fontargen brazing by voestalpine

In-Depth Know-How

BRAZING IN THE HVAC&R INDUSTRY

voestalpine Böhler Welding
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FONTARGEN BRAZING

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.

CUSTOMIZED SOLUTIONS FOR BRAZING IN THE HEATING AND COOLING INDUSTRY

Our customers benefit from having a partner

- reat expertise in soldering and the best application support available worldwide
- comprehensive product portfolio and first-class product solutions for local and global challenges
- worldwide distribution and sales network with just-in-time deliveries in all packaging
- special solutions for process optimization in direct cooperation with the customer

The information compiled here provides an overview of the possible combinations of solder and base material especially for users in the field of HVAC&R, but also in general. These should serve as an initial assessment. Fontargen Brazing will be happy to discuss your existing tasks.

BRAZING IN THE HVAC&R INDUSTRY

Brazing experts Lötexperten in the service of HVAC&R specialists. We support you in the selection of the solder according to your application, e.g.

HEATING

- Heaters, heat pumps
- Household appliances, heating elements, thermocouple and sensor heat exchangers
- Radiators, towel dryers

AIR CONDITIONING

- Multisplit air conditioning systems (ceilings, ROOF top, window and wall units)
- VRF, Package AC
- Evaporators, condensers

REFRIGERATION

- Refrigerators, furniture, rooms, containers, server rooms
- Chillers, cold chain, transport
- Evaporators, condensers, heat exchangers

PLUMBING AND HEATING

- Sanitary facilities, fittings, water heaters, accessories, hand dryers
- Copper u. Gas pipe installations, plumbing

CAR AIR CONDITIONERS

- Aluminum brazing
- Evaporators, condensers, coolers, radiators
- IWT, connections
- Tubes (Fluid Technology)

HVAC&R Product program (Choice of standard filler metals and Fluxes)

	Name	DIN 8513	AWS	EN 1044	ISO 17672 / DIN 1707-100	Melting range (°C)	Flow properties	Industry				
								HV	AC	R	Plumbing	Car
Silver	A 303	L-Ag20Sn	-	AG 206	Ag 220	690 - 810	+++	●	●	●	●	
	A 311	L-Ag44	-	AG 203	Ag 244	675 - 735	++++	●	●	●	●	
	A 314	L-Ag55Sn	-	AG 103	Ag 155	630 - 660	++++++	●	●	●	●	
	A 347	L-Ag56Sn	BAg-7	AG 102	Ag 156	620 - 655	++++++	●	●	●	●	
	A 319	L-Ag34Sn	-	AG 106	Ag 134	630 - 730	++++	●	●	●	●	
	A 320	L-Ag45Sn	BAg-36	AG 104	Ag 145	640 - 680	+++++	●	●	●	●	
	A 326	L-Ag38Sn	BAg-34	-	Ag 138	650 - 720	++++	●	●	●	●	
	A 330	L-Ag30	BAg-20	AG 204	Ag 230	680 - 765	++++	●	●	●	●	
	A 340	L-Ag40Sn	BAg-28	AG 105	Ag 140	650 - 710	+++++	●	●	●	●	
	A 333	-	-	-	Ag 230a	675 - 790	++++	●	●	●	●	
Copper-Phosphor-Silver	A 3002	L-Ag2P	-	CP 105	CuP 279	645 - 825	++	●	●	●	●	
	A 3002 FreeFlow	L-Ag2P	BCuP-6	-	CuP 280	645 - 788	+++	●	●	●	●	
	A 3005	L-Ag5P	-	CP 104	CuP 281a	645 - 815	++	●	●	●	●	

