voestalpine Böhler Welding
www.voestalpine.com/welding

voestalpine
ONE STEP AHEAD.

Handbook
for brazing consumables

Nominal charge: 5,- €

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Group 1

Brazing and soldering alloys

a) Brazing alloys: Rods, Wire, Foil
b) Brazing alloys: Pastes
c) Soldering alloys: Rods, Wire
d) Soldering alloys: Pastes
e) High-temperature brazing alloys: Rods, Wire, Foil
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a) Brazing alloys: Rods, Wire, Foil

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b) Brazing alloys: Pastes

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d) Soldering alloys: Pastes

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e) High-temperature brazing alloys: Rods, Wire, Foil

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f) High-temperature brazing alloys: Pastes, Powder

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FONTARGEN A 101
High strength brazing alloy

ISO 17672:	Cu 773
DIN EN 1044:	CU 305
DIN 8513:	L-CuNi10Zn42
EN ISO 3677:	B-Cu48ZnNi(Si)-890/920
AWS A 5.8:	RBCuZn-A
Material-no.:	2.0711

Composition, typical analysis (% w/w)**:**

Cu	Ni	Si	Mn	Sn	Zn
48	9.5	0.25	< 0.2	< 0.2	Remainder

Mechanical and physical properties:

Working temperature:	910 °C
Melting range:	890 - 920 °C
Specific gravity:	8.7 g/cm³
Tensile strength:	690 N/mm²
Elongation:	15 - 20 %

Characteristics / Applications:
Nickel-bearing filler metal of high strength and good fluidity. Suitable for brazing of steel, cast iron, malleable cast iron, nickel and nickel alloys. Suitable for brazing and hardening in one production step. It is very often used in the steel furniture industry.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 100 - Series
Rapidflux - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☒	☒	☒

13/11/JL/1

FONTARGEN A 102
High strength German silver brazing alloy

ISO 17672	Cu 773 (modified)
DIN EN 1044:	CU 305 (modified)
DIN 8513:	L-CuNi10Zn42 + Ag
EN ISO 3677:	B-Cu48ZnNiAg(Si)-870/900

Composition, typical analysis (% w/w)**:**

Cu	Ni	Ag	Si	Mn	Sn	Zn
48	9.5	1	0.25	< 0.2	< 0.2	Remainder

Mechanical and physical properties:

Working temperature:	890 °C
Melting range:	870 - 900 °C
Specific gravity:	8.2 g/cm³
Tensile strength:	785 N/mm²
Elongation:	17 - 21 %

Characteristics / Applications:
Nickel-bearing filler metal of high strength and good fluidity. Suitable for gap brazing of steel, cast iron, malleable cast iron, nickel and nickel alloys. This alloy is very well suited for butt joints.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 100 - Series
Rapidflux - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☒	☒	☒

13/11/JL/1

FONTARGEN A 210
Brass brazing alloy

ISO 17672:	Cu 470a
DIN EN 1044:	CU 301
DIN 8513:	L-CuZn40
EN ISO 3677:	B-Cu60Zn(Si)-875/895
AWS A 5.8:	RBCuZn-A
Material-no.:	2.0367

Composition, typical analysis (% w/w)**:**

Cu	Si	Sn	Zn
60	0.3	< 0.2	Remainder

Mechanical and physical properties:

Working temperature:	900 °C
Melting range:	875 - 895 °C
Specific gravity:	8.4 g/cm³
Tensile strength:	350 N/mm²
Elongation:	35 %
Electrical conductivity:	15 Sm/mm²
Hardness:	110 BHN

Characteristics / Applications:
Brazing alloy with good flowing properties, hardly sensitive to overheating. Suitable for gap brazing and coating of steel, cast iron, malleable cast iron, nickel and nickel alloys as well as copper and copper alloys with a solidus of > 900 °C.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 100 - Series
Rapidflux - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☒	☒	☒

13/11/JL/1

FONTARGEN A 210 K
Brass brazing alloy

ISO 17672:	Cu 681
DIN EN 1044:	CU 306
DIN 8513:	L-CuZn39Sn
EN ISO 3677:	B-Cu59ZnSn(Ni)(Mn)(Si)-870/890
Material-no.:	2.0533

Composition, typical analysis (% w/w)**:**

Cu	Sn	Si	Mn	Ni	Zn
59	1	0.3	0.6	0.85	Remainder

Mechanical and physical properties:

Working temperature:	900 °C
Melting range:	875 - 895 °C
Specific gravity:	8.4 g/cm³
Tensile strength:	380 - 420 N/mm²
Elongation:	30 %
Hardness:	120 BHN

Characteristics / Applications:
Particularly thin brazing alloy, insensitive to overheating for gap brazing and coating of steel, cast iron, malleable cast iron, nickel and nickel alloys, as well as copper and copper alloys with a solidus of > 900 °C. Also suitable for gap brazing of galvanised steel tubes.

Heat sources:
Acetylene torch, furnace, induction and resistance heating

Flux:
F 100 - Series
Rapidflux - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☒	☐	☐

13/11/JL/1

FONTARGEN A 211
Thin fluid special brass brazing alloy

EN ISO 3677:	B-Cu59ZnAg(Sn)(Ni)(Mn)(Si)-870/890
DIN 8513:	L-CuZn39Sn
Material-no.:	2.0533

Composition, typical analysis (% w/w)**:**

Cu	Sn	Ag	Si	Mn	Ni	Zn
59	0.3	1	0.3	0.6	0.85	Remainder

Mechanical and physical properties:

Working temperature:	890 °C
Melting range:	870 - 890 °C
Specific gravity:	8.4 g/cm³
Tensile strength:	440 N/mm²
Elongation:	30 %
Hardness:	100 - 125 BHN

