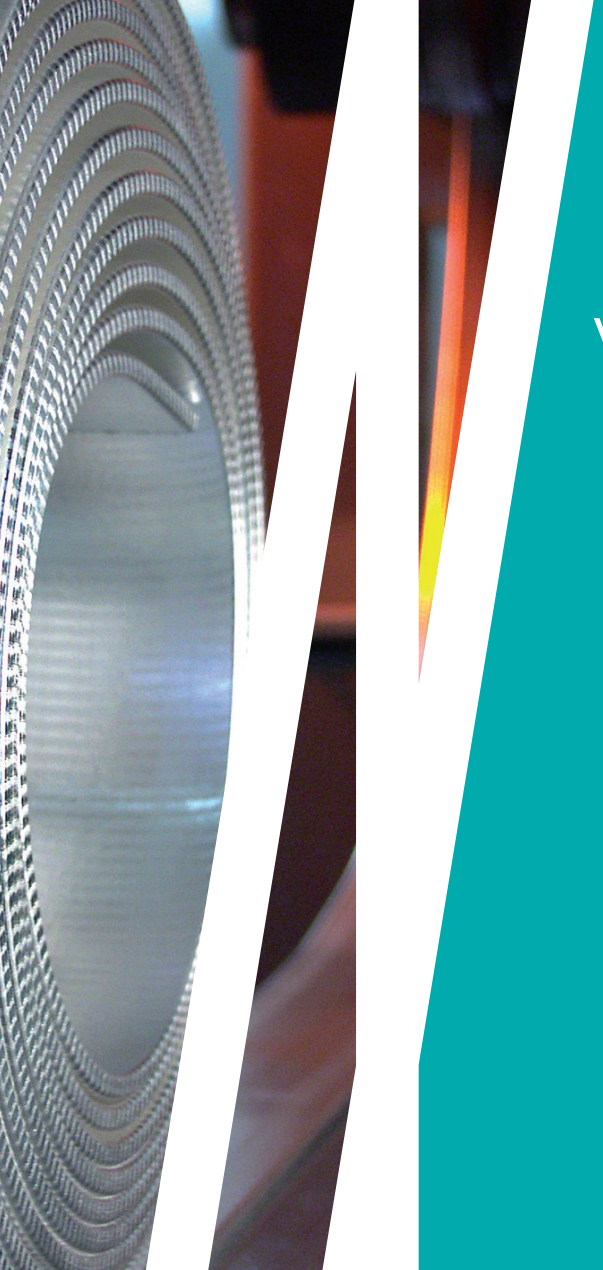


VACUUM GRADE BRAZING ALLOYS

PFARR

WIR BRINGEN LOTE IN FORM

GETTING SOLDER INTO SHAPE

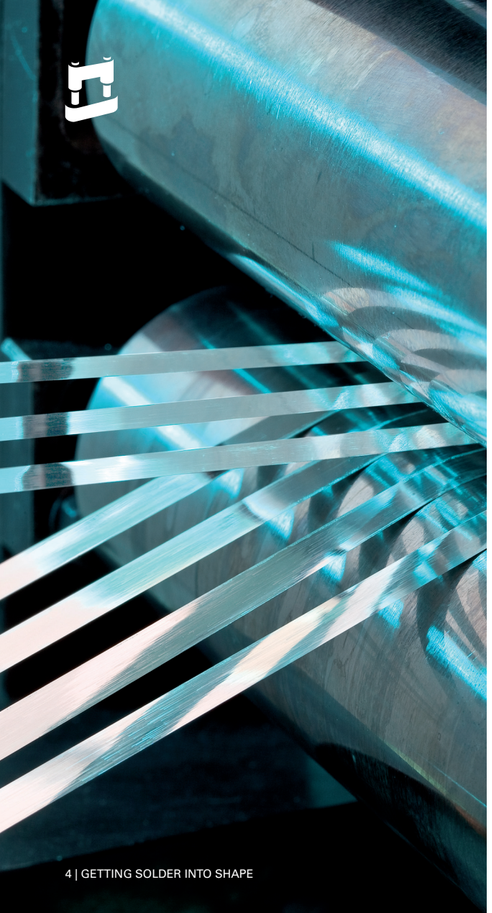
VACUUM GRADE BRAZING ALLOYS

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.

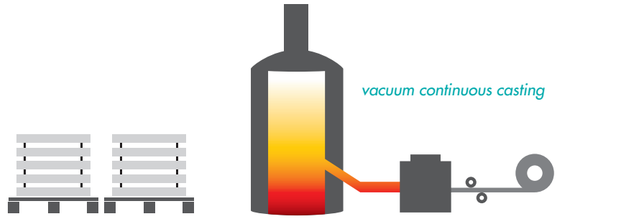
MANUFACTURED FROM HIGH PURITY RAW METALS

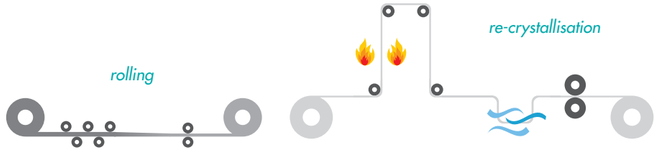
To achieve 100 % performance, the specifications for materials used in joining parts have to be considered from the very beginning of the production process. Semi-fabricated materials, ribbons, preforms and wires manufactured by PFARR as vacuum grade brazing materials provide function and performance.