	Characteristics	Applications	Rods blank	Rods flux-coated (*)	Rods flux-cored	Wires	Pre-forms	Foils
	20% Ag; High ductility; high sculptability; very good gap filling capacity; good corrosion resistance; Matching color when soldering brass; (1) (2)	Alloyed and non-alloyed steel, Malleable cast iron, Ni alloys, Cu alloys	●	●		●	●	●
	44% Ag; Ternary alloy; Suitable for the use in drink water; High ductility; very good gap filling capacity; good corrosion resistance; Suitable for the use in sea water, Matching color when soldering brass; (1) (2)	Alloyed and non-alloyed steel, Malleable cast iron, Ni alloys, Cu alloys, Hard metal; for large gap widths; Electrical engineering; Brass soldering	●	●		●	●	●
	55% Ag; Universal solder; High ductility; Best possible color consistency when soldering stainless steel; good corrosion resistance; Suitable for the use in sea water; good color consistency with CrNi; (1) (3)	Alloyed and non-alloyed steel, Ni alloys, Malleable cast iron, Cu alloys; White goods; Plate heat exchangers; Food and sanitary facilities; Parts made of CrNi where the temperature should be kept low (no tarnish)	●	●		●	●	●
	56% Ag; Universal solder; High ductility; Best possible color consistency when soldering stainless steel; good corrosion resistance; Suitable for the use in sea water; good color consistency with CrNi; (1) (3)	Alloyed and non-alloyed steel, Ni alloys, Malleable cast iron, Cu alloys; White goods; Plate heat exchangers; Food and sanitary facilities; Parts made of CrNi where the temperature should be kept low (no tarnish)	●	●		●	●	●
	34% Ag; High profitability; Versatile; Very good soldering properties; good corrosion resistance; Suitable for the use in drink water; (1) (3)	Alloyed and non-alloyed steel, Ni alloys, Malleable cast iron, Cu alloys; White goods; Food and sanitary facilities	●	●		●	●	●
	45% Ag; Universal solder; Suitable for the use in drink water; Versatile; good soldering pro-perties; high degree of wetting; Suitable for the use in sea water; High ductility, good corrosion resistance; (1) (3)	Alloyed and non-alloyed steel, Ni alloys, Malleable cast iron, Cu alloys; White goods; Plate heat exchangers; Food and sanitary facilities; Parts made of CrNi where the temperature should be kept low (no tarnish)	●	●		●	●	●
	38% Ag; Versatile; Very good soldering properties; High corrosion resistance; (1) (3)	Alloyed and non-alloyed steel, Ni alloys, Malleable cast iron, Cu alloys; White goods; Food and sanitary facilities	●	●		●	●	●
	30% Ag; High ductility; good corrosion resistance; Almost identical colors when soldering brass. (1) (3)	Alloyed and non-alloyed steel, Malleable cast iron, Ni alloys, Cu alloys; For parts without special stress	●	●		●	●	●
	40% Ag; Universal solder; Versatile; good soldering properties; high degree of wetting; High ductility, good corrosion resistance; Suitable for the use in sea water; (1) (3)	Alloyed and non-alloyed steel, Ni alloys, Malleable cast iron, Cu alloys; White goods; Plate heat exchangers; Food and sanitary facilities	●	●		●	●	●
	30% Ag; Very good alternative with reduced silver content; good mechanical quality values; Very High ductility and tensile strenght; (1) (3)	Alloyed and non-alloyed steel, Ni alloys, Malleable cast iron, Cu alloys, Hard metal; White goods; Food and sanitary facilities	●	●		●	●	
	2% Ag; Suitable for the use in drink water; Phosphorus content (6,3%); for operating temp. between -60 ° C and + 150 ° C (4); Do not use with sulphurous media and Fe- and Ni-based alloys	Copper, brass, tin-bronze and gunmetal; Installations exposed to vibration and high pressure; Heat exchanger	●			●	●	
	2% Ag; Phosphorus content (7,0%), thereby lowering the melting temp. and increased flow properties; Ag-Content tolerance narrower +/-0,2%; for operating temp. between -60 ° C and + 150 ° C (4); Do not use with sulphurous media and Fe- and Ni-based alloys	Copper, brass, tin-bronze and gunmetal; Installations exposed to vibration and high pressure; Heat exchanger; Return Bends	●			●	●	
	5% Ag; Good electrical conductivity; Phospho-rus content (6,0%); for operating temp. between -60 ° C and + 150 ° C (4); Do not use with sulphurous media and Fe- and Ni-based alloys	Copper, brass, tin-bronze and gunmetal; Installations exposed to vibration and high pressure; Repair work; Modeling work	●			●	●	

	Name	DIN 8513	AWS	EN 1044	ISO 17672 / DIN 1707-100	Melting range (°C)	Flow properties	Industry				
								HV	AC	R	Plumbing	Car
Copper-Phosphor-Silver	A 3005 EasyForm	L-Ag5P	BCuP-3	-	CuP 281	645 - 815	++	●	●	●	●	
	A 3005 FreeFlow	L-Ag5P	BCuP-7	-	CuP 282	645 - 771	+++	●	●	●	●	
	A 3015	L-Ag15P	BCuP-5	CP 102	CuP 284	645 - 800	++++	●	●	●	●	
	A 3018	L-Ag18P	BCuP-8	-	CuP 285	643 - 666	++++++	●	●	●	●	
Copper-Phosphor	A 2003 EasyForm	L-CuP7	-	CP 202	CuP 180	710 - 820	++++	●	●	●	●	
	A 2003 FreeFlow	L-CuP7	-	CP 202	CuP 180	710 - 820	+++++	●	●	●	●	
	A 2004	L-CuP6	-	CP 203	CuP 179	710 - 890	+++	●	●	●	●	
	A 2005	L-CuSnP7	-	CP 302	CuP 386	650 - 700	++++	●	●	●	●	
	A 204	L-CuP8	-	CP 201	CuP 182	710 - 770	++++++	●	●	●	●	
Aluminium	A 407 L	L-AlSi12	BAlS1-4	AL 104	Al 112	575 - 585	++++		●	●		●
	A 631	-	-	-	S-Zn98Al2	382 - 407	++		●	●		●
	A 665	-	-	-	S-Zn78Al22	420 - 480	+++		●	●		●