Characteristics / Applications:
Brazing alloy with good flowing and wetting properties. Applications on galvanised steel does not lead to a destruction of the zinc-coating. For gap brazing of copper and copper alloys with a solidus of > 900 °C, steel, cast iron, malleable cast iron, galvanised steel, nickel and nickel alloys.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 100 - Series
Rapidflux - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☒	☒	☒

13/11/JL/1

FONTARGEN A 211 RF

Brass brazing alloy with flux impressed in grooves

ISO 17672:	Cu 681
DIN EN 1044:	CU 306
DIN 8513:	L-CuZn39Sn
EN ISO 3677:	B-Cu59ZnSn(Ni)(Mn)(Si)-870/890
Material-no.:	2.0533

Composition, typical analysis (% w/w)**:**

Cu	Sn	Si	Mn	Ni	Zn
59	0.3	0.3	0.6	0.85	Remainder

Mechanical and physical properties:

Working temperature:	890 °C
Melting range:	870 - 890 °C
Specific gravity:	8.4 g/cm³
Tensile strength:	440 N/mm²
Elongation:	30 %
Hardness:	100 - 125 BHN

Characteristics / Applications:

Brazing alloy with a set amount of flux. The brazing-flux combination allows simple operation procedures, outstanding flowing properties and perfect bonding to the base metal. For gap brazing and coating of copper and copper alloys with a solidus of > 900 °C, steel, cast iron, malleable cast iron, galvanised steel, nickel and nickel alloys.

Heat sources:

Acetylene torch, induction and resistance heating

Flux:

F 100 - Series
Rapidflux - Series

Approval:

Germanischer Lloyd (G.L.)

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☐	☐	☐	☐	☐

13/11/JL/1

FONTARGEN A 204 Copper-phosphorus alloy

ISO 17672:	CuP 182
DIN EN 1044:	CP 201
DIN 8513:	L-CuP8
EN ISO 3677:	B-Cu92P-710/770
AWS A 5.8:	BCuP-2
Material-no.:	2.1465

Composition, typical analysis (% w/w)**:**

Cu	P
92.2	7.8

Mechanical and physical properties:

Working temperature:	720 °C
Melting range:	710 - 770 °C
Specific gravity:	8.0 g/cm³
Tensile strength:	250 N/mm²
Elongation:	5 %
Electrical conductivity:	3.5 Sm/mm²

Characteristics / Applications:
Filler metal with very good flowing properties and high capillarity. Suitable for gap brazing of copper and copper alloys. Joint-brazing at working temperatures between -20 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:
Acetylene torch, induction and resistance heating, TIG-torch.

Flux:
Only copper alloys require the use of flux
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☐	☒	☒

13/10/JL/1

FONTARGEN A 2003 Copper-phosphorus alloy

ISO 17672:	CuP 180
DIN EN 1044:	CP 202
DIN 8513:	L-Cu P 7
EN ISO 3677:	B-Cu93P-710/820
AWS A 5.8:	BCuP-2
Material-no.:	2.1463

Composition, typical analysis (% w/w)**:**

Cu	P
93	7

Mechanical and physical properties:

Working temperature:	730 °C
Melting range:	710 - 820 °C
Specific gravity:	8.1 g/cm³
Tensile strength:	250 N/mm²
Elongation:	5 %

Characteristics / Applications:
Filler metal with good flowing properties and capillarity. Suitable for gap brazing of copper and copper alloys. Joint-brazing at working temperatures between -20 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:
Acetylene torch, induction and resistance heating, TIG-torch.

Flux:
Only copper alloys require the use of flux
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☐	☒	☒

13/10/JL/1

FONTARGEN A 2004 Copper-phosphorus alloy

ISO 17672:	CuP 179
DIN EN 1044:	CP 203
DIN 8513:	L-CuP6
EN ISO 3677:	B-Cu94P-710/890
Material-no.:	2.1462

Composition, typical analysis (% w/w)**:**

Cu	P
93.8	6.2

Mechanical and physical properties:

Working temperature:	760 °C
Melting range:	710 - 890 °C
Specific gravity:	8.1 g/cm³
Tensile strength:	250 N/mm²
Elongation:	5 %

Characteristics / Applications:
Filler metal with good flowing properties and capillarity. Suitable for gap brazing of copper and copper alloys. Joint-brazing at working temperatures between -60 °C and +150 °C*. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:
Acetylene torch, induction and resistance heating, WIG-torch.

Flux:
Only copper alloys require the use of flux
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☐	☒	☒

13/10/JL/1

*Ascertained by notched flexural impact tests according to DIN EN 10045

FONTARGEN A 2005 Copper-phosphorus-tin alloy

ISO 17672:	CuP 386
DIN EN 1044:	CP 302
DIN 8513:	L-CuSnP7
EN ISO 3677:	B-Cu86SnP-650/700

Composition, typical analysis (% w/w)**:**

Cu	Sn	P
86.2	7	6.8

Mechanical and physical properties:

Working temperature:	690 °C
Melting range:	650 - 700 °C
Specific gravity:	8.8 g/cm³
Tensile strength:	250 N/mm²

Characteristics / Applications:
Filler metal with good flowing properties and capillarity. Suitable for gap brazing of copper and copper alloys. Colour very similar to brass. Soldering seam can be easily electroplated. Joint-brazing at working temperatures between -20 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:
Acetylene torch, air-gas torch, induction and resistance heating, TIG-torch.

Flux:
Only copper alloys require the use of flux
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preform	Powder	Paste
☒	☐	☒	☐	☒	☒	☒

13/10/JL/1

FONTARGEN A 2006 Copper-phosphorus-tin alloy

ISO 17672:	CuP 385
EN ISO 3677:	B-Cu87PSnSi-635/675
AWS A5.8:	BCuP-9

Composition, typical analysis (% w/w):

Cu	Sn	P	Si
88.8	6.5	6.5	0.2

Mechanical and physical properties:

Working temperature:	670 °C
Melting range:	637 - 674 °C
Specific gravity:	8.8 g/cm³

Characteristics / Applications:
Filler metal with good flowing properties and capillarity. Suitable for gap brazing of copper and copper alloys. The seam colour is silver-gray. Joint-brazing at working temperatures between -20 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:
Acetylene torch, air-gas torch, induction and resistance heating, TIG-torch.

