

SALES PROGRAM



The world of brazing

Competence in soldering and brazing

FONT ARGON



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The world of brazing

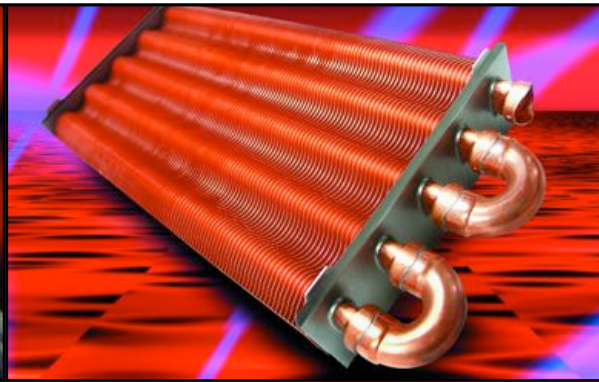
Your competent partner in soldering and brazing materials

We provide you with technical know-how and the suitable products

- Pastes
- Preform parts
- Wires
- Coated sticks
- Fluxes
- Powders

FONTARGEN supplies the technical support especially in the following industry segments

- Heating installation
- Cooling /Air conditioning technology
- Solar energy
- Mechanical and equipment engineering
- Automotive industry
- Electrical industry
- Instrument industry



1. Brazing – for rational joining of metals

1.1. Bare and coated brazing alloys

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | Working temperature Melting range or melting point |
|------|---------------------------------|-------------------------------|--|
|------|---------------------------------|-------------------------------|--|

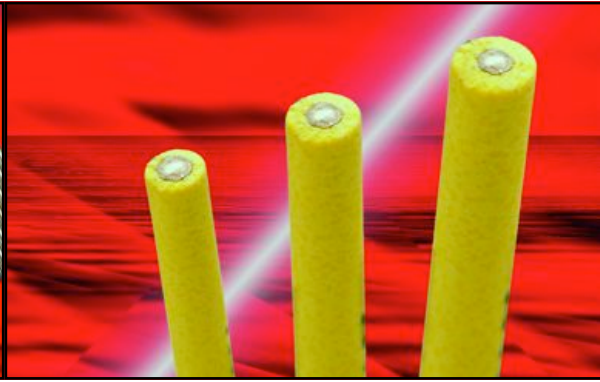
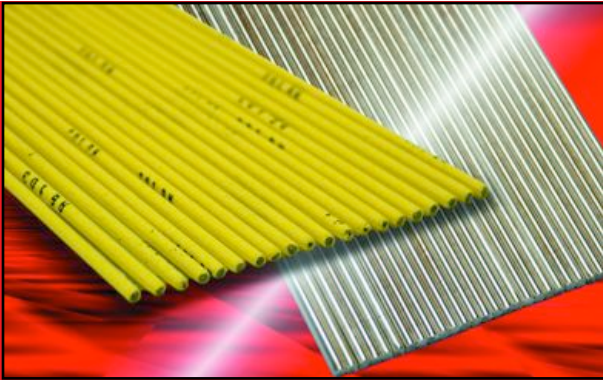
1.1.1. Brazing alloy without Ag

| | | | |
|------------|-----------------------------------|---|-------------------------------|
| A/AF 101 | L-CuNi 10 Zn 42/CU 305 2.0711 | High tensile nickel containing brazing alloy for joining of steel, cast iron, malleable cast iron, nickel and nickel alloys. | AT: 910°C S: 890-920°C |
| A/AF 102 | L-CuNi 10 Zn 42+Ag/ Cu 305 mod | High tensile nickel and silver containing brazing alloy for joining of steel, cast iron, malleable cast iron, nickel and nickel alloys. | AT: 890°C S: 870-900°C |
| A 102 RF | LCuNi 10 Zn 42/CU 305 2.0711 | High tensile nickel containing brazing alloy with flux pressed into chamfers for joining of steel, cast iron, malleable cast iron, nickel and nickel alloy. | AT: 910°C S: 890-920°C |
| A 200 L | L-SFCu/CU 104 2.0091 | Oxygen-free copper brazing alloy for brazing of unalloyed and low alloyed steel. | AT: 1100°C S: 1083°C |
| A 203/6 L | L-CuSn6/CU 201 2.1021 | Copper-tin-brazing alloy for brazing of iron and nickel material. | AT: 1040°C S: 910-1040°C |
| A 203/12 L | L-CuSn 12/CU 202 2.1055 | Copper-tin-brazing alloy (higher tin content) for brazing of iron and nickel material. | AT: 990°C S: 825-990°C |
| A/AF 210 K | L-CuZn 39 Sn/CU 306 2.0533 | Thin, inured to excessive heating, special brass brazing alloy for gap and joint brazing and the surfacing of steel, cast iron, malleable cast iron and copper. | AT: 900°C S: 870-890°C |
| A 210 MK | L-CuZn 39 Sn/CU 306 2.0533 | Special brass brazing rod with flux pressed into chamfers for gap and joint brazing of steel, galvanized steel, cast iron, malleable cast iron and copper. | AT: 900°C S: 870-890°C |
| A/AF 211 | L-CuZn 39 Sn/CU 306 2.0533 | Thin special brass silver containing brazing alloy for gap and joint brazing of copper, steel, galvanized steel, cast iron and malleable cast iron. | AT: 890°C S: 870-890°C |
| A 211 RF | L-CuZn 39 Sn/CU 306 2.0533 | Special brass brazing alloy with flux pressed into chamfers for gap and joint brazing of copper, steel, galvanized steel, cast iron and malleable cast iron. | AT: 890°C S: 870-890°C |
| A 407 L | L-AlSi 12/AL 104 3.2285 | Low melting high silicon aluminium brazing alloys for brazing of pure aluminium, various aluminium alloys and Al-Si-cast iron alloy. | AT: 590-600°C S: 575-585°C |

1.1.2. Cu-P(Ag)- Brazing alloys

| | | | |
|--------|---------------------------|---|---------------------------|
| A 2003 | L-Cu P 7/CP 202 2.1463 | Well fluent copper-phosphorus-brazing alloy for gap brazing on copper and copper alloy. Also suitable for gas-and water installations according to DVGW. | AT: 730°C S: 710-820°C |
| A 2004 | L-Cu P 6/CP 203 2.1462 | Well fluent copper-phosphorus-brazing alloy for gap brazing on copper and copper alloy. Also suitable for gas and water installation according to DVGW. | AT: 760°C S: 710-890°C |
| A 2005 | L-Cu Sn P 7/CP 302 | Copper-phosphorus-tin-brazing alloy for gap brazing on copper, brass, bronze, red cast. Also suitable for tungsten-inert gas welding. | AT: 690°C S: 650-700°C |
| A 3002 | L-AG 2 P/CP 105 2.1467 | Silver containing copper-phosphorus-brazing alloy for gap brazing on copper and copper alloy. Suitable for gas and water installations according to the DVGW. | AT: 740°C S: 645-825°C |

