



VACUUM GRADE BRAZING ALLOYS



PFARR

WIR BRINGEN LÖTE IN FORM
GETTING SOLDER INTO SHAPE



» VACUUM GRADE BRAZING ALLOYS

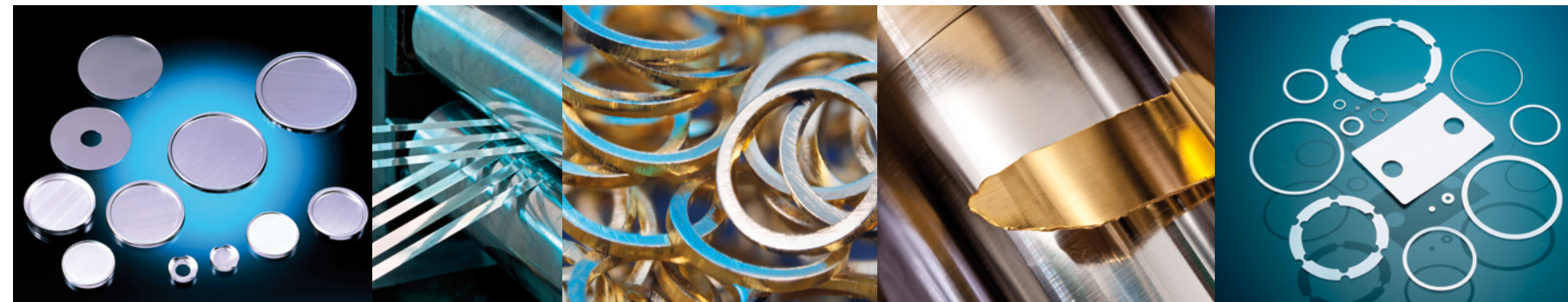
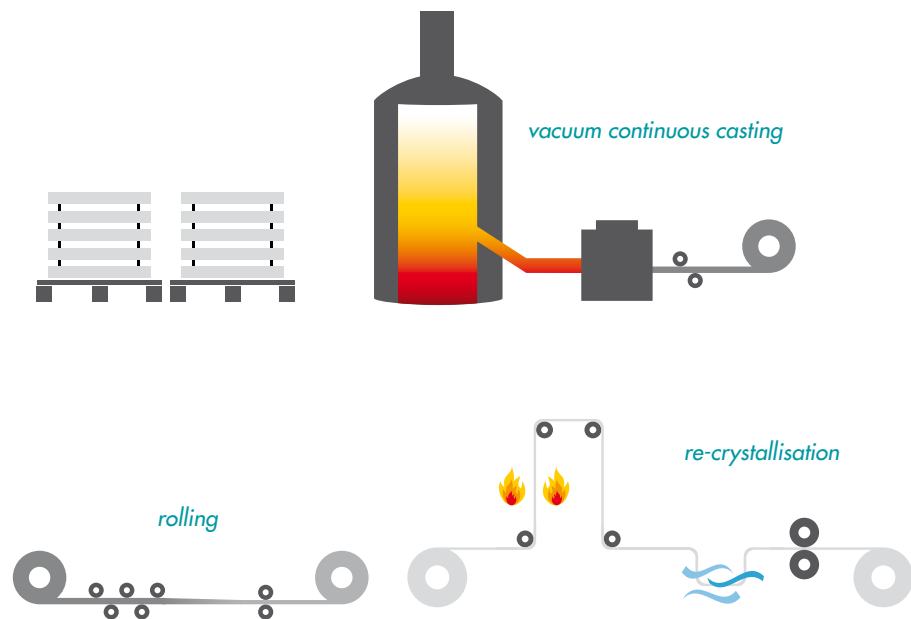
MANUFACTURED FROM HIGH PURITY RAW METALS

Today's high tech applications, manufactured and assembled by our customers, require customised, engineered materials; components which have to meet the highest levels of quality and purity. They must guarantee functions and characteristics, even under extreme conditions, for service lives in excess of thirty years.