Flux:
Only copper alloys require the use of flux
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☐	☐	☐	☐	☐

13/10/JL/1

FONTARGEN A 3002
Silver containing copper-phosphorus alloy

ISO 17672:	CuP 279
EN ISO 3677:	B-Cu92PAg-645/825
DIN EN 1044:	CP 105
DIN 8513:	L-Ag2P
Material-no.:	2.1467

Composition, typical analysis (% w/w)**:**

Ag	Cu	P
2	91.7	6.3

Mechanical and physical properties:

Working temperature:	740 °C
Melting range:	645 - 825 °C
Specific gravity:	8.1 g/cm³
Tensile strength:	250 N/mm²
Elongation:	5 %
Electrical conductivity:	4 Sm/mm²

Characteristics / Applications:
Copper-phosphorus alloy with low silver content. This alloy has good gap filling properties and is well suited to bridge wide gaps. Suitable for gap brazing of copper and copper alloys. Approved by DVGW-worksheet GW 2 for copper pipes. Joint-brazing at working temperatures between -60 °C and +150 °C*. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:
Acetylene torch, induction and resistance heating, TIG-torch.

Flux:
Only copper alloys require the use of flux
F 300 - Series

Approval:
DVGW-Worksheet GW 2

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☒	☒	☒

13/10/JL/1

*Acertained by notched flexural impact tests according to DIN EN 10045

FONTARGEN A 3005
Silver containing copper-phosphorus alloy

ISO 17672:	CuP 281
EN ISO 3677:	B-Cu89PAg-645/815
DIN EN 1044:	CP 104
DIN 8513:	L-Ag5P
AWS A 5.8:	BCuP-3
Material-no.:	2.1466

Composition, typical analysis (% w/w)**:**

Ag	Cu	P
5	89	6

Mechanical and physical properties:

Working temperature:	710 °C
Melting range:	645 - 815 °C
Specific gravity:	8.2 g/cm³
Tensile strength:	250 N/mm²
Elongation:	8 %
Electrical conductivity:	5 Sm/mm²

Characteristics / Applications:
Copper-phosphorus alloy with low silver content, good flowing properties and high ductility. Suitable for gap brazing of copper and copper alloys. Joint-brazing at working temperatures between -60 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:
Acetylene torch, induction and resistance heating, TIG-torch.

Flux:
Only copper alloys require the use of flux
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☒	☒	☒

13/10/JL/1

FONTARGEN A 3015
Copper-phosphorus alloy with high silver content

EN ISO 17672:	CuP 284
DIN EN 1044:	CP 102
DIN 8513:	L-Ag15P
EN ISO 3677:	B-Cu80AgP-645/800
AWS A 5.8:	BCuP-5
Material-no.:	2.1210

Composition, typical analysis (% w/w)**:**

Ag	Cu	P
15	80	5

Mechanical and physical properties:

Working temperature:	700 °C
Melting range:	645 - 800 °C
Specific gravity:	8.4 g/cm³
Tensile strength:	250 N/mm²
Elongation:	10 %
Electrical conductivity:	7 Sm/mm²

Characteristics / Applications:
Thin fluid copper-phosphorus alloy with high silver content and high ductility, even at low temperatures. Suitable for gap brazing of copper and copper alloys. Recommended for joints with strong thermal load and vibrations. Joint-brazing at working temperatures between -70 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:
Acetylene torch, induction and resistance heating, TIG-torch.

Flux:
Only copper alloys require the use of flux
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☒	☒	☒

13/10/JL/1

FONTARGEN A 3018
Copper-phosphorus alloy with high silver content

EN ISO 17672:	CuP 285
DIN 8513:	L-Ag18P
EN ISO 3677:	B-Cu75AgP-645
AWS/ASME/SFA-5.8:	BCuP-8

Composition, typical analysis (% w/w)**:**

Ag	Cu	P
18	75	6,5

Mechanical and physical properties:

Working temperature:	670 °C
Melting range:	643-666°C
Specific gravity:	8.7 g/cm³
Tensile strength:	250 N/mm²
Elongation:	> 10 %

Characteristics / Applications:
Thin fluid copper-phosphorus alloy with high silver content and high ductility, even at low temperatures. Suitable for gap brazing of copper and copper alloys. Recommended for joints with strong thermal load and vibrations. Joint-brazing at working temperatures between -70 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heatsources:
Acetylene torch, air-gas torch, furnace, induction and resistance heating, TIG-torch.

Flux:
Only copper alloys require the use of flux
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☒	☒	☒

13/10/JL/2

FONTARGEN A 303
Silver brazing alloy, cadmium-free

DIN EN 1044:	AG 206
DIN 8513:	L-Ag20
EN ISO 3677:	B-Cu44ZnAg(Si)-690/810

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn
20	44	36

Mechanical and physical properties:

Working temperature:	810 °C
Melting range:	690 - 810 °C
Specific gravity:	8.7 g/cm³
Tensile strength:	380 - 450 N/mm²
Elongation:	25 %
Electrical conductivity:	10.6 Sm/mm²
Hardness:	125 BHN

Characteristics / Applications:
Silver-bearing, cadmium-free brazing alloy insensitive to overheating for gap and joint brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys and carbides. Perfect colour match with brass. The silicon contained in the brazing filler metal can reduce the mechanical property values of welded carbon steels. For brazing joints at working temperatures of max. 300 °C.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☒	☒	☐	☐

13/10/JL/1

FONTARGEN A 308 V
Silver-Copper-Eutectic

ISO 17672:	Ag 272[a]
DIN EN 1044:	AG 401
DIN 8513:	L-Ag72
EN ISO 3677:	B-Ag72Cu-780
AWS A 5.8:	BAg-8

Composition, typical analysis (% w/w)**:**

Ag	Cu
72	28

Mechanical and physical properties:

Working temperature:	780 °C
Melting range:	779 °C (Eutectic)
Specific gravity:	10 g/cm³
Tensile strength:	340 - 390 N/mm²
Elongation:	17 %
Electrical conductivity:	46.1 Sm/mm²

Characteristics / Applications:
Zinc- and cadmium free alloy with good flowing properties for gap brazing in vacuum and for vacuum-sealed joints of alloyed and unalloyed steel, nickel and nickel alloys. Very good vacuum durability even at high temperatures. Also suitable for joints of copper and copper alloys. The brazing alloy is coalesced in vacuum with a minimum purity of 99.9 %.