(*) 4 different coating standards available

	Characteristics	Applications	Rods blank	Rods flux-coated (*)	Rods flux-cored	Wires	Pre-forms	Foils
	5% Ag; Good electrical conductivity; Phosphorus content (6,0%); for operating temp. between -60 ° C and + 150 ° C (4); Do not use with sulphurous media and Fe- and Ni-based alloys	Copper, brass, tin-bronze and gunmetal; Installations exposed to vibration and high pressure; Repair work; Modeling work	●			●	●	
	5% Ag; Good electrical conductivity; Phosphorus content (6,7%), thereby lowering the mel-ting temp. and increased flow properties; for operating temp. between -60 ° C and + 150 ° C (4); Do not use with sulphurous media and Fe- and Ni-based alloys	Copper, brass, tin-bronze and gunmetal; Installations exposed to vibration and high pressure; Industrial brazing	●			●	●	
	15% Ag; Very Good electrical conductivity; low melting temperature; High ductility even at low temperatures; for operating temp. between -70 ° C and + 150 ° C. Do not use with sulphurous media and Fe- and Ni-based alloys	Copper, brass, tin-bronze and gunmetal; Components that are subject to vibrations and thermal fluctuations; E-motors; Collectors; Heat exchanger	●	●		●	●	●
	18% Ag; Very Good electrical conductivity; very low melting temperature; High ductility even at low temperatures; for operating temp. between -70 ° C and + 150 ° C. Do not use with sulphurous media and Fe- and Ni-based alloys	Copper, brass, tin-bronze and gunmetal; Components that are subject to vibrations and thermal fluctuations; Very suitable for narrow gaps and large wetting areas; Especially when a very low soldering temperature is required	●			●	●	
	Medium flow behavior; for operating temp. between -60 ° C and + 150 ° C (4); Do not use with sulphurous media and Fe- and Ni-based alloys; Phosphorus content (7,0%)	Copper, brass, tin-bronze and gunmetal; the solder can influence the flow; Repair work; Modeling work; Plumbing	●			●	●	
	Increased flow behavior; for operating temp. between -60 ° C and + 150 ° C (4); Do not use with sulphurous media and Fe- and Ni-based alloys; Phosphorus content (7,25%)	Copper, brass, tin-bronze and gunmetal; Capillary soldering; Connections with narrow soldering gaps; Industrial brazing	●			●	●	
	Soldering large gaps; Suitable for the use in drink water; suitable for operating temperatures between -60 ° C and + 150 ° C(4); Do not use with sulphurous media and Fe- and Ni-based alloys	Copper, brass, tin-bronze and gunmetal; Suitable for bridging gaps; Repair work; Modeling work; Copper pipe installation; Plumbing	●			●	●	
	Good color similarity when soldering brass; The solder seam can be galvanized; very low melting temperature.; for operating temp. between -60 ° C and + 150 ° C (4); Do not use with sulphurous media and Fe- and Ni-based alloys.	Copper, brass, tin-bronze and gunmetal; Connections with narrow soldering gaps; Industrial brazing; Plumbing	●	●		●	●	
	Thin-flowing solder with very good flow properties; very capillary active; for operating temp. between -20 ° C and + 150 ° C; Do not use with sulphurous media and Fe- and Ni-based alloys	Copper, brass, tin-bronze and gunmetal; Connections with narrow soldering gaps at low soldering temperature; Industrial brazing, Plumbing	●			●		
	Universal solder; very capillary active; The Mg content must be ≤ 3%; The solidus temperature of the base materials should be >630 ° C; not suitable for connections that are subsequently anodized	Solder for hard soldering of the same structure and color on aluminum and rolled / cast aluminum alloys; The solder is also suitable for joining aluminum with Cr-Ni steels and with copper	●		●	●	●	
	Soft solder; Removal of flux residues: The flux residues can be removed by thorough washing and brushing in hot water.	Soldered connections on aluminum and aluminum alloys; Suitable for aluminum / copper connections in refrigeration and air conditioning; Repair of aluminum	●		●	●	●	
	Soft solder; Increased strength and better corrosion protection than A631; Removal of flux residues: The flux residues can be removed by thorough washing and brushing in hot water.	Soldered connections on aluminum and aluminum alloys; Suitable for aluminum / copper connections in refrigeration and air conditioning; Repair of aluminum	●		●	●	●	

(1) The temperature resistance of soldered connections also depends on the construction (gap geometry) and the base materials to be soldered and, if necessary, can be verified by a process test; (2) Suitable for operating temperatures up to + 300 ° C; (3) Suitable for operating temperatures of -200 ° C on austenitic and -70 ° C on ferritic steels as well as up to + 200 ° C (4) Determined by notched impact tests according to DIN EN 10045

SELECTION TABLE: BASE MATERIALS/SOLDERS

All base materials, solders and fluxes at a glance.