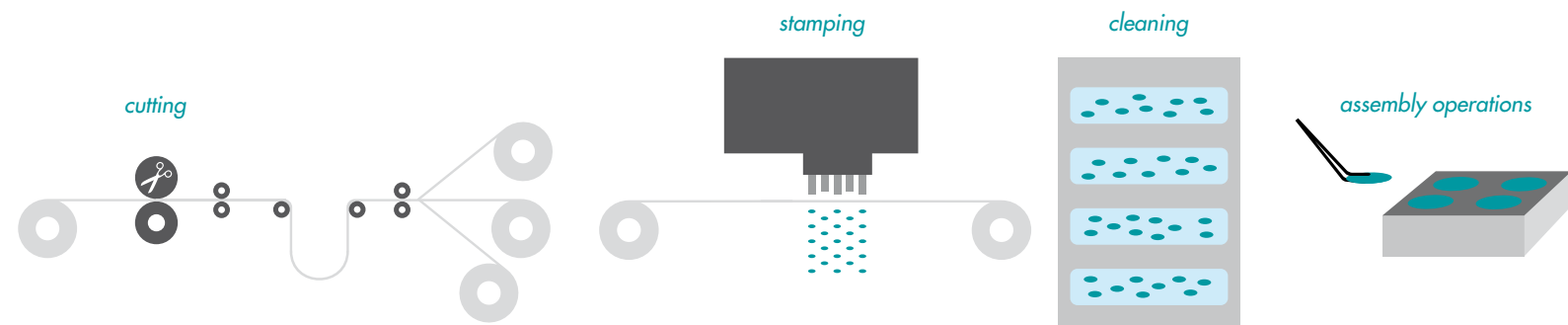
To achieve 100 % performance, the specifications for materials used in joining parts have to be considered from the very beginning of the production process. Semi-fabricated materials, ribbons, preforms and wires manufactured by PFARR as vacuum grade brazing materials provide function and performance.

VACUUM SEALED FOR LIFE.

» MANUFACTURING PROCESSES



THE BENEFITS ARE YOURS!



VARIETY

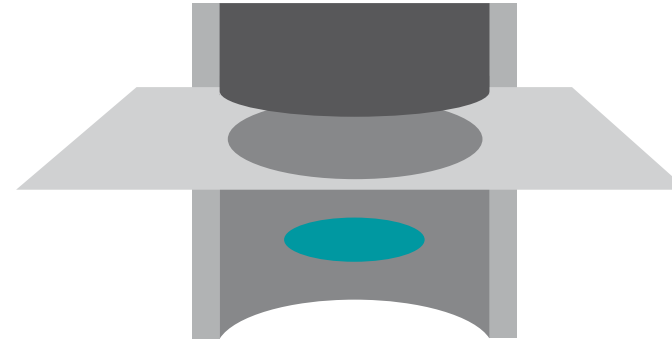
There are two different methods: One-step punching and Multi-step punching. Both technologies can be used.

Advantages and disadvantages have to be analysed before the tooling technology used can be decided.