Heat sources:
Vacuum furnace, inert gas furnace, acetylene torch, induction and resistance heating, TIG-torch

Flux:
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☐	☐	☒	☒	☒	☒	☒

13/10/JL/1

FONTARGEN A 311
Silver brazing alloy, cadmium-free

ISO 17672:	Ag 244
DIN EN 1044:	AG 203
DIN 8513:	L-Ag44
EN ISO 3677:	B-Ag44CuZn-675/735
AWS A 5.8:	BAg-5

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn
44	30	26

Mechanical and physical properties:

Working temperature:	730 °C
Melting range:	675 - 735 °C
Specific gravity:	9.1 g/cm³
Tensile strength:	400 - 480 N/mm²
Elongation:	25 %
Electrical conductivity:	11.2 Sm/mm²

Characteristics / Applications:
Cadmium free brazing alloy with good fluidity and capillary flow characteristics. For gap and joint brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys and carbides. Approval: Marine code VG 81245, section 3. Also suitable for copper pipe installation according to DVGW work certificate GW 2. For brazing joints with a working temperature of max.
300 °C.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 300 - Series

Approval:
Marine code VG 81245, section 3
DVGW work certificate GW 2

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☒	☒	☐	☐

13/10/JL/1

FONTARGEN A 312 F
3-layer-silver brazing foil, cadmium-free

EN ISO 3677: B-Ag49ZnCuMnNi-680/705

Composition, typical analysis (% w/w)**:**

Ag	Zn	Ni	Mn	Cu
49	20.5	0.5	2.5	27.5

Composition refers to the different solder coats

Mechanical and physical properties:

Working temperature:	690 °C
Melting range:	680 - 705 °C
Specific gravity:	9.0 g/cm³
Shear strength:	150 - 300 N/mm² (depends on Co-content of metal)
Elongation:	35 %

Characteristics / Applications:

Copper foil coated with silver brazing filler metal on both sides for the joining of hard metals and carrier steel. The foil is build-up with a ratio 1:2:1. The copper which does not melt during the brazing process relieves the stress that occurs during brazing due to the difference in coefficients of expansion of the hard metal layer and the carrier steel. Compared to A 324, A 312 F has a lower manganese- and nickel content.

Heat sources:

Acetylene torch, induction and resistance heating

Flux:

F 300 - Series, particularly recommendable: F 300 HF Ultra

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☐	☐	☐	☒	☐	☐	☐

13/10/JL/1

FONTARGEN A 314
Silver brazing alloy, cadmium-free

ISO 17672:	Ag 155
DIN EN 1044:	AG 103
DIN 8513:	L-Ag55Sn
EN ISO 3677:	B-Ag55ZnCuSn-630/660
Material-no.:	2.5159

Composition, typical analysis (% w/w)**:**

Ag	Zn	Cu	Sn
55	22	21	2

Mechanical and physical properties:

Working temperature:	650 °C
Melting range:	630 - 660 °C
Specific gravity:	9.4 g/cm³
Tensile strength:	330 - 430 N/mm²
Elongation:	25 %
Electrical conductivity:	7 Sm/mm²
Hardness:	110 BHN

Characteristics / Applications:
Silver-bearing, cadmium-free low melting brazing alloy, insensitive to overheating for gap and joint brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys and carbides. Brazing stainless steel provides the best possible colour match. Suitable for brazing joints which will be used in seawater according to marine code VG 81245, section 3. The absence of cadmium makes it especially suitable for joints destined to come in contact with food. The silicon contained in the brazing alloy can reduce the mechanical property values of welded carbon steels. For brazing joints with a working temperature of max. 200 °C.

Heat sources:
Acetylene torch, air-gas torch, induction and resistance heating

Flux:
F 300 - Series

Approval:
Marine code VG 81245, section 3

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☒	☒	☒	☒

13/10/JL/1

FONTARGEN A 317
Silver brazing alloy, cadmium-free

ISO 17672:	Ag 160
DIN EN 1044:	AG 402
EN ISO 3677:	B-Ag60CuSn-600/720
AWS A 5.8:	BAg-18
AMS:	4773 F

Composition, typical analysis (% w/w):

Ag	Cu	Sn
60	30	10

Mechanical and physical properties:

Working temperature:	720 °C
Melting range:	602 - 718 °C
Specific gravity:	9.8 g/cm³
Tensile strength:	390 - 460 N/mm²
Elongation:	35 %
Electrical conductivity:	8.7 Sm/mm²

Characteristics / Applications:
Zinc- and cadmium free silver brazing alloy, low vacuum-resistant for gap brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys. Excellent in reducing atmospheres since no contamination of the furnace can occur through the evaporation of the contents of the alloy. Particularly well suited for brazing on supply circuits in aircraft constructions.