AT: working temperature S: melting range/melting point



| Type | Norm DIN/DIN EN Material No. | Characteristic Application | Operation temperature Melting range or melting point |
|--------|---------------------------------|---|--|
| A 3005 | L-Ag 5 P/CP 104 2.1466 | Silver containing copper-phosphorus-brazing alloy for gap brazing on copper and copper alloy. Also suitable for tungsten-inert gas welding. | AT: 710°C S: 645-815°C |
| A 3015 | L-Ag 15 P/CP 102 2.1210 | High silver containing copper-phosphorus-brazing alloy for gap brazing on copper and copper alloy. Also suitable for tungsten-inert gas welding. | AT: 700°C S: 645-800°C |
| A 3018 | L-Ag 18 P/CP 101 | High silver containing, very thin copper-phosphorus-brazing alloy for gap brazing on copper, brass, bronze, red cast. Also suitable for tungsten-inert gas welding. | AT: 650°C S: 645°C |

1.1.3. High silver containing brazing alloys, cadmium free

| | | | |
|-----------|------------------------------|--|---------------------------|
| A/AF 303 | L-Ag 20/AG 206 2.1213 | Silver containing, inured to excessive heating brazing alloys for gap and sjoint brazing of steel, malleable cast iron, copper, nickel and hard metals. | AT: 810°C S: 690-810°C |
| A 308 | L-Ag 72/AG 401 2.5151 | High silver containing, eutectic brazing alloys for gap brazing under svacuum on steel, copper, copper alloy, nickel and nickel alloy. | AT: 780°C S: 779°C |
| A/AF 311 | L-Ag 44/AG 203 2.5147 | High silver containing brazing alloy for gap brazing of steel, Cr-Ni-steel, malleable cast iron, copper, copper alloy, nickel and nickel alloy. Suitable for gas and water installations according to DVGW. Saltwater resistant. | AT: 730°C S: 675-735°C |
| A 312 F | L-Ag 49 (Cu)/AG 502 | High silver containing layer brazing alloy with copper medium layer for brazing of hard metal on support steel. | AT: 690°C S: 680-705°C |
| A/AF 314 | L-Ag 55 Sn/AG 103 2.5159 | High silver containing brazing alloy for gap brazing of steel, Cr-Ni-steel, malleable cast iron, copper, copper alloy, nickel and nickel alloy. Food safe, saltwater resistant. | AT: 650°C S: 630-660°C |
| A/AF 319 | L-Ag 34 Sn/AG 106 2.5157 | High silver containing brazing alloy for gap brazing of steel, copper and copper alloy, nickel and nickel alloy. For gas and water installations according to DVGW/GW2. | AT: 710°C S: 630-730°C |
| A/AF 320 | L-Ag 45 Sn/AG 104 2.5158 | High silver containing brazing alloy for gap brazing of steel, Cr-Ni-steel, malleable cast iron, copper, copper alloy, nickel and nickel alloy. For gas and water Cu-pipe-installation according to DVGW/GW2. | AT: 670°C S: 640-680°C |
| A/ AF 324 | L-Ag 49/AG 502 2.5156 | High silver containing brazing alloy for gap brazing, brazing of hard metal onto steel; brazing of tungsten, tantalum-and molybdenum material. | AT: 690°C S: 680-705°C |
| A/AF 330 | L-Ag 30/AG 204 2.5167 | Silver containing brazing alloy for gap brazing on steel. Cr-Ni-steel, copper and copper alloy, nickel and nickel alloy. | AT: 750°C S: 680-765°C |
| A/AF 340 | L-Ag 40 Sn//AG 105 2.5165 | High silver containing brazing alloy for gap brazing on steel, copper, copper alloys, nickel and nickel alloys. | AT: 690°C S: 650-710°C |

AT: working temperature S: melting range/melting point

1.1.4. High silver containing brazing alloy, cadmium containing

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | Working temperature Melting range or melting point |
|----------|---------------------------------|---|--|
| A/AF 304 | L-Ag 20 Cd/AG 309 2.1215 | Versatile silver brazing material for gap and joint brazing of steel, Cr-Ni-steel, malleable cast iron, copper, copper alloys, nickel and nickel alloys. | AT: 750°C S: 605-765°C |
| A/AF 305 | L-Ag 30 Cd/AG 306 2.5145 | Low temperature brazing filler metal with high silver content for gap brazing of steel, Cr-Ni-steel, malleable cast iron, copper, copper alloys, nickel and nickel alloys. | AT: 680°C S: 600-690°C |
| A/AF 306 | L-Ag 40 Cd/AG 304 2.5141 | Brazing filler metal with high silver content and lowest working temperature for gap brazing of steel, Cr-Ni-steel, malleable cast iron, copper, copper alloys, nickel and nickel alloys. | AT: 610°C S: 595-630°C |
| A/AF 309 | L-Ag 50 CdNi/AG 351 2.5160 | High silver containing brazing alloys for gap brazing on hard metal, also on steel, Cr-Ni-steel, copper, copper alloys, nickel and nickel alloys. | AT: 655°C S: 645-690°C |

Delivery types: sticks:

diameter: 1, 5/2,0/3,0 mm

Delivery types: wire:

**diameter: 0.8/1,0/1,2/1,5/2,0 mm
Continuous wire on a ring/D 300**

Foil/Powder: upon request:

additional delivery types upon request

1.2. Preform parts

Preform parts are especially suitable for the mechanical and automatic brazing of geometrically complex components. They are predestined for the serial manufacturing and are suitable for the technical and economical use of the customer. We manufacture preform parts from various brazing alloys, custom made and fine-tuned to the special requirements. Please ask us for more information!

| Wire strength | Ring inside diameter |
|---------------|----------------------|
| 0,8 mm | 4,0 - 26,0 mm |
| 1,0 mm | 4,0 - 40,0 mm |
| 1,2 mm | 4,0 - 45,0 mm |
| 1,5 mm | 4,0 - 55,0 mm |
| 2,0 mm | 6,0 - 55,0 mm |

Additional delivery types on request



1.3 Brazing pastes

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | Working temperature Melting range or melting point |
|------|---------------------------------|-------------------------------|--|
|------|---------------------------------|-------------------------------|--|

1.3.1 Brass brazing pastes and powders

| | | | |
|---------------------|-----------------|---|---------------------------|
| A 101 P | L-CuZnNi/CU 305 | Well fluent, high strength nickel containing brazing powder. The adding of Si produces a very good fluidity and wetting characteristics. Economically interesting product for the brazing of steel in the air. Brazing of steel, cast iron, malleable cast iron, nickel, and nickel alloy. Suitable for brazing and hardening of steel in one working process. It produces a good colour equalization with brass and is used, together with the standard flux, mainly for brazing of acoustic pieces for the brass instrument production. | S: 890-920°C AT: 910°C |
| AP 210 AP 210 IL | L-CuZn40/CU 301 | Flux containing dispensable brazing paste for brazing of steel in normal atmosphere. AP 210 IL suits also to the brazing of some hard metals. Mainly used in the electrical industry, tool industry and vehicle manufacturing. | S: 890-900°C AT: 900°C |

AT: working temperature S: melting range/melting point

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | Working temperature Melting range or melting point |
|---------|---------------------------------|--|--|
| AP 211 | L-CuZn39Sn/Cu 306 | Dispensable brazing paste. Especially suitable for hard metal-steel joints. Gaping and joint brazing of copper, copper alloy with Solidus > 950 °C, steel, cast iron, malleable cast iron, galvanized steel, nickel, and nickel alloy. Steel furniture, vehicle industry, locksmith work, copper pipes and galvanized steel, plumbing fixture work etc. Very good wetting characteristics. | S: 870-890°C AT: 890°C |
| A 357 P | B-Ag4 CuZn | Brazing spelter alloy with very good wetting properties. The high melting point however requires an exact controlling of the heat supply. Produces a good colour equalization on brass. Preferably used for brazing of brass, copper and steel material (acoustic pieces, friction lining) | S: 820-870°C |