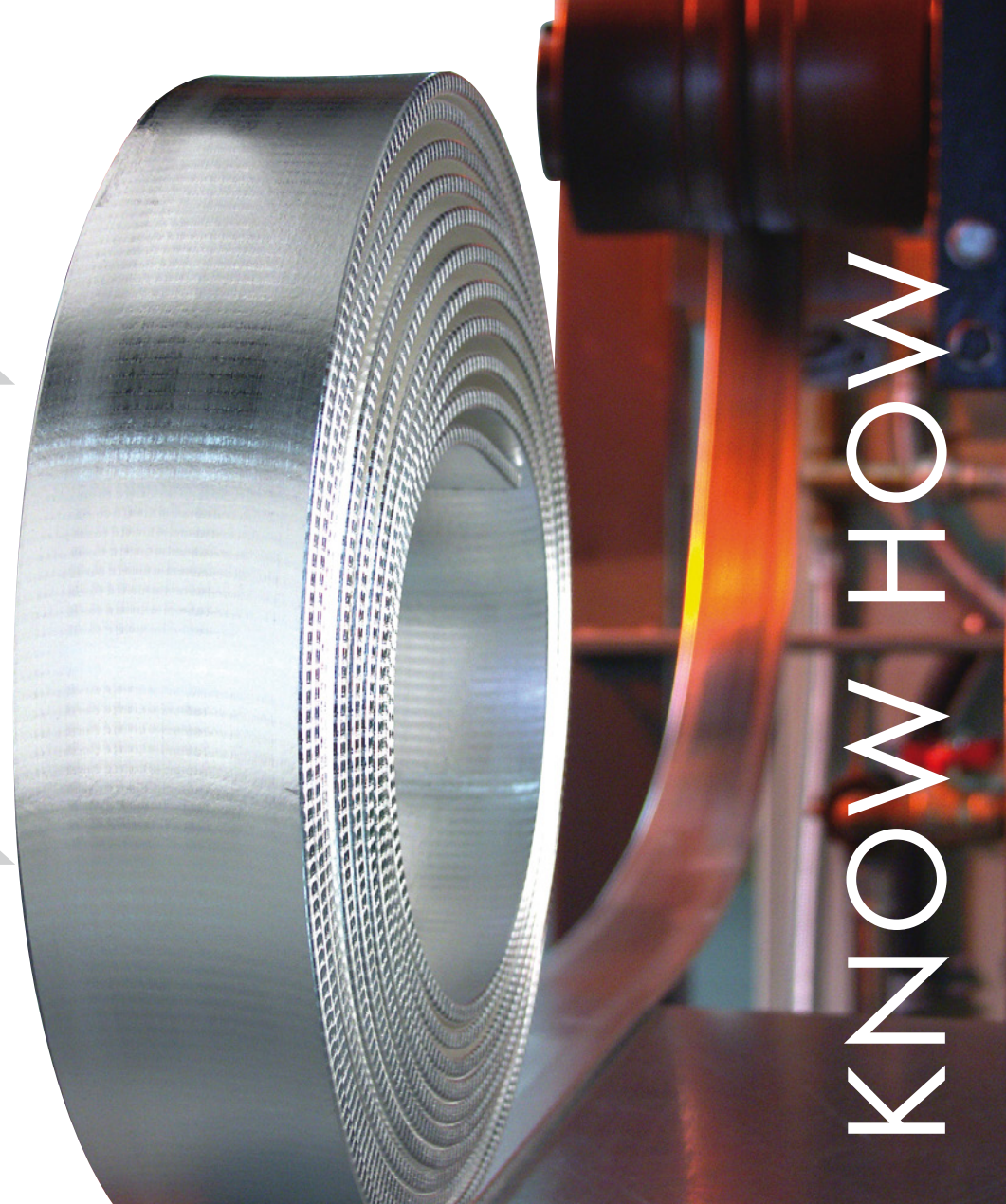
» ADVICE PROVIDED BY THE EXPERTISE OF PFARR



one-step-punching



multi-step-punching





LIST OF ALLOYS

alloy composition	melting range [°C]	density [g/m³]
Ag Cu(27) In(13)	605 - 710	9.7
Ag Cu(42) Ni(2)	770 - 895	9.74
Ag Cu(28)	780	10.0
Ag Cu(28) Ni(0.7)	784 - 813	10.0
Ag Cu(28) Ge(2) Co(0.3)	711 - 798	9.8
Ag Cu(26.6) Pd(5)	798 - 824	10.1
Ag Cu(31.5) Pd(10)	812 - 872	10.1
Ag Cu(20) Pd(15)	846 - 905	10.3
Ag Cu(21) Pd(25)	901 - 950	10.5
Ag	961	10.5
Ag Pd(5)	970 - 1010	10.6
Cu Pd(18)	1080 - 1090	9.4

