

In-Depth Know-How

BRAZING SOLUTIONS FOR THE TOOLING INDUSTRY



IN-DEPTH KNOW-HOW

As a leading brand of soldering and brazing consumables, Fontargen Brazing offers proven solutions based on 50 years of industrial experience, tried and tested processes and methods. This In-Depth Know-How has made Fontargen Brazing an internationally preferred partner for every soldering and brazing task.

Europe is the focus market for brazing. As a competent partner for Brazing applications Fontargen Brazing serves customers in the tooling Industry. The industry trends are taken into account in product selection and product development:

- » pastes for brazing diamond and tungsten carbide machine tools and cutting tools
- » low silver brazing alloys
- » dispensable fluxes
- » brazing foils

Some company's under the roof of voestalpine produce strips, steel, bimetal for tooling industry such as:

- » voestalpine persicion strip - bimetal, cold rolled precision strip for bad saws, circular saw blades
- » Böhler Uddeholm – high speed-steel, tool steel

Together we offer full range solutions in joining technology's for our customers.



TAKE ADVANTAGE OF TECHNICALLY PROVEN AND CUSTOMIZED PRODUCTS

Applications

Fontargen Brazing supplies products for brazing diamonds or tungsten carbides to:

- » Drill tools for mining
- » Jig saws
- » Milling cutters
- » Cutting blades
- » Gang saw blades
- » Agriculture tools

Product solutions

- » Bare and coated silver rods
- » Brazing foils
- » Fluxes brush able and dispensable
- » Brazing pastes
- » Brazing wire
- » Stamped foil parts
- » Brazing filler metal preforms

Services

Fontargen Brazing provides additional value by offering:

- » Process optimization with the customer
- » Support in solving brazing problems
- » Training courses for the staff
- » Expertise in brazing techniques
- » Intensive customer support by our competent internal and external staff

Important benefits for customers

- » Solution provider
- » Global distribution and sales network
- » Broad product range
- » Fulfilling special demands
- » Engineering support
- » ISO 9001 / 14001 Approvals
- » AEO Standard
- » Just in time deliveries in all packing units
- » Financial performance