1.3.2. Copper-phosphorus brazing pastes

| | | | |
|---------|-------------------|--|---------------------------|
| AP 2003 | L-CuP7 / CP 202 | Gap brazing on copper, brass, bronze, red cast iron. The brazing alloy should not be used on components subjected to sulphur containing items and on components made of Fe and Ni base alloy. Suitable for brazing joints with operation temperatures up to 150 °C. | S: 710-820°C AT: 730°C |
| AP 2004 | L-CuP6 / CP 203 | Gap brazing on copper, brass, bronze and red cast iron. No flux needed when used on copper. Copper pipes and water pipes (cold and hot water according to DVGW-process sheet GW2). Container and apparatus construction, heat exchanger, boiler. Suitable for brazing joints with operation temperatures up to 150 °C. Not suitable for sulphur containing items or Fe and Ni base alloys. | S: 710-880°C AT: 730°C |
| AP 2005 | L-CuSnP7 / CP 302 | Gap brazing on copper, brass, bronze, red cast iron. High similarity in colour while brazing brass. Induction welding and resistance flame brazing are only possible on copper. Not suitable on components subjected to sulphur or made of Fe and Ni base alloy. The solder seam is galvanizable. Suitable for soldering joints with operation temperatures up to 150 °C. | S: 650-700°C AT: 690°C |
| AP 3018 | L-Ag18P / CP 101 | Thin fluid, silver containing copper-phosphorus-brazing alloy. Highly ductile, also at low temperatures up to 70 °C. Suitable for vibrations and big thermal changes. Gap brazing on copper. While brazing copper on copper joints no flux is needed. Suitable for soldering joints up to 150 °C. Do not use on sulphur containing items and on Fe and Ni base alloy. | S: 645°C AT: 650°C |

1.3.3. Copper brazing pastes for inert-gas brazing and vacuum brazing

| | | | |
|---------------|------------------|--|------------------------------|
| AP 20 AL DB | L-Cu/CU 101 | Ready-made, dispensable copper brazing paste with very high metal contents and medium viscosity. Furnace brazing of parts made of non alloyed, low carbon and high alloyed steel, for example in the automotive industry, for office equipment, textile machines and the electrical industry. | S: 1100-1150°C AT: 1083°C |
| AP 21 AL | L-Cu/Cu 101 | Ready-made copper hard brazing paste. Very dispensable, with high metal contents for inert-gas brazing or vacuum brazing of low and high alloyed steel. | S: 1083°C AT: 1100-1150°C |
| AP 21 CL No.3 | L-SF Cu / CU 104 | Flux free copper hard brazing paste with high metal contents. High viscosity and slow drying in air. This paste can be successfully used under hydrogen/nitrogen atmospheres and under exothermic gas. AP 21 CL P is suitable for material made of non alloyed and alloyed steel. Metal contents approximately 80% | S: 1100-1150°C AT: 1085°C |
| AP 21 DL/DS | CU 105 | Hard brazing paste made of Cu-Ni alloy, very dispensable, very high metal contents for brazing of hard metal equipped tools, used in inert-gas brazing or vacuum brazing. | S: 1085-1100°C AT: 1120°C |



| Type | Norm DIN/DIN EN Material No. | Characteristic Application | Working temperature Melting range or melting point |
|-------------|---------------------------------|--|--|
| AP 21 EL/ES | L-Cu Mn Ni | Hard brazing paste made of Cu-Mn-Ni alloy, very dispensable, very high metal contents for brazing of hard metal equipped tools, used in inert-gas brazing or vacuum brazing. | S: 980-1030°C AT: 1120°C |
| AP 21 HL/HS | L-CuSn 6/CU 201 | Ready-made tin bronze-brazing paste, well dispensable, with very high metal contents for the inert-gas brazing or vacuum brazing of low and high alloyed steel. | S: 910-1040°C AT: 1040-1100°C |
| AP 21 KL/KS | L-CuSn 12/CU 202 | Ready-made tin bronze-brazing paste of higher tin content, well dispensable, with very high metal contents for the inert-gas brazing or vacuum brazing of steel and copper. | S: 825-990°C AT: 990-1050°C |
| AP 22 LL | L-CuSn 20 | Ready-made tin bronze-brazing paste of very high tin content, well dispensable, with very high metal contents for the inert-gas brazing or vacuum brazing of steel and copper. | S: 800-890°C AT: 930-980°C |
| AP 22 GS | L-Cu Sn 4 | Ready-made, dispensable brazing paste with high metal contents, containing a high thixotropen support material, rapidly drying in air and burning off free from residue related to the solder atmosphere. Soldering of low, medium and high alloyed steel in inert-gas brazing or vacuum soldering, for example automotive industry. | S: 960-1060°C AT: 1060-1100°C |
| AP 21 CLP | L-SF Cu / CU 104 | Flux free copper brazing paste with high metal contents. It has a high viscosity and dries very slowly in the air. The AP 21 CLP can be successfully used under hydrogen/nitrogen atmospheres and under exothermic gas. AP 21 CLP can be used for material made of non alloyed and alloyed steel. Metal contents 89%. | S: 1100-1150°C AT: 1085°C |

1.3.4. Silver containing brazing pastes, free of cadmium

| | | | |
|---|-------------------|--|---------------------------|
| AP 308 AP 308 V AP 308 OLF | L-Ag72 / AG 401 | Zinc and cadmium free alloy with excellent fluidity. Brazing on 308V steel and stainless steel, copper, copper alloy, nickel and nickel alloy. Induction and resistance heating. Inert-gas brazing or vacuum brazing. | S: 779°C Eut. |
| AP 314 AP 314 FM AP 314 IL AP 314 FL | L-Ag55Sn / AG 102 | Very fluid and low-melting dispensable brazing paste with high silver content, for gap brazing of steel, stainless steel, malleable cast iron, copper, brass, zinc bronze, nickel and nickel-alloys, hard metal. Suitable for joining these metals with each other. Because of the missing cadmium especially suitable for joinings subjected to food. Preferably suitable for induction soldering and all kinds of flame brazing. | S: 620-660°C AT: 650°C |

1.3.5. Silver and cadmium containing brazing pastes

| | | | |
|-----------|-------------------|---|---------------------------|
| AP 306 FM | L-Ag40Cd / AG 304 | The paste is low melting and has excellent fluidity. Gap soldering of steel and stainless steel, malleable cast iron, copper, brass, zinc bronze, nickel, nickel alloy and hard metal. Joining of these metals with each other. Serial manufacturing, apparatus construction, fine mechanics, precisions tools, joining of copper pipes, refrigeration systems, electrical industry, plumbing, installations. For brazing joints with an operational temperature up to 200 °C. The paste AP 306 FM is suitable for the application with FONTARGEN dispensing units. | S: 595-630°C AT: 610°C |
|-----------|-------------------|---|---------------------------|

