs and specifications. Our alloy production and custom fabrication processes are the most versatile in the world. We strive to meet ANY size or shape requirements that you may have, from the smallest to the largest preform rings or stampings.

## LUCAS-MILHAUPT CONTROLLED PROCESSES FOR HIGH-PURITY ALLOYS MEET AND EXCEED STRINGENT INDUSTRY REQUIREMENTS:

- Technical Support and Customer Service staff works closely with you to determine your requirements.
- Alloy melting and casting performed in a controlled environment to assure alloy purity and cleanliness from oxides, high vapor pressure elements and other contaminants.
- Thorough verification of alloy chemistry analysis completed to detect impurities ensuring reliable performance for your critical applications
- Further processing includes rolling and slitting for strip products or wire drawing. (*Annealing is done during this stage as needed*).
- Each item fabricated into its final form, whether it is bulk, preform rings, or stampings and packed for shipment.
- Cleanliness is maintained to prevent impurities during alloy processing.





Purer alloys mean better connections,  
better assemblies, longer life,  
and predictable product performance.

# Broad Product Line

**ANY SIZE | ANY SHAPE | ANY FORM**

Our Premabraz® brazing materials were developed to satisfy the demands for high-purity materials for reliable subassemblies. Purer alloys mean better connections, better assemblies, longer life, and predictable product performance.

We have perfected the processes to manufacture Premabraz® alloys in gold, silver and palladium with trace elements less than 1 part per million. We produce the widest array of high-purity alloy preforms, powder and paste products.

**OUR PRODUCTION CAPABILITIES INCLUDE:**



WIRE DRAWING



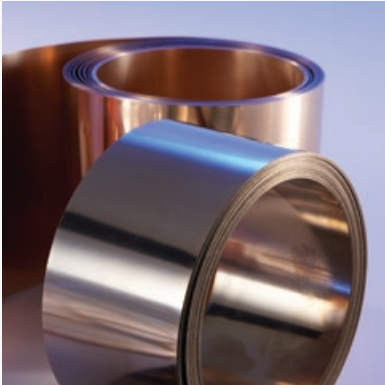
STRIP ROLLING/  
SLITTING WIDTHS



BLANKING/  
RING FORMING



POWDER  
ATOMIZATION





Choosing Lucas-Milhaupt means you are  
selecting a partner who is committed  
to your product performance

# Service Worldwide

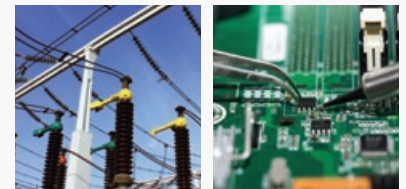
## WE ARE THE EXPERTS IN BRAZING

Our quality systems are ISO 9001: 2008 and ISO 14001 certified, and our employees have advanced training in six sigma and lean manufacturing tools.

As a technical resource for hundreds of companies worldwide, we provide engineering resources for product design, process development, training, and problem resolution. Our proven track record with customers has given us a reputation for reliability and responsiveness that we work hard to maintain with every brazing and soldering product.

Assemblies found in applications ranging from aerospace to telecommunications equipment depend on brazed connections that must perform to expectations, maintain vacuum seals, cycle through heat and load, and resist the corrosion that leads to failure. Product design, process development and control, and supplier performance must come together to ensure optimum product life cycle.

Product performance comes down to the tiniest of details. Those details include joints and connections that create the assemblies—the alloys that hold it all together. When it is time to choose the brazing and soldering consumables to match the performance demands of today's assemblies, companies worldwide turn to Lucas-Milhaupt for metal joining products, custom fabrication services, and technical support they trust.



# High Purity Chart

Product Family	Product Name	AWS Spec	Solidus		Liquidus		Alloy Composition					Comments
			°F	°C	°F	°C	Ag	Au	Pt	Pd	Other	
Pure Metals	Silver		1761	961	1761	961	99.9					Available in several grades including (99.9, 99.93, 99.5, 99.99)
	Gold		1947	1064	1947	1064		99.9				Very ductile – wets most metals. Several grades available.
	Platinum		3216	1767	3216	1767			99.9			Very high temperature – several grades available
	Palladium		2826	1552	2826	1552				99.9		High temperature brazing of refractory metals. Several grades available.

Product Family	Product Name	AWS Spec	Solidus		Liquidus		Composition					Comments
			°F	°C	°F	°C	Ag	Cu	Sn	Ni	Other	
Silvaloy® Alloys	Silvaloy® 285		1435	780	1555	846	85	15				For joining nonferrous electric components in vacuum.
	Silvaloy 503	BVAg-6b	1435	779	1600	870	50	50				For electronic components where Cd and Zn are not desired.
	Silvaloy 604	BVAg-18	1115	602	1325	718	60	30	10			For vacuum tube seals – joins ferrous and nonferrous alloys.
	Silvaloy 711	-	1435	780	1465	795	71.15	28.1		0.75		For atmosphere brazing of Nickel & ferrous based alloys.
	Silvaloy 716	BVAg-8b	1435	780	1465	795	71.5	28		0.5		For atmosphere brazing of Nickel & ferrous based alloys.
	Silvaloy 721	BVAg-8	1435	780	1435	780	72	28				For joining nonferrous electric components in vacuum.
	Silvaloy 999	BVAg-0	1761	961	1761	961	99.95					A HPA alloy for brazing ceramics to be used in semiconductors.