Heat sources:
Acetylene torch, air-gas torch, induction and resistance heating, inert-gas furnace, vacuum furnace

Flux:
F 300 - Series → Choose the flux depending on the base material

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☒	☒	☒

13/10/JL/1

FONTARGEN A 319
Silver brazing alloy, cadmium-free

ISO 17672:	Ag 134
DIN EN 1044:	AG 106
DIN 8513:	L-Ag34Sn
EN ISO 3677:	B-Cu36AgZnSn-630/730

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn	Sn	Si
34	36	27.5	2.5	0.15

Mechanical and physical properties:

Working temperature:	710 °C
Melting range:	630 - 730 °C
Specific gravity:	9 g/cm³
Tensile strength:	360 - 480 N/mm²
Elongation:	12 %
Electrical conductivity:	14 Sm/mm²

Characteristics / Applications:
Cadmium free brazing alloy for gap brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys. Suitable for the copper pipe installation according to DVGW work certificate GW 2. The silicon contained in the brazing alloy can reduce the mechanical property values of welded carbon steels. Joint-brazing at working temperatures of -200 °C on austenitic and -70 °C on ferritic steels as well as up until +200 °C.

Heat sources:
Acetylene torch, air-gas torch, induction and resistance heating

Flux:
F 300 - Series

Approval:
DVGW work certificate GW 2

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☒	☒	☐	☐

13/10/JL/1

FONTARGEN A 320
Silver brazing alloy, cadmium-free

ISO 17672:	Ag 145
DIN EN 1044:	AG 104
DIN 8513:	L-Ag45Sn
EN ISO 3677:	B-Ag45CuZnSn-640/680
AWS A 5.8:	BAg-36

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn	Sn
45	27	25.5	2.5

Mechanical and physical properties:

Working temperature:	670 °C
Melting range:	640 - 680 °C
Specific gravity:	9.2 g/cm³
Tensile strength:	350 - 430 N/mm²
Elongation:	12 %
Electrical conductivity:	13 Sm/mm²

Characteristics / Applications:
Cadmium free brazing alloy for gap brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys. Approval: Marine code VG 81245, section 3. Also suitable for the copper pipe installation according to DVGW work certificate GW 2. The silicon contained in the brazing alloy can reduce the mechanical property values of welded carbon steels. Joint-brazing at working temperatures of max 200 °C.

Heat sources:
Acetylene torch, air-gas torch, induction and resistance heating

Flux:
F 300 - Series

Approval:
DVGW work certificate GW 2
Marine code VG 81245, section 3

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☒	☒	☒	☒

13/10/JL/1

FONTARGEN A 324
Silver brazing alloy, cadmium free

ISO 17672:	Ag 449
DIN EN 1044:	AG 502
DIN 8513:	L-Ag49
EN ISO 3677:	B-Ag49ZnCuMnNi-680/705
AWS A 5.8:	BAg-22

Composition, typical analysis (% w/w)**:**

Ag	Zn	Cu	Mn	Ni
49	23	16	7.5	4.5

Mechanical and physical properties:

Working temperature:	690 °C
Melting range:	680 - 705 °C
Specific gravity:	8.9 g/cm³
Shear strength:	250 - 300 N/mm² (depends on Co-content of hard metals)
Electrical conductivity:	4 Sm/mm²

Characteristics / Applications:
Nickel- and manganese-bearing silver brazing alloy with very good wetting properties on steel and hard metals, therefore ensuring very tough joints. Gap brazing of hard metals in combination with steel, tungsten, tantalum and molybdenum materials.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 300 - Series, particularly recommendable: F 300 HF Ultra

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☒	☒	☐	☐

13/10/JL/1

FONTARGEN A 330
Silver brazing alloy, cadmium-free

ISO 17672:	Ag 230
DIN EN 1044:	AG 204
DIN 8513:	L-Ag 30
EN ISO 3677:	B-Cu38ZnAg-680/765
AWS A 5.8:	BAg-20

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn
30	38	32

Mechanical and physical properties:

Working temperature:	750 °C
Melting range:	680 - 765 °C
Specific gravity:	8.9 g/cm³
Tensile strength:	380 - 430 N/mm²
Elongation:	25 %

Characteristics / Applications:
Silver alloy, cadmium free, insensitive to overheating. Gap brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys. Good colour match with brass. Joint-brazing at working temperatures of max. 300 °C.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☒	☒	☒

13/10/JL/1

FONTARGEN A 331
Silver brazing alloy, cadmium-free

ISO 17672:	Ag 225
DIN EN 1044:	AG 205
DIN 8513:	L-Ag25
EN ISO 3677:	B-Cu40ZnAg-700/790

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn
25	40	35

Mechanical and physical properties:

Working temperature:	780 °C
Melting range:	700 - 790 °C
Specific gravity:	8.8 g/cm³
Tensile strength:	380 - 430 N/mm²
Elongation:	25 %

Characteristics / Applications:
Silver alloy, cadmium free, insensitive to overheating. Gap brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys. Good colour match with brass. Joint-brazing at working temperatures of max. 300 °C.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☒	☐	☐

13/10/JL/1

FONTARGEN A 332
Silver brazing alloy, cadmium-free

ISO 17672:	Ag 130
DIN EN 1044:	AG 107
DIN 8513:	L-Ag30Sn
EN ISO 3677:	B-Cu36ZnAgSn-665/755

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn	Sn	Si
30	36	32	2	0.15

Mechanical and physical properties:

Working temperature:	740 °C
Melting range:	665 - 755 °C
Specific gravity:	8.8 g/cm³
Tensile strength:	360 - 480 N/mm²
Hardness:	140 BHN

Characteristics / Applications:
Silver alloy, cadmium free, insensitive to overheating. Gap brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys. Joint-brazing at working temperatures of max. 300 °C.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☒	☐	☐

13/10/JL/1

FONTARGEN A 333
Cadminum free silver brazing alloy

DIN EN 17672: Norm classification in progress
ISO 3677: B-Cu36AgZnNi-676/788 (*)
(*) Acc. To

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn	Ni
30	36	Rest	2

Mechanical and physical properties:
Melting range: 676 – 788°C
Specific gravity: 9,17 g/cm³ (Metal content)
Notch impact energy: 138J (-75°C until +100°C)

Characteristics / Applications:
Cadmium free, intermediate temperature brazing alloy with good wetting and mechanical properties. Suitable for ferrous and nonferrous base materials. Can be used for the brazing of carbide tools.