AT: working temperature S: melting range/melting point



1.3.6. Soldering pastes

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | Working temperature Melting range or melting point |
|-------------|------------------------------------|--|--|
| AP 604/12 | L-Sn 99,9/S-Sn 100 F-SW 12 | Highly active pure zinc tinning soldering paste. Use on copper, brass, steel, Cr-Ni-steel in the food industry and art industry. Dispensable. | S: 232°C |
| AP 612/12 | L-Sn 60Pb/S-Sn 60 Pb 40 F-SW 12 | Highly active zinc-lead soldering paste. Use on copper, brass, steel, non-rusting steel, nickel. Dispensable. Minimum metal content: 80 %. | S: 183-190° C |
| AP 634/12 | L-PbSn 40/S-Pb 60 Sn 40 F-SW 12 | Highly active lead-zinc-tinning soldering paste. Use on copper, brass, steel, nickel. Used in the car-body construction. Tinning of copper sheet, Dispensable. Minimum metal content: 60% | AT: 230° C S: 183-235° C |
| AP 654/12 | L-Sn Ag 5/S-Sn 96 Ag 4 F-SW 12 | Highly active silver containing, lead free tinning soldering paste. Use on stainless steel, steel, copper and copper alloy in the food and refrigeration industry. Minimum metal content: 60%. Dispensable. | S: 221-240°C |
| AP 644/21 | L-Sn Cu 3/S-Sn 97 Cu 3 F-SW 21 | Copper containing, lead free tinning soldering paste on zinc base. Use on steel, copper and copper alloy in the food industry. Approval for the sanitation installation according to DVGW process sheet GW 2. Dispensable. Minimum metal content: 60%. | S: 230-250° C |
| AP 654/21 | L-SnAg 5/S-Sn 96 Ag 4 F-SW 21 | Silver containing, lead-free tinning soldering paste on zinc base. Use on steel, copper and copper alloy for the food industry. Dispensable. Minimum metal content: 60% | S: 230-250°C |
| AP 612/26 | L-Sn 60 Pb/S-Sn 60 Pb40 F-SW 26 | Soft solder paste for tinning and soldering of copper in the electrical industry. Colophony-based, noncorrosive flux. Metal content: 78-80%.. | S: 183-190°C |
| AP 638/26 | S-SnCu1/Leg. Nr. 23 | Soft solder paste with high metal content, colophony-based, noncorrosive flux. Soldering of copper used in the solar industry. | S: 230-240°C AT: 240°C |
| AP 638/26 N | S-SnCu3/Leg. Nr.24 | Soft solder paste with high metal content and a colophony-based, noncorrosive flux for soldering of copper in the solar industry. Suitable for soft soldering in cold and hot water installation technique. | S: 230-250°C AT: 250°C |

AT: working temperature S: melting range/melting point

1.3.7. Nickel-based brazing pastes

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | Working temperature Melting range or melting point |
|----------------|---------------------------------|--|--|
| HTL1/HTL 1 AP | L-Ni1/ NI 101 | For joinings subjected to high thermal and dynamic exposure, for example turbine blades, as well as components in the hot range of jet engines, iron, nickel, cobalt and special material. Suitable for metal parts with high lateral cuts. High stability, heat and oxidation resistant, high diffusibility. | S: 1066-1204°C AT: 1175°C |
| HTL2/HTL2 AP | L-Ni2 / NI 102 | For joinings subjected to high thermal and dynamic exposures. The brazing alloy allows the processing in the optimum brazing range. Turbine blades, as well as components in the hot range of jet engines. Iron, nickel, cobalt and special metal materials. | S: 1010-1177°C AT: 1040°C |
| HTL2/HTL2 APD | L-Ni2 / NI 102 | Brazing paste with low solvent content for laminar brazing joints (silk screen printing). For joinings subjected to highly thermal and dynamic exposure. The brazing alloy allows the processing in the optimum brazing range. Turbine blades as well as components in the hot area of jet engines. Iron, nickel, cobalt and special metal material. | S: 1010-1177°C AT: 1040°C |
| HTL5/HTL5 AP | L-Ni5 / NI 105 | HTL 5-brazing alloy is very good for highly strained joints and is highly resistant to oxidation. The missing of boron allows the use in the nuclear area. Iron material, nickel material, cobalt material and special metal material. | S: 1149-1204°C AT: 1190°C |
| HTL6/HTL6 AP | L-Ni6 / NI 106 | Very high wettability. No erosion when brazing Fe or Ni base basic material. Useable on currentless Ni P-coated components, iron, nickel, cobalt and special metal material. Suitable in the food industry. | S: 927-1093°C AT: 980°C |
| HTL7/HTL7 AP | L-Ni7 / NI 107 | The paste is being used for brazing on thin-walled pipes on Honeycomb structures, as well as on parts for the nuclear technique. Very suitable for high performance, vacuum tight, high temperature and corrosion resistant joints, suitable in the food industry. The ductility of the brazing can be enlarged by the extension of the holding period. Iron, nickel, cobalt and special metal material. | S: 927-1093°C AT: 980°C |
| HTL14/HTL14 AP | L-Au82Ni/AU 105 | HTL 14 is being used in a large application field in jet engine plant design. This standard-Au-Ni-brazing alloy is being used universally for the brazing of steel and Ni-alloy, where a high consistence and an excellent high temperature-/ corrosion resistance is required. 0,15 Pa vacuum (1x10Torr) hydrogen (dew point) -51 °C), argon (dew point -62 °C) | S: 949-1004°C AT: 950°C |
| HTL17/HTL17 AP | L-Cu87Mn Ni | Soldering of tools, base metals: steel, hard metal, tungsten, molybdenum, tantalum. Brazing alloy with good wetting and fluidity Inert-gas brazing under gaped ammonia (NH3) and vacuum brazing . | S: 980-1030°C AT: 1120°C |

AT: working temperature S: melting range/melting point

Delivery types: cartridge, cans, buckets, dual-use container



1.4 Dispensing units

Discover the advantages of reproducible work using the rational employment of brazing- and flux pastes. By using the Fontargen dispensing technique it is possible to place time saving micro points and tracks or to fill grooves.

All-purpose, dependable and environmentally sound, the single components with the matching dispensing cartridge and dispensing needles can be integrated in the existing workstations. A detailed information brochure is available upon request.