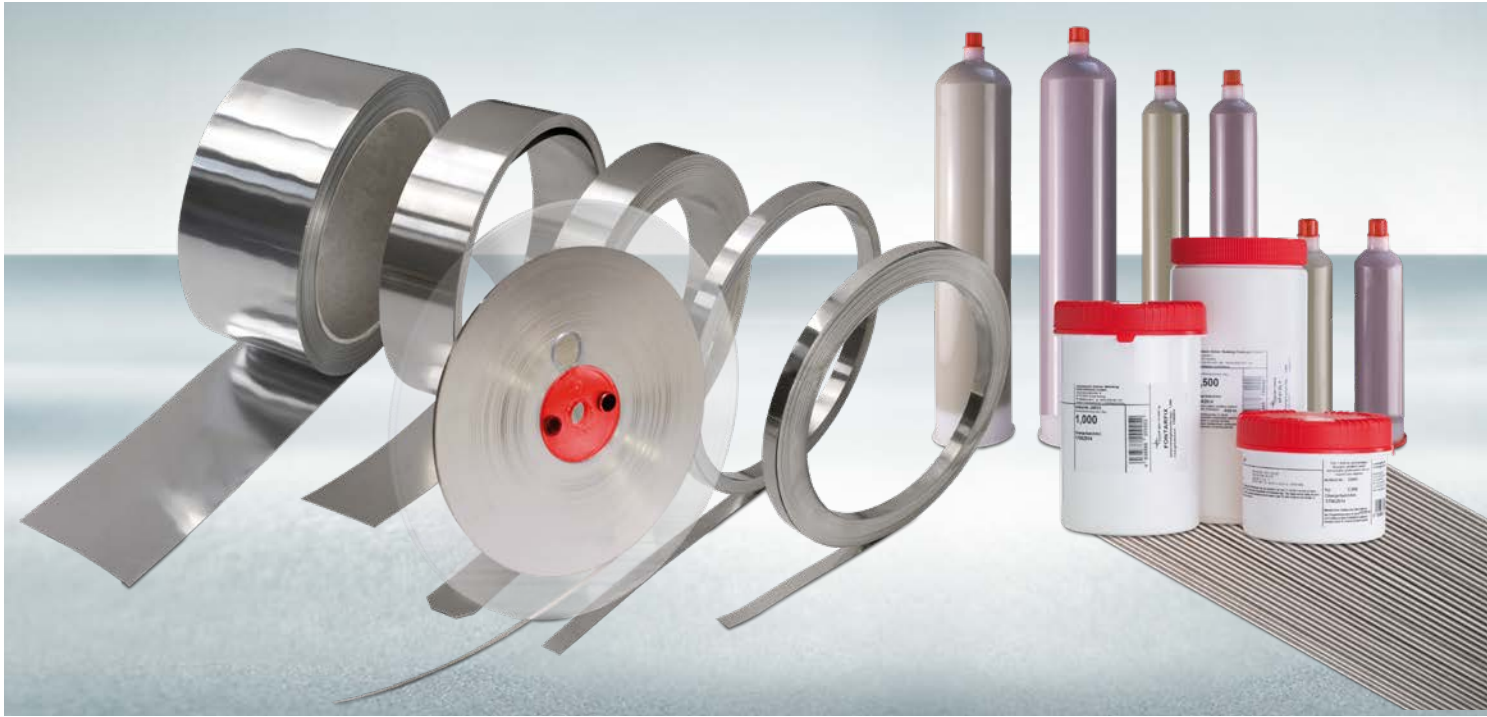


JOIN A STRONG PARTNERSHIP

Fontargen Brazing gets involved in numerous R&D projects worldwide as well as in partnerships with companies in the tooling industry. Fontargen Brazing offers the essential technical support to develop a technical process optimization in collaboration with the customer. We provide our knowledge in the selection of the perfect brazing filler metal and support brazing specialists with the perfect application.

Characteristics of brazing filler metals and fields of application

Fontargen	Comments	Typical applications
A 101	for ductile joints and high tensile strength	Brazing tungsten carbides and high-speed steel; hardening after brazing possible, auger bits; bits for road mills
A 200 L	molten filler low viscosity, long flow path, narrow gap necessary	socket drills, tungsten carbide grinding wheel
A 202-2 L	very good gap filling and wettability on tungsten carbides, applicable for vacuum furnace brazing	carbide tipped drills, brazing and heat treatment in one batch possible
A 205	good wetting at tungsten carbides, high strength in combination with good ductility	carbide tipped drills, coal mining drills; cutter
A 206	good gap filling, heat resisting brazed joints because of Co-content	mining tools and road drill bits
A 210	widely used for repair purpose	tools for tunneling for examples scraper, agricultural tools
A 324	very good wetting and flow at tungsten carbides because of Mn and Ni content, high strength - $\tau_{AB} > 200 \text{ N/mm}^2$ possible	widely used standard filler metal in brazing tungsten carbides for example conveyor belt scraper; auger bits; crushing teeth; knives,
A 333	good wetting and flow at tungsten carbides because Ni content, high strength - $\tau_{AB} > 200 \text{ N/mm}^2$ possible	plough share and brazed joints of high dynamic load
A 338	lower silver content as A 324 with comparable properties	alternative for A 324
A 314	molten filler metal low viscosity, low melting point,	diamond bits with carbide surface
A 350	very fluid filler metal for close fit up, good wetting at carbides	diamond tools
A 356	Zn-free alloy, good wetting at tungsten carbides used where zinc fumes in the furnaces not tolerable	for brazed tools which are coated by vacuum process after for example TiN
A 312 F	tri metal foil, widely used, attenuate stress inside the brazed joints	circular saw blades, cutter,
A 338 FT	lower silver content as A 312 with comparable properties	alternative for A 312F
AP 21 DL	flux-free Ni containing brazing paste with high metal content; vacuum furnace brazing; good gap filling; brazing in combination with heat treatment possible	high performance carbide tipped drills, cutter,
AP 21 ES B2	flux free Cu - Mn - Ni brazing paste low melting point, excellent wetting at carbide, in vacuum brazing take care for the Mn-content,	carbide tipped drills
AP 21 CL	flux free copper paste, molten filler metal is very fluid; max. joint clearance 0,1 mm, suitable for vacuum brazing	one edge carbide tipped drills