Heat sources:
Flame, induction, resistance

Flux:
F 300 – Serie FH10 (EN 1045)
FH12 (EN 1045)

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☐	☐	☒	☐	☐

13/10/JL/2

FONTARGEN A 338 F
Silver brazing alloy, cadmium free

EN ISO 3677: B-Ag38 ZnCuMnNi-680/700

Composition, typical analysis (% w/w)**:**

Ag	Zn	Cu	Mn	Ni
38	Balance	26,0	7.2	3.5

Mechanical and physical properties:

Working temperature:	700 °C
Melting range:	680 - 700 °C
Specific gravity:	8.8 g/cm³
Tensile strength:	525,0 N/mm²

Characteristics / Applications:
Nickel- and manganese-bearing silver brazing alloy with very good wetting properties on steel and hard metals, therefore ensuring very tough joints. Gap brazing of hard metals in combination with steel, tungsten, tantalum and molybdenum materials.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 300 - Series, particularly recommendable: F 300 HF Ultra

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☒	☒	☐	☐

13/11/JL/2

FONTARGEN A 338 FT

3-layer-silver brazing foil, cadmium-free

EN ISO 3677: B-Ag38ZnCuMnNi-680/700

Composition, typical analysis (% w/w)**:**

Ag	Zn	Ni	Mn	Cu
38,0	Balance	7,0	3.5	26.5

Composition refers to the different solder coats

Mechanical and physical properties:

Working temperature: 700 °C
Melting range: 680 - 700 °C
Specific gravity: 8,8 g/cm³

Characteristics / Applications:

Copper foil coated with silver brazing filler metal on both sides for the joining of hard metals and carrier steel. The foil is build-up with a ratio 1:2:1. The copper which does not melt during the brazing process relieves the stress that occurs during brazing due to the difference in coefficients of expansion of the hard metal layer and the carrier steel. Compared to A 312 F has a lower silver content.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 300 - Series, particularly recommendable: F 300 HF Ultra

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☐	☐	☐	☒	☐	☐	☐

13/11/JL/2

FONTARGEN A 340

Silver brazing alloy, cadmium-free

ISO 17672:	Ag 140
DIN EN 1044:	AG 105
DIN 8513:	L-Ag40Sn
EN ISO 3677:	B-Ag40CuZnSn-650/710

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn	Sn	Si
40	30	28	2	0.15

Mechanical and physical properties:

Working temperature:	690 °C
Melting range:	650 - 710 °C
Specific gravity:	9.1 g/cm³
Tensile strength:	350 - 430 N/mm²
Elongation:	20 %
Electrical conductivity:	14 Sm/mm²
Hardness:	130 BHN

Characteristics / Applications:

Silver alloy, cadmium free, insensitive to overheating. Gap brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys and carbides. Seawater resistant, according to marine standard VG 82145, part 3. Silicon can reduce the mechanical properties of carbon steel. Joint-brazing at working temperatures of max. 200 °C.

Heat sources:

Acetylene torch, air-gas torch, induction and resistance heating

Flux:

F 300 - Series

Approval:

Marine Standard VG 81245, Part 3

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☒	☒	☐	☐

13/10/JL/1

FONTARGEN A 347
Silver brazing alloy, cadmium-free

ISO 17672:	Ag 156
DIN EN 1044:	AG 102
AWS A 5.8:	BAG-7
DIN 8513:	L-Ag56Sn
EN ISO 3677:	B-Ag56ZnCuSn-620/655

Composition, typical analysis (% w/w)**:**

Ag	Zn	Cu	Sn
56	17	22	5

Mechanical and physical properties:

Working temperature:	650 °C
Melting range:	620 - 655 °C
Specific gravity:	9.5 g/cm³
Tensile strength:	350 - 430 N/mm²
Elongation:	25 %
Electrical conductivity:	7 Sm/mm²

Characteristics / Applications:
Silver-bearing, cadmium-free low melting brazing alloy, insensitive to overheating for gap and joint brazing of alloyed and unalloyed steel, nickel, nickel alloys and malleable iron as well as the corresponding metals amongst each other. Brazing stainless steel provides the best possible colour match. The absence of cadmium makes it especially suitable for joints destined to come in contact with food. For applications with service temperatures until 200°C suitable.

Heat sources:
Acetylene torch, air-gas torch, induction and resistance heating

Flux:
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☒	☒	☒	☒

13/10/JL/1

FONTARGEN A 350
Silver brazing alloy, cadmium free

ISO 17672:	Ag 450
EN ISO 3677:	B-Ag50ZnCuNi-660/705
AWS A 5.8:	BAg-24

Composition, typical analysis (% w/w)**:**

Ag	Zn	Cu	Ni
50	28	20	2

Mechanical and physical properties:

Working temperature:	690 °C
Melting range:	660 - 705 °C
Specific gravity:	9.2 g/cm³

Characteristics / Applications:
Nickel bearing silver brazing alloy with very good wetting properties on steel and hard metals, therefore ensuring very tough joints. Gap brazing of hard metals in combination with steel, tungsten, tantalum and molybdenum materials.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 300 - Series, particularly recommendable: F 300 HF Ultra

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☐	☐	☐

13/10/JL/1

FONTARGEN A 384
Copper-free silver brazing alloy

DIN 8513: L-Ag72Zn
EN ISO 3677: B-Ag72Zn-710/730

Composition, typical analysis (% w/w)**:**

Ag	Zn
72	28

Mechanical and physical properties:
Working temperature: 730 °C
Melting range: 710 - 730 °C
Specific gravity: 9.8 g/cm³

Characteristics / Applications:
Corrosion-resistant, copper free silver brazing alloy for joints of alloyed and unalloyed steel. The brazing seam is suited for ammonia in liquid or vapour form. This brazing alloy is mostly used in the heating and cooling industry.