1.5 Solders

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | Working temperature Melting range or melting point |
|-------------|--|---|--|
| A 604 | L-Sn Zn 40 2.3830 | A friction solder for step soldering (first solder) and sealing of blowholes and tears on cast iron and aluminium cast iron. Filling of dents in aluminium sheets. | S: 200-340°C |
| A/AF 605 | L-Sn Pb Cd 18/ S-Sn 50/Pb 32 Cd 18 2.3618 | Low-melting eutectic solder for joining of steel, copper and copper alloys. Especially suitable for difficult jobs on parts which can only be subjected to minor heat exposure. Second solder for step soldering. | S: 145°C |
| A 611 | L-Sn Ag 5/ S-Sn 96 Ag 4 2.3690 | Lead and cadmium free soft solder material. Elegant flow characteristics. Especially suitable for soldering on Cr-Ni-steel as well as water installations according to DVGW- process sheet GW2 and in the food industry. Cold resistant up to -200°C. | S: 221°C |
| A/AF 612 | LSn 60 Pb/ S-Sn 60 Pb 40 2.3660 | Antimony free solder alloy for general soldering work on iron and copper material, also suitable for tinning. AF 612 only for soldering on copper. | S: 183-190°C |
| A/AF 618 | L-Sn 60 Pb Cu 2/ S-Sn 60 Pb 38 Cu 2 2.3662 | Antimony free solder alloy for general soldering work on iron and copper material. AF 618 only for soldering on copper. | S: 183-190°C |
| A 627 | L-Sn Sb 5/ S-Sn 95 Sb 5 2.3695 | Solder alloy for the heating and cooling industry, pipe installations. Cold resistant up to -200 °C. | S: 230-240°C |
| A 630 | L-Sn 50 Pb/ S-Pb 50 Sn 50 2.3650 | Classical lead-zinc solder alloy for general soldering work. Solder with a larger melting interval. Good wetting on copper and copper alloy, steel. | S: 183-215°C |
| A 630-30/70 | L-Pb Sn 30 (Sb)/ S-Pb 70 Sn 30 2.3430 | Lead-zinc-solder alloy with largest melting range for general soldering work on steel and copper. Gap bridgeable. | S: 183-255° C |
| A 630-40/60 | L-Pb Sn 40 (Sb)/ S-Pb 60 Sn 40 2.3440 | Lead-zinc-solder alloy with large melting interval, gap bridgeable. For general soldering on steel and copper, titanium zinc and zinc. | S: 183-235° C |
| A 630-60/40 | L-Sn 60 Pb (Sb)/ S-Sn 60 Pb 40 Sb 2.3665 | Zinc-lead-solder alloy with small melting interval, capillary active. For general soldering on steel and copper. | S: 183-190° C |
| A 633 | L-ZnAl 3 | Solder for soldered joints on aluminium and aluminium alloy, as well as copper-aluminium. | S: 430-450° C |
| A 644 | L-SnCu 3/S-Sn 97 Cu 3 2.3691 | Copper containing, lead free zinc base-solder. Water installation according to DVGW-work sheet GW 2 and suitable in the food area. | S: 230-250° C |

AT: working temperature S: melting range/melting point

Delivery types:

Rods: 500 mm round
Triangular rods
Spools 0,25/0,5/1,0 kg
Additional delivery types upon request



1.6 Fluxes

| Type | Characteristic Application |
|------------|---|
| F 100 | Flux paste according to DIN 8511: F-SH 2/FH 21. Active temperature range: 750-1100 °C. Suitable for brass and nickel silver brazing onto steel, malleable cast iron, cast iron and copper. |
| F 120 | Flux powder according to DIN 8511:F-SH2/FH 21. Active temperature range: 750-110 °C. Suitable for brass and nickel silver soldering onto steel, malleable cast iron, cast iron and copper. |
| RAPIDFLUX | Liquid flux according to DIN 8511:F-SH2/FH 21. Use with RAPIDFLUX-equipment. The torch receives the solder flux through an acetylene hose. Suitable for brass and nickel silver solder. |
| F 300 | Standard flux-powder according to DIN 8511: F-SH/FH 10. Active temperature range: 500-800 °C. Use on silver brazing alloys onto steel, Cr-Ni-steel, copper and copper alloy, nickel and nickel alloy. |
| F 300 F | Flux-paste according to DIN 8511: F-SH1/FH 10, Avoids red stains while brazing thin brass parts. |
| F 300 HF | Flux-paste according to DIN 8511: F-SH 1/FH 12. Active temperature range: 500-800 °C. Use on silver brazing alloys onto chromium, chromium-nickel and carbon steel, especially during a longer heat up time. |
| F 300 AB | Flux-paste according to DIN 8511: F-SH 1 a/FH 11 Active temperature range: 500-800 °C. This paste is being used for brazing of aluminium-bronze or Al-alloyed brass by use of silver hard solder. |
| F 300 S | Flux-paste according to DIN EN 1045; FH 10. Active temperature range: 500-800 °C. Use on silver brazing alloys onto steel, Cr-Ni-steel, nickel and nickel alloy, copper and copper alloy. Suitable for spraying and dispensing. |
| F 400 M | Flux-powder according to DIN 8511: F-LH1/FL 10 for the brazing of aluminium and some aluminium alloys. The powder is low-melting and hygroscopic (corrosive). |
| F 400 NH | Flux-powder according to DIN 8511: F-LH2/FL 20 for the brazing of aluminium and some aluminium alloys. The powder is not hygroscopic (noncorrosive). |
| F 600 | Aqueous flux according to DIN 8511: F-SW 12/3.1.1.A. A corrosive flux, very active, suitable for the soldering on steel and Cr-Ni-steel. |
| F 600 S 15 | Aqueous flux according to DIN 8511: F-SW 11/3.2.2.A. A very corrosive flux, extremely active, suitable for difficult soldering Cr-Ni-alloy, gutters made of titanium zinc and zinc. |
| F 600 C | Soldering grease-flux according to DIN 8511:F-SW 21/3.1.1.C. Lightly activated, suitable for the soldering of copper and copper alloys.. |
| F 600 CC | Flux paste according to DIN 8511: F-SW 26/1.1.2.C. Noncorrosive flux for the soldering of copper, especially used in the electrical industry. |
| F 600 Al | Soldering oil-flux according to DIN 8511:F-LW 3/2.1.2. Suitable for the soldering of aluminium, copper, copper alloys. |
| F 600 CW | Flux paste according to DIN 8511:F-SW 21/3.1.1.C. for the soldering. Suitable according to DVGW-process sheet GW2 for the copper pipe installation. Applicable also on brass and red cast iron. |
| F 600 LW | Soldering water according to DIN 8511: F-SW 12/3.2.2.A. Corrosive, for the soldering of heavy metal. |
| F 600 ZN | Special flux for the soldering of aluminium and aluminium alloys, preferably with high zinc containing solder. Active temperature range: 400-500 °C. |

Delivery types: bottles, cans, buckets, canisters



2. Welding for various applications

2.1. Welding rods

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | property values of filler metal |
|------|---------------------------------|-------------------------------|------------------------------------|
|------|---------------------------------|-------------------------------|------------------------------------|