Base materials	Stainless steel	Nickel and nickel alloys	Steel	Zinc-coated steel	Cast iron	Copper	Copper alloys	Aluminum
Stainless steel	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	A 407 L + F 400 MD
Nickel and nickel alloys		AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390	
Steel			AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210 A 202 M	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210 A 202 M	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210 A 202 M	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210 A 202 M	A 407 L + F 400 MD
Zinc-coated steel				AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210	
Cast iron					AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A /AF 210	
Copper						AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A 2004 V A 3002 V A 3005 V A /AF 210	AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A 2004 V A 3002 V A 3005 V only use with flux! “F 300 H Ultra NT” A /AF 210 A 202 M	A 407 L + F 400 MD
Copper alloys							AF 314 AF 319 AF 320 AF 347 AF 350 AF 390 A 2004 V A 3002 V A 3005 V only use with flux! F 300 H Ultra NT” A /AF 210 A 202 M	A 407 L + F 400 MD
Aluminum								A 407 L + F 400 MD

Overview of Fontargen Brazing product groups:

- Copper wire (CuSi3-wire)
- Aluminium solder
- Brass solder
- Silver solder
- Copper-Phosphor (-Silver) solder

SUSTAINABILITY & PROCESS RELIABILITY - WITH XS-COATING

Boric acid-free brazing with the new Fontargen XS variant with significantly reduced flux coating

According to the European CLP regulation, toxic substances such as boric acid and Borax have been re-classified and categorized as toxic to reproduction. Our new coating without SVHC (Substances Of Very High Concern) is the alternative to the existing products and therefore particularly interesting with regard to safety and REACH-aspects. The XS product series complements our „BF“ (boric acid-free) product portfolio and - in accordance with Regulation No. 1272/200 - does not require labeling.

THE NEW XS: EXTRA THIN, BORIC ACID FREE COATING

Product benefits

- Reduced health risks
- Optimization of the soldering process in terms of residue removal
- Reduction of the risk of corrosion
- Boric acid and Borax free
- Partly flexible
- Transport safe

The following 4 alloys are currently available as standard: (other alloys on request)

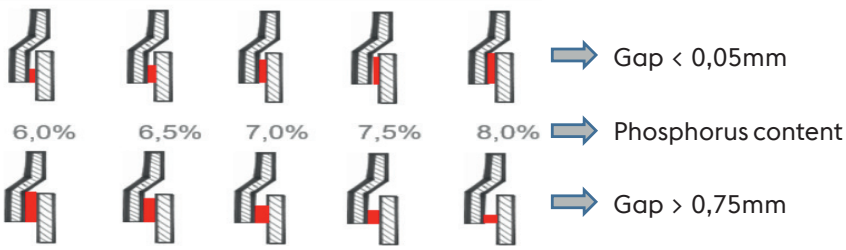
Product name	EN ISO 17672	EN 1044	AWS	DIN 8513	Dimensions
AF319 XS BF	Ag 134	AG 106	N/A	L-Ag34Sn	2,0 x 500
AF320 XS BF	Ag 145	AG 104	BAg-36	L-Ag45Sn	
AF340 XS BF	Ag 140	AG 105	BAg-28	L-Ag40Sn	
AF314 XS BF	Ag 155	AG 103	N/A	L-Ag55Sn	

BETTER CONTROL OVER THE FLOW BEHAVIOR OF FONTARGEN CuP

The capillary pressure and thus the filling capacity of the solder change depending on the gap width. Phosphorus (P) plays an essential role in this.

Most of the fluctuations observed during the flow of the copper-phosphorus solders are mainly due to the fluctuations in the phosphorus content.

In response to this problem, we decided to tighten tolerances.



SERVICES / TRAINING

In addition to the basic advice we take for granted, we would also like to offer our customers the opportunity to fall back on the experience vaBW Fontargen GmbH has acquired over the years. As a further addition to our extensive training program, we therefore offer the following application services.

- Constructive advice
- Manufacturing advice
- Process optimization
- Planning for production via soldering

Our focus is on advanced soldering products and strategies that support our customers in achieving robust processes with optimal results and in overcoming the challenges of the market.

more infos:

or by phone at:
+49 6351 4010

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

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