SELECTION OF FLUXES

Fontargen	DIN EN 1045 Class:	colour	texture	typical property's	brazing filler metal
F 100	FH 21	white	Paste	non -corrosive, for use in brazing steel and nonferrous alloys	Brass and Cu - base alloys
F 100 CT	FH 21	brown	Paste	for long brazing cycles at high working temperatures	
F 120	FH 21	white	powder	non- corrosive; general purpose in brazing steel and nonferrous alloys	
F 300	FH 10	white	powder	for general purpose in brazing steel and nonferrous alloys	Ag -brazing filler metals
F 300 DS 12	FH 12	brown	Paste	dispensable flux for automatic brazing process in brazing steel and tungsten carbide	Mn- and Ag -brazing filler metals,
F 300 HM	FH 12	brown	Paste	brushable flux paste in brazing steel and tungsten carbides	Mn- and Ag -brazing filler metals, tungsten carbides
F 300 MA	FH 10	white	Paste	use for area brazed joints, brushable	Ag -brazing filler metals, tungsten carbides
F 300 Ultra NT	FH 10	white	Paste	non- corrosive; general purpose in brazing steel and nonferrus alloys	Ag -brazing filler metals
F 3400	-	colour less	liquid	Flux act as activator for induction brazing with shielding gas	Ag -brazing filler metals

BRAZING FILLER METALS AND FILLER METALS FOR INDUSTRIAL

Brazing filler metals for tungsten carbide brazing						
	Fontargen name	classification				
		DIN 8513	ISO 17672	ISO 3677	AWS 5.8	
Copper based filler metals	A 101	L-Cu Ni10Zn42	Cu 773	B-Cu48ZnNi(Si)-890/920	RBCuZn-D	
	A 200 L	L-SF Cu	Cu 141	B-Cu100(P)-1085	BCu1f/BVCu1x	
	A 202-2 L			B-Cu98NiMn-1085/1100		
	A 205			B-Cu86MnNi-970/990		
	A 206			B-Cu87MnCo-980/1030		
	A 210	L-CuZn30	Cu 470a	B-Cu60Zn(Si)-875/895		
Silver filler metals	A 324	L-Ag49	Ag 230	B-Cu38ZnAg-680/765	BAG-22	
	A 333		Ag 230a	B-Cu36AgZnNi-676/788		
	A 338			B-Ag38CuZnMnNi-680/700		
	A 350		Ag 450	B-Ag50ZnCuNi-660/705	BAG-24	
	A 356			B-Ag63CuInMnNi-730/780		

Brazing filler metals for industrial diamonds brazing						
	Fontargen Name	classification				
		DIN 8513 (Alt)	ISO 17672	ISO 3677	AWS 5.8	
Silver filler metals	A 314	L-Ag55Sn	Ag 155	B-Ag55ZnCuSn-630/660		
	A 347	L-Ag56Sn	Ag156	B-Ag56ZnCuSn-620/655	BAG-7	
	A 324	L-Ag49	Ag 230	B-Cu38ZnAg-680/765	BAG-22	
	A 333		Ag 230a	B-Cu36AgZnNi-676/788		
	A 350		Ag 450	B-Ag50ZnCuNi-660/705	BAG-24	
	A 356			B-Ag63CuInMnNi-730/780		

tri - foil (sandwich foil)						
	Fontargen name	classification				
		DIN 8513 (Alt)	ISO 17672	ISO 3677	AWS 5.8	
Silver alloys	A 312 F			B-AgZnCuMnNi-680/705		
	A 338 FT			B-Ag38CuZnMnNi-680/700		

dosable brazing paste						
	Fontargen name	classification				
		DIN 8513 (Alt)	ISO 17672	ISO 3677	AWS 5.8	
Copper based filler metals	AP 21 DL			B-Cu98NiMn-1085/1100		
	AP 21 ES B2			B-Cu86MnNi-1085/1030		
	AP 21 CL	L-SF Cu	Cu 141	B-Cu100(P)-1085	BCu1f/BVCu1x	
Silver filler metals	AP 350 I		Ag 450	B-Ag50ZnCuNi-660/705	BAG-24	
	AP 356 I			B-Ag63CuInMnNi-730/780		
	AP 314 I	L-Ag55Sn	Ag 155	B-Ag55ZnCuSn-630/660		