2.1.1. Welding of copper and copper alloys

| | | | |
|------------|---------------------------|--|---|
| A 200 W | SG-Cu-Ag 2.1211 | Copper welding rod for gas- and MIG-welding of pure copper. Recommended according to DVGW-Process-sheet Nr. GW 2 for copper pipes (gas/water). | Z: 200-280 N/mm ² D: >18% |
| A 200 SW | SG-Cu Sn 2.1006 | Copper welding rod for MIG-welding of copper and low-alloy copper-alloys. | Z: 200-240 N/mm ² D: ≥ 30 % |
| A 202 W | SG-Cu Si 3 2.1461 | Copper-Silicon welding rod for MIG-welding of copper-alloys. Surfacing on steel and cast iron. MIG-welding of galvanized steel. | Z: ≥ 390 N/mm ² D: 46% |
| A 203/6 W | SG-Cu Sn 6 2.1022 | Cu-Sn-welding rod for MIG-welding of copper material, ferrite material and cast iron. Noncorrosive and heat-resistant alloy | Z: 330-360 N/mm ² D: >30% |
| A 203/12 W | SG-Cu Sn 12 2.1056 | Cu-Sn-welding rod for MIG-welding of copper and ferrite material. Noncorrosive and heat-resistant alloy | Z: 390-440 N/mm ² D: 25-28% |
| A 207 W | SG-Cu Si 2 Mn 2.1522 | Copper-silicon-manganese welding rod for MIG welding of galvanized steel sheets, welding of apparatus copper. | Z: 340 N/mm ² D: bis 40% |
| A 215/8 W | SG-Cu Al 8 2.0921 | Copper-aluminium welding rod for MIG welding of aluminium bronzes. Noncorrosive and saltwater-proof alloy. | Z: 400-480 N/mm ² D: 52% |
| A 216 W | SG-Cu Al 8 Ni 2 2.0922 | Welding rod made of nickel-bearing multi-alloyed aluminium-bronze for MIG-welding of material of same or similar kind. Saltwater-proof and noncorrosive. | Z: 530-590 N/mm ² D: >30% |
| A 512/30 W | SG-Cu Ni 30 Fe 2.0837 | Cu-Ni-welding rod for MIG-welding of Cu-Ni-Fe-alloys. Approval: G.L. | Z: 380-480 N/mm ² D: >30% |

Z: Tensile strength D: Elongation H: Hardness

2.1.2. Welding of Titanium

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | property values of filler metal |
|-------|---------------------------------|---|---|
| A 850 | SG Ti 2 3.7036 | Pure titanium, unalloyed welding rod for MIG-welding of pure titanium | Z: 390-540 N/mm ² D: 20-22% |

2.2. Wire electrodes and cored-wire electrodes

2.2.1. Welding of copper and copper alloy

| | | | |
|--------------|--------------------------|--|--|
| A 200 M | SG-CuAg 2.1211 | Cu-wire electrode; MIG-welding of pure copper | Z: 200-280 N/mm ² D: >18 % |
| A 200 SM | SG-CuSn 2.1006 | Cu-wire electrode; MIG-welding of copper and low-alloy copper | Z: 200-240 N/mm ² D: >30 % |
| A 202 M | SG-CuSi 3 2.1461 | Cu-Si-alloyed wire electrode; MIG-welding of copper-alloys. Surfacing of steel and cast iron. MIG-welding of galvanized steel. | Z: >390 N/mm ² D: 46 % |
| A 203/6 M | SG-CuSn 6 2.1022 | Cu-Sn wire electrode; MIG-welding of copper and iron material. Noncorrosive and heat-resistant alloy | Z: 330-360 N/mm ² D: >30 % |
| A 203/12 M | SG-CuSn 12 2.1056 | Copper-tin wire electrode with higher tin content for MIG-welding of copper and iron materials. Noncorrosive and heat resistant alloy. | Z:390-440 N/mm ² D:25-28 % |
| A 207 M | SG-CuSi 2 Mn 2. 1522 | Cu-Si-Mn wire electrode for MIG- and MAG-welding of galvanized steel plates and apparatus copper | Z:>300 N/mm ² D:bis 40 % |
| A 2115/8 M | SG-CuAl 8 2.0921 | Copper-aluminium-wire electrode for MIG-welding of aluminium bronze, steel and cast iron. Noncorrosive and saltwater-resistant alloy. MIG-welding of galvanized steel. | Z:380-450 N/mm ² D: >45 % |
| A 2115/5 NiM | SG-CuAl 5 Ni 2 | Multi alloy aluminium bronze electrode for MIG-welding of related and similar basic material. MIG-welding of steel. | Z:360-450 N/mm ² D: >45 % |
| A 216 M | SG-CuAl 8 Ni 2 2.0922 | Multi alloy aluminium bronze electrode for MIG-welding of related and similar basic material, steel and cast iron. Noncorrosive and saltwater-resistant alloy. | Z: 530-590 N/mm ² D: >30% |

Z: Tensile strength D: Elongation H: Hardness

2.2.2. Welding of wear resistant applications

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | property values of filler metal |
|----------|---------------------------------|--|--|
| A 7101 M | MSG 2-GZ-350/S Fe 1 1.8405 | Low-alloyed Mn-Cr-steel wire electrode for MAG-welding of medium hard prone to wear construction units | H: 340-395 HV 325-375 HB 35-40 HRC |
| A 7111 M | MSG 6-60-P / S Fe 2 1.4718 | Wire electrode made of wear proof Cr-Si steel for MAG-welding of wear and impact strained construction units | H: 650-775 HV 56-62 HRC |

2.2.3. Cored wire electrodes, self shielding (open arc)

| Type | Norm DIN/DIN EN Material No. | Characteristic Application | property values of filler metal | current type |
|-----------------|--|---|--|----------------------|
| FONTARFILL 7003 | T 42 ZZ N 2 | Self-shielding cored wire electrode for metal arc welding , very suitable for welding on low alloyed, galvanized or aluminised steel. For car body work and maintenance. Deliverable starting at 0,9 mm diameter. | Z: >520 N/mm ² D: 15-24% | = (-) at the wire |
| FONTARFILL 7015 | MF 8 - GF - 150/ 400 KNZR 1.4370 | Self shielding cored wire electrode of 18/8/6 type for joint welding and buffering. Austenitic strain-hardened weld material. | Z: >580 N/mm ² H: 160-180 HB | = (+) at the wire |
| FONTARFILL 7065 | MF 10 - GF - 65 - GTZ | Self shielding cored electrode, special alloy for extreme wear off, suitable for temperatures up to 600° C | H: 63 HRC | = (+) at the wire |
| FONTARFILL 7068 | MF 10 - GF - 65 - G | Self shielding cored wire electrode for extreme mineral abrasion and medium impact strain. | H: ca. 64 HRC | = (+) at the wire |

Delivery forms **wire:** **Diameter: 0,8/1,0/1,2 mm**
Spool body K 300, barrel spool, eco-drums
Additional delivery forms on request

2.3. Welding consumables for maintenance and repair

2.3.1. Welding of copper and copper alloys

2.3.1.1. Stick electrode-welding

| Type | Characteristic Application |
|-------|--|
| E 218 | Tin-bronze-stick electrode for joining of copper-tin and copper-zinc alloys. For wear-resistant application on steel, cast steel and cast iron. Good gliding properties. |

2.3.1.2.. WIG-and gas welding

| | |
|---------|---|
| A 200 W | Silver alloyed copper welding rod for TIG- and gas-welding of copper. Recommended according to DVGW/GW2 on copper pipes for gas and drinking water. |
|---------|---|

2.3.1.3. MIG welding

| | |
|------------|--|
| A 200 SM | Copper-wire electrode for welding of copper and low alloyed copper types. |
| A 203/12 M | Cu-Sn-wire electrode for welding of copper and low alloyed steel. Surfacing of steel and cast iron. Welding of brass and red cast. |
| A 216 M | Aluminium-tin-wire-electrode for joining of low alloyed steel and aluminium-bronze. Abrasion-corrosion and saltwater resistant. Good gliding properties. |

Z: Tensile strength D: Elongation H: Hardness

2.3.2. Armouring

As a protection of the surface against wear. Selection of welding consumables considering the nature of wear and attrition. Please note that thick applications require intermediate layers from case to case. A pre-warming is required using high carbon base metals, depending on the chemical combination and material thickness.