Heat sources:
Acetylene torch, induction and resistance heating

Flux:
F 300 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☐	☐	☒	☒	☒	☐	☐

13/10/JL/1

FONTARGEN A 407 L
Aluminium brazing alloy

EN ISO 17672:	Al 112
DIN EN 1044:	AL 104
DIN 8513:	L-AlSi12
EN ISO 3677:	B-Al88Si-575/585
AWS A 5.8:	BAlSi-4
Material-no.:	3.2285

Composition, typical analysis (% w/w)**:**

Al	Si
88	12

Mechanical and physical properties:

Working temperature:	590 °C
Melting range:	575 - 585 °C
Specific gravity:	2.7 g/cm³
Tensile strength:	100 N/mm²

Characteristics / Applications:
Capillary active brazing alloy for structure matching and tonal joints of aluminium and rolled / cast aluminium alloys. The Mg-content must be ≤ 3 %. The solidus temperature should be > 630 °C. Not suitable for joints that are to be eloxadized. This brazing alloy is also suited for joints of aluminium with Cr-Ni-steel.

Heat sources:
Inert gas- and vacuum furnace, induction and resistance heating, acetylene torch

Flux:
F 400 - Series

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☒	☒	☒	☒

13/10/JL/1

FONTARGEN AF 407 LI Seamed
Flux-cored aluminium brazing alloy

Alloy
EN ISO 17672: Al 112
DIN EN 1044: AL 104
DIN 8513: L-AlSi12
EN ISO 3677: B-Al88Si-575/585
AWS A 5.8: BAlSi-4

Flux
DIN EN 1045: FL 20

Composition, typical analysis (% w/w)**:**

Al	Si
88	12

Mechanical and physical properties:
Working temperature: 590 °C
Melting range: 575 - 585 °C
Specific gravity: 2.7 g/cm³
Tensile strength: 100 N/mm²

Characteristics / Applications:
Capillary active flux cored brazing alloy for structure matching and tonal joints of aluminium and rolled / cast aluminium alloys. The Mg-content must be ≤ 3 %. The solidus temperature should be > 630 °C. Not suitable for joints that are to be eloxadized. This brazing alloy is also suited for joints of aluminium with Cr-Ni-steel. The flux residues can remain on the assembly. The brazing joint must be kept dry.

Heat sources:
Induction, Flame

Flux:
FL 20 - Non corrosive

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☐	☐	☒	☐	☒	☐	☐

13/10/JL/1

FONTARGEN AP 210
Brass brazing paste

EN ISO 3677: B-Cu55Zn(Si)(Mn)-875/890

Composition, typical analysis (% w/w)**:**

Cu	Si	Mn	Zn
55	0.2	0.2	Remainder

Mechanical and physical properties:
Working temperature: 900 °C
Melting range: 875 - 890 °C

Characteristics / Applications:
Dispensable brass brazing paste. The Si-content improves the wetting and flowing properties. AP 210 is a low cost product for brazing of steel under a normal atmosphere. AP 210 can also be used for the brazing of hard metals. Typical applications are the tooling (drills) and electro-industry as well as car manufacturing.

Heat sources:
Flame and induction

Flux:
The content of our binders can be altered according to your application depending on (heat source, atmosphere, geometry of the brazing assembly etc.). We can offer flux free and flux containing binder systems. The powder characteristics can be adapted (Metal content of the paste, grain size, geometry). Our application technicians will be pleased to assist you in choosing the appropriate product.

Storage:
Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:
6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm

Availability:
On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 211
Fluid brass brazing paste

EN ISO 3677: B-Cu59ZnAg(Sn)(Ni)(Mn)(Si)-850/870
DIN 8513: L-CuZn39Sn

Composition, typical analysis (% w/w)**:**

Cu	Sn	Ag	Si	Mn	Ni	Zn
59	0.3	1	0.3	0.6	0.85	Remainder

Mechanical and physical properties:
Working temperature: 890 °C
Melting range: 850 - 870 °C
Specific weight: 8.4 g/cm³ (Metal content)

Characteristics / Applications:
Dispensable brass brazing paste with very good flowing and wetting properties. Suitable for the brazing of hard metal with steel. Gap and joint brazing of copper and copper alloys with a solidus of > 900 °C, nickel and nickel alloys, steel, cast iron, malleable iron, zinc coated steel (no destruction of the zinc layer).

Heat sources:
Flame, induction and resistance heating

Flux:
The content of our binders can be altered according to your application depending on (heat source, atmosphere, geometry of the brazing assembly etc.). We can offer flux free and flux containing binder systems. The powder characteristics can be adapted (Metal content of the paste, grain size, geometry). Our application technicians will be pleased to assist you in choosing the appropriate product.

Storage:
Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:
6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm

Availability:
On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 218
Brass brazing paste

EN ISO 3677: B-Cu51Zn(Si)-870/915

Composition, analysis (% w/w)**:**

Cu	Sn	Zn
51.8	0.2	Remainder

Mechanical and physical properties:
Working temperature: 925 °C
Melting range: 870 - 915 °C

Characteristics / Applications:
Dispensable brass brazing paste with good flowing and wetting properties. Gap and joint brazing of copper and copper alloys with solidus > 900 °C, steel and hard metal.

Heat source:
Flame, induction and resistance heating

Flux:
The content of our binders can be altered according to your application depending on (heat source, atmosphere, geometry of the brazing assembly etc.). We can offer flux free and flux containing binder systems. The powder characteristics can be adapted (Metal content of the paste, grain size, geometry). Our application technicians will be pleased to assist you in choosing the appropriate product.