Product Family	Product Name	AWS Spec	Solidus		Liquidus		Nominal Alloy Composition					Comments	
			°F	°C	°F	°C	Ag	Au	Cu	Pd	Other		
Premabraz® Alloys	Premabraz 051	-	1625	885	1643	895	5	75	20			Narrow melting range – good for step brazing.	
	Premabraz 110	-	1945	1063	1972	1078		10	90			Exhibits good wetting characteristics on metallized ceramics	
	Premabraz 127	BAu-3	1785	974	1885	1029		35	62		3 Ni	For Nickel, Mo, SS, Kovar®, and Mo-Mn metalized ceramics.	
	Premabraz 131	BVAu-4	1740	949	1740	949		82			18 Ni	For vacuum applications – joins SS, Inconel, Kovar®, Tungsten, etc.	
	Premabraz 140	-	1796	980	1832	1000		40	60			For Copper, Nickel, Kovar®, and Mo-Mn metalized ceramics.	
	Premabraz 180	BVPd-1	2245	1230	2255	1235					65	35 Co	Low penetration of substrates.
	Premabraz 265	-	1562	850	1562	900	65		20	15			For SS, Cu, Kovar®, and non Mo-Mn metalized ceramics.
	Premabraz 300	BAu-5	2075	1135	2130	1166		30			34	36 Ni	Good oxidation resistance – low vapor pressure
	Premabraz 399	BAu-1	1815	991	1860	1016		37.5	62.5				For Copper, Nickel, Kovar®, and Mo-Mn metalized ceramics.
	Premabraz 402	BVAu-10	1751	955	1778	970		50	50				For Copper, Nickel, Kovar®, and Mo-Mn metalized ceramics.
	Premabraz 403	BVAu-2	1635	891	1635	891		80	20				For Copper, Nickel, Kovar®, and Mo-Mn metalized ceramics.
	Premabraz 407	BVAu-9	1814	990	1850	1010		35	65				For Copper, Nickel, Kovar®, and Mo-Mn metalized ceramics.
	Premabraz 408	-	1535	835	1553	845	20	60	20				Narrow melting range, useful in step brazing.
	Premabraz 409	-	1670	910	1697	925		81.5	16.5			2 Ni	For Cu, Ni. Mo-Mn – remains ductile. Low vapor pressure.
	Premabraz 500	BVAu-7	2016	1102	2050	1121		50			25	25 Ni	High strength and good oxidation resistance, for joining Super Alloys.
	Premabraz 540	BVAg-32	1652	900	1740	950	54		21	25			Similar to Au-Ni – lower cost and density. Doesn't embrittle Kovar®.
	Premabraz 550	-	1520	827	1600	871	55		30	10	5	Ni	For corrosion resistant joints – Brazing stainless steel
	Premabraz 580	BVAg-31	1515	824	1565	852	58		32	10			For Nickel, Copper, Kovar®, and Mo-Mn. Good for vacuum tight joints.
	Premabraz 616	BVAg-29	1155	624	1305	707	61.5		24		14.5	In	For joining ferrous and nonferrous metals in moderate temp vacuum.
	Premabraz 631	-	1265	685	1346	730	63		27		10	In	Low melting, low vapor pressure. Joins ferrous and nonferrous metals.
	Premabraz 680	BVAg-30	1485	807	1490	810	68		27	5			For Kovar®, and Mo-Mn seals.
	Premabraz 700	BAu-6	1845	1007	1915	1046		70			8	22 Ni	For Super Alloys and stainless – high ductility and strength.
Premabraz 800	-	536	280	536	280		80			20	Sn	Low ductility alloy – low vapor pressure.	
Premabraz 880	-	673	356	673	356		88				12 Ge	Low ductility alloy.	
Premabraz 901	-	1835	1002	1950	1065	90				10		Recommended for Ni, stainless steel, Mo, W and fast cycles on Ti.	
Premabraz 920	BVAu-8	2190	1200	2265	1240		92			8		Oxidation resistant filler metal for joining super alloys, Mo, Ta, etc.	

Product Family	Product Name	AWS Spec	Solidus		Liquidus		Composition					Comments
			°F	°C	°F	°C	Ag	Au	Cu	Ti	Other	
Active Metal Brazing	Lucanex											Brazing Paste Blended with Ti for active metal brazing of ceramics.
	Titanium Ink											For spraying, screening for brazing to non-metalized ceramics
	LM 69-241		1148	620	1328	720	60		24	2	14 In	Exhibits good wetting characteristics of ceramic surfaces
	LM 69-270		1435	780	1472	800	70		28	2		Exhibits good wetting characteristics of ceramic surfaces
	LM 69-271		1435	780	1472	800	71		27.5	1.5		Exhibits good wetting characteristics of ceramic surfaces
	LM 69-272		1435	780	1490	810	64		34.2	1.8		Exhibits good wetting characteristics of ceramic surfaces
	LM 69-273		1435	780	1481	805	70.5		26.5	3		Exhibits good wetting characteristics of ceramic surfaces

Most alloys available in strip, wire, powder, paste, and preforms. Other alloy chemistries available upon request.

Kovar® is a registered trademark of CRS Holdings

## LucasMilhaupt®

A Handy & Harman Company

### Global Brazing Solutions®

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