2.3.2.1. Abrasion

2.3.2.1. Stick electrode welding

E 7225 FE Hardfacing electrode with completely alloyed coat for seams almost free of slag. Suitable for armouring of edges. Hardness: 60-62 HRC.

2.3.2.2. Impact and abrasion

2.3.2.2.1. Stick electrode welding

E 710 Basic covered stick electrode for friction wear. Impact and impact stress. Suitable for impact tools, bearing surfaces, gliding surfaces, matrixes, plungers. Hardness: 40 HRC

E 711 All purpose stick electrode for armouring. For tough, tear resistant applications, also in multiple layers. Extremely suitable for impact and impact stress. Hardness: 56-58 HRC.

E 7245 High capacity hardfacing electrode for usage in extreme abrasion wear during medium impact stress. Wet wear- resistant. Hardness 65 HRC.

2.3.2.2.2. MAG-Welding

Fontarfill 60 Flux cored wire electrode, high alloyed with rupture resistant, tough weld material. For extreme abrasion impact and high impact stress. Hardness: 57-62 HRC.

Fontarfill 712/650 Flux cored wire electrode with metal powder filling, free of slag. The weld metal is tough, non-porous, free of cracks and resistant to impact and abrasion. Hardness: 57-62 HRC.

A 7111 M Solid filler rod for armouring free of cracks. The filler metal is tough and resistant to impact and abrasion. Hardness: 56 – 62 HRC

2.3.2.2.3. WIG- and gas welding

A 711 W Welding rod of wear-free chromium-silicium-steel for tough hard, impact stress applications (edges). Especially suitable for cold working and spraying tools. Hardness: 54-60 HRC.

A 715 Welding rod of tungsten-molybdenum-chromium steel for corrective maintenance of high speed and cold working tools, especially edges. Hardness: 61-64 HRC.

2.3.3. Brazing of low alloyed steel and cast iron

AF 305 Flux coated, low temperature silver hard brazing alloy for gap brazing of steel, malleable cast iron, copper and copper alloys. Good gap bridging, high elongation; working temperature: 680° C.

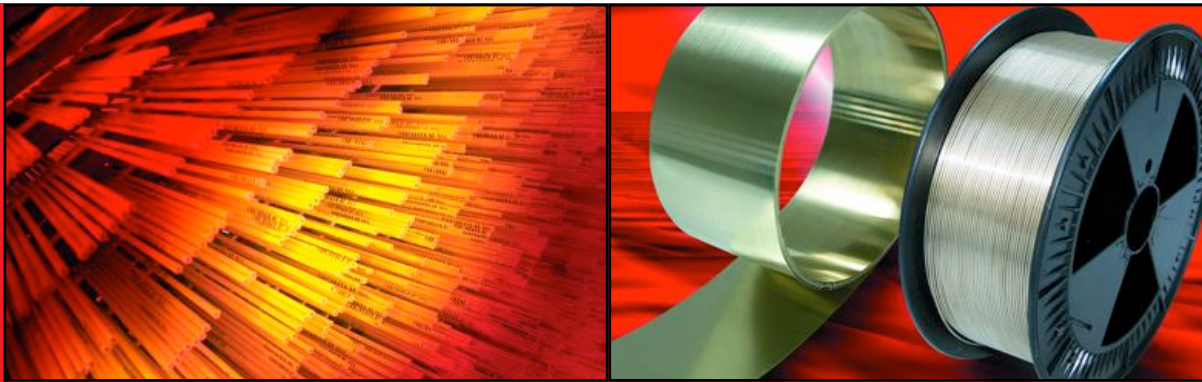
AF 314 Flux coated, low temperature cadmium free silver hard alloy, all-purpose use, also on constructional parts for the food processing industry. High elongation, working temperature: 650 ° C.

Table of Materials

Welding of copper and copper alloy

FONTARGEN Welding Consumables

| Material No. | Material description | WIG-TIG-welding | MIG-welding | gas welding |
|--------------|----------------------|--------------------|----------------------|-------------------|
| 2.0060 | E-Cu 57 | A 200 W, A 200 SW | A 200 SM | - |
| 2.0070 | SE-Cu | A 200 W, A 200 SW | A 200 SM | A 200 W/A 200 SW |
| 2.0080 | F-Cu | A 200 SW | A 200 SM | A 200 SW |
| 2.0090 | SF-Cu | A 200 W, A 200 SW | A 200 SM | A 200 W/ A 200 SW |
| 2.0100 | D-Cu | A 200 SW | A 200 SM | A 200 SW |
| 2.0110 | SD-Cu | A 200 W, A 200 SW | A 200 SM | A 200 W/A 200 SW |
| 2.0120 | C-Cu | A 200 SW | A 200 SM | A 200 SW |
| 2.0150 | SB-Cu | A 200 W, A 200 SW | A 200 SM | A 200 W/A 200 SW |
| 2.0170 | SA-Cu | A 200 W, A 200 SW | A 200 SM | A 200 W/A 200 SW |
| 2.0220 | Cu Zn 5 | A 202 W, A 203/6 W | A 202 M | A 210, A 203/6 W |
| 2.0230 | Cu Zn 10 | A 202 W, A 203/6 W | A 202 M | A 210, A 203/6 W |
| 2.0240 | Cu Zn 15 | A 202 W, A 203/6 W | A 202 M | A 210, A 203/6 W |
| 2.0250 | Cu Zn 20 | A 203/6 W, A 202 W | A 203/6 M | A 210, A 203/6 W |
| 2.0280 | Cu Zn 33 | A 203/6 W, A 202 W | A 203/6 M | A 210, A 203/6 W |
| 2.0321 | Cu Zn 37 | A 203/6 W | - | A 210 |
| 2.0335 | Cu Zn 36 | A 203/6 W | - | A 210 |
| 2.0360 | Cu Zn 40 | A 203/6 W | . | A 210 |
| 2.0460 | Cu Zn 20 Al 2 | A 215/8 W | (A215/8 M) | - |
| 2.0470 | Cu Zn 28 Sn | A 203/6 W, A 202 W | A 215/8 M, A 203/6 M | A 211 |
| 2.0490 | Cu Zn 31 Si | A 203/6 W, A 202 W | A 203/6 M, A 202 M | - |
| 2.0510 | Cu Zn 37 Al | A 215/8 W | A 215/8 M | A 210 |
| 2.0515 | Cu Zn 30 Al | A 215/8 W | A 215/8 M | A 210 |
| 2.0530 | Cu Zn 39 Sn | A 203/6 W | A 203/6 M | A 210 |
| 2.0540 | Cu Zn 3S Ni | A 203/6 W | A 203/6 M | A 210 |
| 2.0550 | Cu Zn 40 Al 2 | A 203/6 W, A 202 W | A 203/6 M | A 210 |
| 2.0571 | Cu Zn 40 Ni | A 203/6 W, A 202 W | A 203/6 M | A 210 |
| 2.0572 | Cu Zn 40 Mn | A 203/6 W, A 202 W | A 203/6 M | A 210 |
| 2.0730 | Cu Ni 12 Zn 24 | A 512/30 W | - | - |
| 2.0740 | Cu Ni 18 Zn 20 | A 512/30 W | - | - |
| 2.0750 | Cu Ni 25 Zn 15 | A 512/30 W | - | - |
| 2.0806 | Cu Ni 5 | A 512/30 W | A 512/30 M | - |
| 2.0812 | Cu Ni 10 | A 512/30 W | A 512/30 M | - |
| 2.0818 | Cu Ni 15 | A 512/30 W | A 512/30 M | - |
| 2.0822 | Cu Ni 20 | A 512/30 W | A 512/30 M | - |
| 2.0830 | Cu Ni 25 | A 512/30 W | A 512/30 M | - |
| 2.0836 | Cu Ni 30 | A 512/30 W | A 512/30 M | - |
| 2.0842 | Cu Ni 44 | A 512/30 W | A 512/30 M | - |
| 2.0853 | Cu Ni 1,5 Si | A 202 W | A 202 M | - |