VACUUM SEALED FOR LIFE.

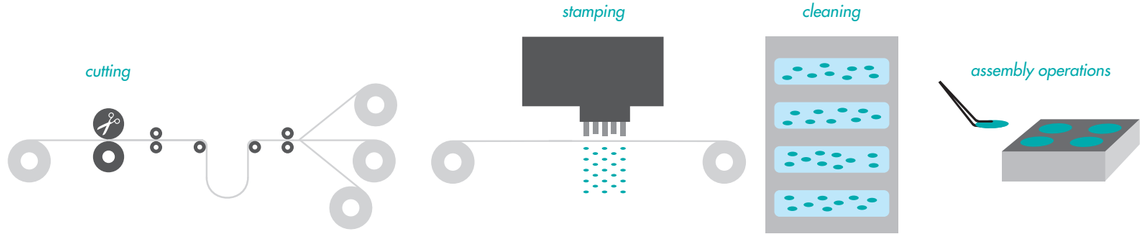


MANUFACTURING PROCESSES





THE BENEFITS ARE YOURS!

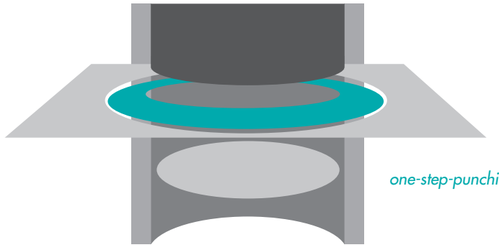


VARIETY

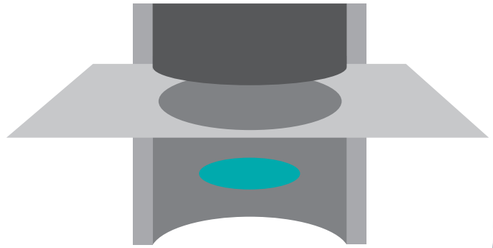
There are two different methodes: One-step punching and Multi-step punching. Both technologies can be used.

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

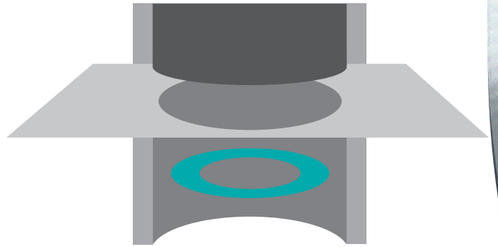
ADVICE PROVIDED BY THE EXPERTISE OF PFARR