COMPOSITION TOLERANCES

alloy	tolerances					
	Ag	Cu	Pd	Ge	Co	Ni
Ag Cu(28)	± 1 %	± 1 %				
Ag Cu(28) Ni(0,7)	± 1 %	± 1 %				± 0.25 %
Ag Cu(28) Ge(2) Co(0,3)	± 1 %	± 1 %		± 0.2 %	± 0.1 %	
Ag Cu(42) Ni(2)	± 1 %	± 1 %				± 0.25 %
Ag Cu(26,6) Pd(5)	± 0.5 %	± 0.5 %	± 0.5 %			
Ag Cu(31,5) Pd(10)	± 0.5 %	± 0.5 %	± 0.5 %			
Ag Cu(20) Pd(15)	± 0.5 %	± 0.5 %	± 0.5 %			
Ag Cu(21) Pd(25)	± 0.5 %	± 0.5 %	± 0.5 %			

PRECISION

PROCESS CAPABILITY

ribbons/foils				
	min		max	
	mm	inch	mm	inch
thickness	0.015	0.0006	5.0	0.1969
width	0.8	0.0315	125.0	4.9213

washers			
inner diameter		outer diameter	
mm	inch	mm	inch
≥ 0.45	≥ 0.0177	0.75–120.0	0.0295–4.7244

wire					
diameter				tolerances	
min		max			
mm	inch	mm	inch	mm	inch
0.1	0.0039	6.0	0.2362	± 0.01	0.0004

wire rings			
wire diameter		inner diameter	
mm	inch	mm	inch
0.4–3.0	0.0158–0.1181	1.1–178.0	0.433–7.0866

All indicated values are dependent on the specific material properties. Technical material support is available on request.

ALLOY PURITY

minimum brazing alloy purity	≥ 99.99 % (4N)
O ₂ , C	less than 10 ppm.
Zn, Cd	less than 10 ppm.
P	less than 20 ppm.

FLEXIBILITY

PRODUCTS

PRECISION

» THE BRAZING PROCESS AT TEMPERATURES ABOVE 450 °C



Vacuum brazing is a materials joining technique that offers significant advantages over other methods: it is extremely clean and creates superior, flux-free braze joints of high integrity and strength. The process must be performed inside a vacuum chamber.

Temperature uniformity is maintained on the workpiece when heating in a vacuum, greatly reducing residual stresses due to slow heating and cooling cycles.

This, in turn, can significantly improve the thermal and mechanical properties of the material, thus providing unique heat treatment capabilities. One example is the potential of simultaneously heat-treating or age-hardening the workpiece while performing a metal-joining operation; all in a single furnace cycle.

Vacuum brazing is often conducted in a furnace; this means that several joints can be made at once because the whole workpiece reaches the brazing temperature. The heat is transferred using radiation, as many other methods cannot be used in a vacuum.

(www.wikipedia.com)



VACUUM INTERRUPTERS

VACUUM CAPACITORS

SURGE ARRESTERS AND
TRANSIENT VOLTAGE SUPPRESSORS

MAGNETRONS

MEDICAL X-RAY TUBES

THYRATRONS

HIGH VOLTAGE RECTIFIERS

HYBRID MODULES

X-RAY TUBES FOR SPACE AND DEFENCE



APPLICATIONS

» THE DESIGN AND FUNCTION OF VACUUM INTERRUPTERS

Vacuum interrupters are medium voltage switches used in electrical distribution systems. If the voltages concerned were interrupted or re-joined in air, an electrical arc would develop delaying the switching process and often causing

damage. Maintaining a vacuum inside the tube containing the switch contacts eliminates oxidation/burning when arcing, and enables hazard-free switching.





TECHNICAL SUPPORT



» OPTIMUM CONTACT: THE BASIS FOR THE HIGHEST QUALITY



In co-operation with your engineers, PFARR provides its know-how and state-of-the-art equipment to analyse and optimise materials and processes.

With signed agreements in place between PFARR and its partners, third parties such as technical institutes and laboratories can be involved as and when necessary.

YOU CAN PROFIT FROM THIS!



OUR VISION AND MISSION

As a global player and competent partner, PFARR manufactures and supplies technical materials with the quality level of vacuum grade brazing materials (i.e. Silver, Silver/Copper-based alloys) for your vacuum grade applications.

We provide technical support to optimise materials and existing processes.

PFARR also offers the development of new brazing materials in co-operation with your development and engineering staff.

YOU CAN COUNT ON US!

» VACUUM SEALED
IN YOUR APPLICATION
FOR LIFE





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