| | | | | | | | | | | | | | | |
|-----------|---|----------|-----------------------------|------|-----------|------------------|-------------------|--------------------------|--------------------------------|------------------------------|------|------|--------|----------|
| FONTARSEN | DIN EN 1044 (Brazing) EN 29463 (Soldering) | DIN 8613 | Deep temperature resistance | Flux | Delivery | | | | | | | | | |
| | | | | | Rods bare | Square rods bare | Rods flux- coated | Rods flux- coated (thin) | Rods flux- coated (extra-thin) | Rods flux- coated (flexible) | Foil | Wire | Powder | Preforms |

Copper - Copper ① Copper - Brass ②

Brazing

Overlapping joint

| | | | | | | | | | | | | | | | | | | | | |
|----------|----------|------------|--------|-----------------|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| A 2004 | CP 203 | L-Cu P 6 | -20 °C | · ① / F 300 S ② | ■ | | | | | | | | | | | | | | | |
| A 3002 V | CP 105 | L-Ag 2 P | -20 °C | · ① / F 300 S ② | | ■ | | | | | | | | | | | | | | |
| A 3005 V | CP 104 | L-Ag 5 P | -40 °C | · ① / F 300 S ② | | ■ | | | | | | | | | | | | | | |
| A 3005 S | ~ CP 104 | ~ L-Ag 5 P | -60 °C | · ① / F 300 S ② | ■ | | | | | | | | | | | | | | | |
| A 3015 V | CP 102 | L-Ag 15 P | -70 °C | · ① / F 300 S ② | ■ | ■ | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | |
|-------|--------|------------|---------|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A 319 | AG 106 | L-Ag 34 Sn | -200 °C | F 300 S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| A 340 | AG 105 | L-Ag 40 Sn | -200 °C | F 300 S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| A 320 | AG 104 | L-Ag 45 Sn | -200 °C | F 300 S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| A 314 | AG 103 | L-Ag 55 Sn | -200 °C | F 300 S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

Blunt joint

| | | | | | | | | | | | | | | | | | | | | |
|-------|--------|---------|---------|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A 311 | AG 203 | L-Ag 44 | -200 °C | F 300 S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
|-------|--------|---------|---------|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Soldering

Overlapping joint

| | | | | | | | | | | | | | | | | | | | | |
|-------|--------------|--|---------|---------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| A 611 | S-Sn 96 Ag 4 | | -200 °C | F 600 C | | | | | | | | | | | | | | | | |
| A 627 | S-Sn 95 Sb 5 | | -200 °C | F 600 C | | | | | | | | | | | | | | | | |

Copper - Steel (austenitic) ③ (ferritic) ④

Brazing

Overlapping joint

| | | | | | | | | | | | | | | | | | | | | |
|-------|--------|------------|----------------------|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A 319 | AG 106 | L-Ag 34 Sn | -200 °C ③ / -70 °C ④ | F 300 S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| A 340 | AG 105 | L-Ag 40 Sn | -200 °C ③ / -70 °C ④ | F 300 S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| A 320 | AG 104 | L-Ag 45 Sn | -200 °C ③ / -70 °C ④ | F 300 S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| A 314 | AG 103 | L-Ag 55 Sn | -200 °C ③ / -70 °C ④ | F 300 S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

Blunt joint

| | | | | | | | | | | | | | | | | | | | | |
|-------|--------|---------|----------------------|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A 311 | AG 203 | L-Ag 44 | -200 °C ③ / -70 °C ④ | F 300 S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
|-------|--------|---------|----------------------|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Soldering

Overlapping joint

| | | | | | | | | | | | | | | | | | | | | |
|-------|--------------|--|----------------------|-------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| A 611 | S-Sn 96 Ag 4 | | -200 °C ③ / -70 °C ④ | F 600 | | | | | | | | | | | | | | | | |
|-------|--------------|--|----------------------|-------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

Aluminium - Aluminium

Brazing

| | | | | | | | | | | | | | | | | | | | | |
|---------|--------|------------|---------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A 407 L | AL 104 | L-Al Si 12 | -200 °C | F 400 D2 ⑤ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | | | | F 400 NHD ⑥ | | | | | | | | | | | | | | | | |

⑤ DIN EN 1045: FL 10: korrosive residues to be removed

⑥ DIN EN 1045: FL 20: Residues non-corrosive in general. Keep dry

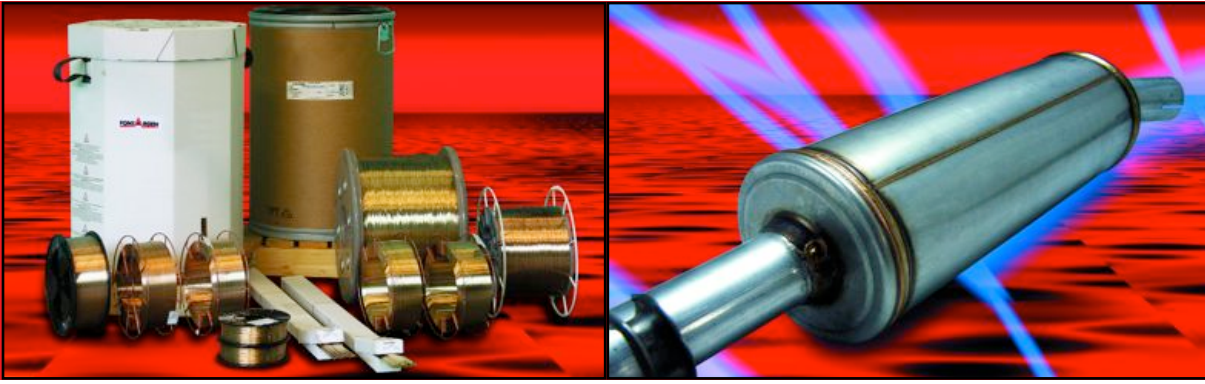
Soldering

| | | | | | | | | | | | | | | | | | | | | |
|-------|--------------|--|--------|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| A 608 | L-Pb Sn Cd 4 | | -70 °C | F 600 AL | | | | | | | | | | | | | | | | |
| A 633 | L-Zn Al 4 | | -70 °C | F 600 Zn | | | | | | | | | | | | | | | | |

Aluminium - Copper

Soldering

| | | | | | | | | | | | | | | | | | | | | |
|-------|-----------|--|--------|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| A 633 | L-Zn Al 4 | | -70 °C | F 600 Zn | | | | | | | | | | | | | | | | |
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Notes:



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