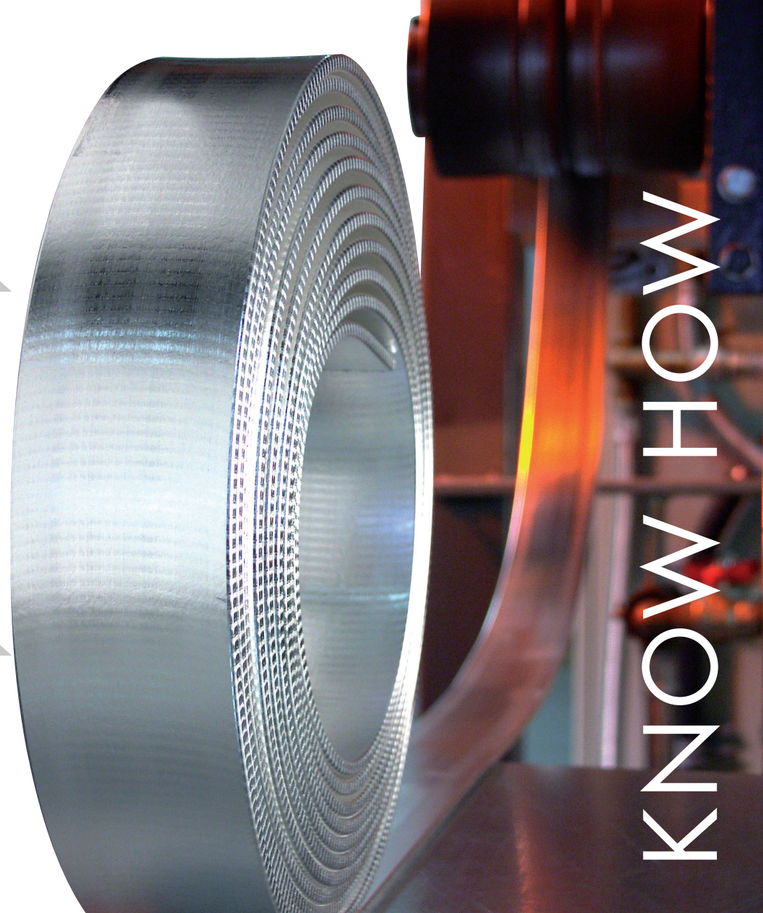


one-step-punching



multi-step-punching



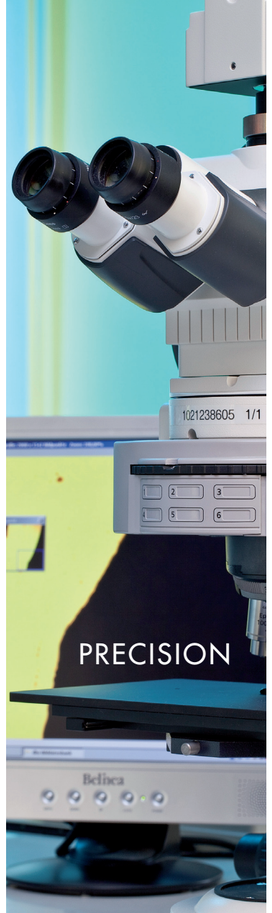


LIST OF ALLOYS

alloy composition	melting range [°C]	working temperature [°C]	density [g/m³]	coefficient of thermal expansion [x 10-6K-1]	thermal conductivity [W/mK]	electrical conductivity [x 10-6W-1m-1]	young's modulus [GPa]	tensile strength [MPa]
Ag Cu(27) In(13)	605–710	720	9.7	33.0	–	10	85	400–500
Ag Cu(42) Ni(2)	771–893	900	9.74	17.9	236	33	120	350–460
Ag Cu(28)	780	780–820	10.0	17.8	352	46	100	250–360
Ag Cu(28) Ni(0.7)	780–795	795	10.0	17.8	224	29	110	330
Ag Cu(28) Ge(2) Co(0.3)	779	810	9.8	17.6	200	30	110	250–360
Ag Cu(26.6) Pd(5)	807–810	815	10.1	22.0	785	26	120	370–410
Ag Cu(31.5) Pd(10)	824–852	860	10.1	17.5	150	19	140	500–540
Ag Cu(20) Pd(15)	850–900	905	10.3	22.0	100	15	140	500–550
Ag Cu(21) Pd(25)	901–950	955	10.5	17.5	80	8	140	540–580
Ag	961	960	10.5	19.5	429	63	81	200
Ag Pd(5)	970–1010	1015	10.6	22.0	210	25	40	180–220
Cu Pd(18)	1080–1090	1095	9.4	18.9	100	9.1	135	380–420

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 %		± 0.25 %	± 0.1 %	
Ag Cu(42) Ni(2)	± 1 %	± 1 %				± 0.25 %
Ag Cu(26,6) Pd(5)	± 1 %	± 1 %	± 0.5 %			
Ag Cu(31,5) Pd(10)	± 1 %	± 1 %	± 0.5 %			
Ag Cu(20) Pd(15)	± 1 %	± 1 %	± 0.5 %			
Au Cu(21) Pd(25)	± 1 %	± 1 %	± 0.5 %			



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.

PRODUCTS

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

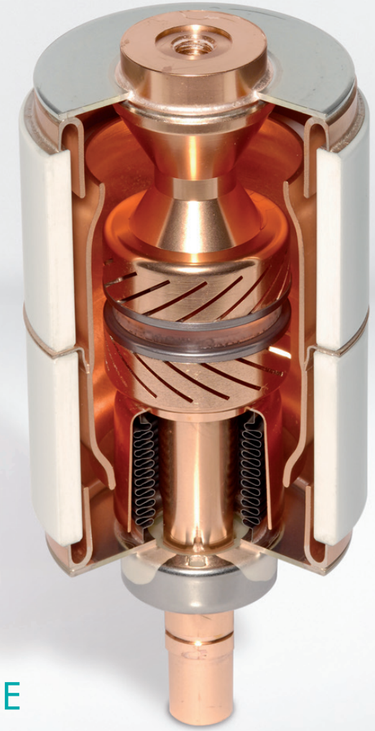
MEDICAL X-RAY TUBES

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

Certificate of Registration

QUALITY MANAGEMENT SYSTEM – DIN EN ISO 9001: 2008

This is to certify that

Pfarr Stanztechnik GmbH
Am kleinen Sand 1
36419 Buttlar
Germany

PFARR
WIR BRINGEN LOTE IN FORM
GETTING SOLDER INTO SHAPE

Holds Certificate No: **FS 529988/ 2751D**

and operates a Quality Management System which complies with the requirements of **DIN EN ISO 9001:2008** *for the following scope:*

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For and on behalf of BSI:

Managing Director, BSI Management Systems (Germany)

Originally registered: **14.12.1994** Latest issue: **15.02.2011** Expiry date: **26.02.2014**

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36419 Buttlar
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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/OUR 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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