DIAMONDS BRAZING

	nominal composition (Mass %)						melting range		recom. brazing temperature	
	Ag	Cu	Zn	Mn	Ni	other	°C	°F	°C	°F
		48	42.5	max.0.2	9.5		890 - 920	1634 - 1688	910	1670
		100					1085	1985	1100	2012
		98		0.3	2		1085 - 1100	1985 - 2012	1100	2012
		86		12	2		970 - 990	1778 - 1814	990	1814
		87		12		Co-3.0	980 - 1030	1796 - 1886	1020	1868
		60	40			Si max 0.3	875 - 895	1607 - 1643	900	1652
	49	16	23	7.5	4.5		680 - 705	1260 - 1301	690	1274
	30	36	32		2		676 - 788	1248 - 1450	770	1418
	38	26	25.5	7	3.5		680 - 700	1265 - 1292	700	1292
	50	20	28		2		660 - 705	1220 - 1305	690	1274
	63	26		2	2	In-6.0	680 - 705	1256 - 1301	770	1418

	nominal composition (Mass %)						melting range		recom. brazing temperature	
	Ag	Cu	Zn	Mn	Ni	other	°C	°F	°C	°F
	55	21	22			Sn-2.0	630 - 660	1166 - 1220	660	1220
	56	22	17			Sn-5.0	620 - 655	1148 - 1211	650	1202
	49	16	23	7.5	4.5		680 - 705	1260 - 1301	700	1274
	30	36	32		2		676 - 788	1248 - 1450	780	1418
	50	20	28		2		660 - 705	1220 - 1305	690	1274
	63	26		2	2	In-6.0	680 - 705	1260 - 1301	770	1418

	nominal composition (Mass %)						melting range		recom. brazing temperature	
	Ag	Cu	Zn	Mn	Ni	other	°C	°F	°C	°F
	49	27.5	20.5	2.5	0.5		680 - 705	1260 - 1301	690	1274
	38	26	25.5	7	3.5		680 - 700	1265 - 1292	700	1274

	nominal composition (Mass %)						melting range		recom. Brazing temperature	
	Ag	Cu	Zn	Mn	Ni	other	°C	°F	°C	°F
		98			2.5	B- max. 0.05	1085 - 1100	1985 - 2012	1100	2012
		86		110	3		980 - 1030	1796 - 1886	1120	2048
		100					1085	1985	1100	2012
	50	20	28		2		660 - 705	1220 - 1305	690	1274
	63	26		2	2	In-6.0	680 - 705	1260 - 1301	770	1418
	55	21	22			Sn-2.0	630 - 660	1166 - 1220	660	1220

brazing filler metals - form of delivery	application field
brazing paste with and without flux	tungsten carbide tipped drills
flux coated brazing rods	repair of drill crowns
bare brazing rods	add-on brazing filler metal during brazing of knives for example
brazing Foil	circular saw blades
brazing foil stamped parts	road picks
brazing foils - catted shapes	belt scraper
granulate ; balls for example	round shank bit
brazing wire - catted shapes	drill crowns
preforms - rings made from brazing wire	cutter
brazing plate - stamped	mining bits
brazing powder in diff. sizes	customised brazing paste done by client

Coefficient of thermal expansion

tungsten carbide metal	ISO 513	linear coefficient of thermal expansion (10-6K-1)
HB 01F	K01-K05	5
HB 40 F	K20-K40	5.5

HB 01 F and HB 40 F carbide types for wood machining of the company Boehlerit Austria

Strip metal	linear coefficient of thermal expansion (10-6K-1)
C75S	11.7
75Ni8	11.7

Steel strip qualities of the voestalpine Precision Strip

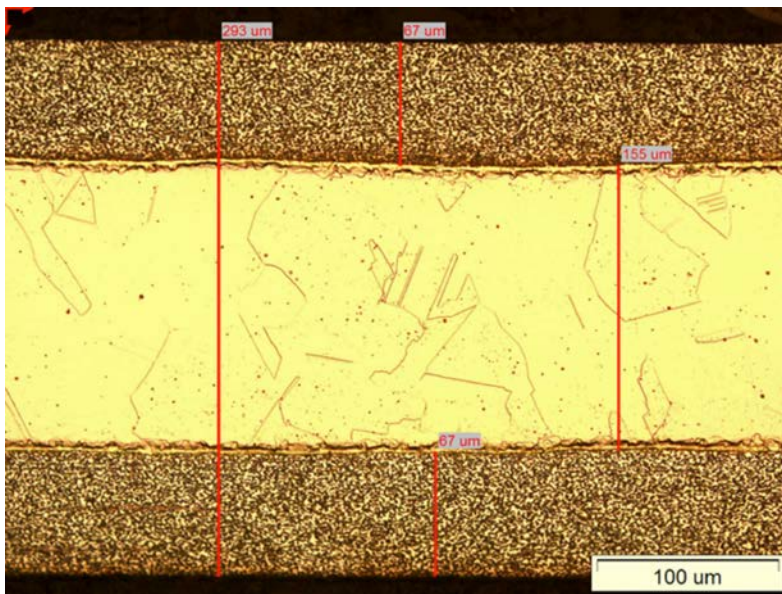


Gas-shielded induction brazing by using Nitrogen; alloyed steel tube construction, Brazing alloy A 200 L (with kind permission of IEW Induktive Erwärmungsanlagen; www.iew.eu)

Zn and Cd free brazing alloys for example A 200L; A 205 are suitable for gas-shielded induction brazing.

But some applications in carbide brazing require low melting temperature. In such cases Zn containing silver brazing alloys often used.

The activator liquid F 3400 in combination with the shielding gas avoid Zn oxidation and provide wetting of surface by the liquid filler metal.



Micrograph tri-foil A 312 F, Copper core layer both sides brazing filler metal cladde

Tri-foils are often used for brazing carbides to reduce stress because of the soft core copper layer which do not melt. Stress arises due the differences in thermal expansion between the tungsten carbide and the steel when cooling down from brazing temperature.

Typical application: brazing circular carbide tipped saw blades



JOIN! voestalpine Böhler Welding

We are a leader in the welding industry with over 100 years of experience, more than 50 subsidiaries and more than 4,000 distribution partners around the world. Our extensive product portfolio and welding expertise combined with our global presence guarantees we are close when you need us. Having a profound understanding of your needs enables us to solve your demanding challenges with Full Welding Solutions - perfectly synchronized and as unique as your company.



Lasting Connections – Perfect alignment of welding machines, consumables and technologies combined with our renowned application and process know-how provide the best solution for your requirements: A true and proven connection between people, products and technologies. The result is what we promise: Full Welding Solutions for Lasting Connections.



Tailor-Made Protectivity™ – The combination of our high-quality products and application expertise enables you to not only repair and protect metal surfaces and components. Our team of engineers, experienced in your specific applications, offer you customized solutions resulting in increased productivity for your demanding challenge. The result is what we promise: Tailor-Made Protectivity™.



In-Depth Know-How – As a manufacturer of soldering and brazing consumables, we offer proven solutions based on 60 years of industrial experience, tested processes and methods, made in Germany. This in-depth know-how makes us the internationally preferred partner to solve your soldering and brazing challenge through innovative solutions. The result is what we promise: Innovation based on in-depth know-how.

The Management System of voestalpine Böhler Welding Group GmbH, Peter-Mueller-Strasse 14-14a, 40469 Duesseldorf, Germany has been approved by Lloyd's Register Quality Assurance to: ISO 9001:2015, ISO 14001:2015, OHSAS 18001:2007, applicable to: Development, Manufacturing and Supply of Welding and Brazing Consumables. More information: www.voestalpine.com/welding