Storage:
Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:
6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm

Availability:
On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 2003

Copper-phosphorus brazing paste alloy

ISO 17672:	CuP 180
DIN EN 1044:	CP 202
EN ISO 3677:	B-Cu93P-710/820
DIN 8513:	L-CuP7

Composition, typical analysis (% w/w)**:**

Cu	P
93	7

Mechanical and physical properties:

Working temperature:	730 °C
Melting range:	710 - 820 °C
Specific gravity:	8.1 g/cm³ (Metal content)

Characteristics / Applications:

Filler metal with good flowing properties and capillarity. The AP 2003 is suitable for gap brazing of copper and copper alloys. For joints with a working temperature between -20 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:

Acetylene torch, air-gas torch, furnace, induction and resistance heating.

Flux:

None - For copper applications there is no need of flux

Storage:

Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:

6 months in pots; 3 months in cartridges

Availability:

On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 2004
Flux free copper-phosphorus brazing paste

ISO 17672:	CuP 179
DIN EN 1044:	CP 203
DIN 8513:	L-CuP6

Composition, typical analysis (% w/w):

P	Cu
6.2	Remainder

Mechanical and physical properties:

Working temperature:	760 °C
Melting range:	710 - 890 °C
Specific gravity:	8.1 g/cm³ (Metal content)

Mechanical and physical properties:
Capillary brazing on copper, brass, bronze and red brass. For joints with operating temperatures between -20 °C up to +150 °C. Do not use on assemblies that come in contact with sulphide substances and on Fe and/or Ni based alloys.

Heat sources:
Oxy-acetylene torch, air torch, furnace, induction, resistance.

Storage:
Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:
6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm

Availability:
On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 2005
Copper-phosphorus-tin brazing paste

ISO 17672:	CuP 386
DIN EN 1044:	CP 302
DIN 8513:	L-CuSnP7
EN ISO 3677:	B-Cu86SnP-650/700

Composition, typical analysis (% w/w)**:**

Cu	Sn	P
86.2	7	6.8

Mechanical and physical properties:

Working temperature:	690 °C
Melting range:	650 - 700 °C
Specific gravity:	8.8 g/cm³ (Metal content)

Characteristics / Applications:
Filler metal with good flowing properties and capillarity. Suitable for gap brazing of copper and copper alloys. High colour similarity with brass. Easy electroplating of the soldering seam. For brazing joints with working temperatures between -20 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:
Acetylene torch, air-gas torch, furnace, induction and resistance heating.

Flux:
None - For copper applications there is no need of flux

Storage:
Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:
6 months in pots; 3 months in cartridges

Availability:
On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 3018

Copper-phosphorus paste with high silver content

ISO 17672:	CuP 286
DIN EN 1044:	CP 101
DIN 8513:	L-Ag18P
EN ISO 3677:	B-Cu75AgP-645

Composition, typical analysis (% w/w)**:**

Ag	Cu	P
18	75	7

Mechanical and physical properties:

Working temperature:	650 °C
Melting range:	645 °C (Eutectic)
Specific gravity:	8.7 g/cm³ (Metal content)

Characteristics / Applications:

AP 3018 is a thin fluid copper-phosphorus alloy with high silver content and high ductility, even at low temperatures. It is suitable for gap brazing of copper and copper alloys. It is recommended for joints with strong thermal load and vibrations and for brazing joints with working temperatures between -70 °C and +150 °C. Do not use in sulphurous environment and on Fe- and Ni-alloys.

Heat sources:

Acetylene torch, air-gas torch, furnace, induction and resistance heating.

Flux:

None - For copper applications there is no need of flux.

Storage:

Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:

6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm

Availability:

On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 308 V

Silver-Copper-Eutectic paste for vacuum brazing

ISO 17672:	Ag 272[a]
DIN EN 1044:	AG 401
DIN 8513:	L-Ag72
EN ISO 3677:	B-Ag72Cu-780
AWS A 5.8:	BAg-8

Composition, typical analysis (% w/w)**:**

Ag	Cu
72	28

Mechanical and physical properties:

Working temperature:	780 °C
Melting range:	779 °C (Eutectic)
Specific gravity:	10 g/cm³ (Metal content)
Electrical conductivity:	46.1 Sm/mm²

Characteristics / Applications:

Zinc- and cadmium free alloy with good flowing properties for gap brazing in vacuum and for vacuum-sealed joints of alloyed and unalloyed steel, nickel and nickel alloys. Very good vacuum durability even at high temperatures. Also suitable for joints of copper and copper alloys. The brazing alloy is coalesced in vacuum with a minimum purity of 99.9 %.

Heat sources:

Vacuum furnace

Flux:

None

Storage:

Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:

6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm.

Availability:

On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 314
Silver brazing alloy, cadmium-free

ISO 17672:	Ag 156
DIN EN 1044:	AG 102
DIN 8513:	L-Ag55Sn
EN ISO 3677:	B-Ag56CuZnSn-620/655

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn	Sn
56	22	17	5

Mechanical and physical properties:

Working temperature:	660 °C
Melting range:	620 - 655 °C
Specific gravity:	9.4 g/cm³
Electrical conductivity:	7 Sm/mm²

Characteristics / Applications:
Cadmium-free low melting silver brazing alloy for gap and joint brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys and carbides. Brazing stainless steel produces the best possible colour match. The paste is suitable for brazing joints used in seawater according to marine code VG 81245, section 3. The absence of cadmium makes it especially suitable for joints destined to come in contact with food. For brazing joints with a working temperature of max. 200 °C.

Heat sources:
Oxy-acetylene torch, induction, resistance

Flux:
The content of our binders can be altered according to your application depending on (heat source, atmosphere, geometry of the brazing assembly etc.). We can offer flux free and flux containing binder systems. The powder characteristics can be adapted (Metal content of the paste, grain size, geometry). Our application technicians will be pleased to assist you in choosing the appropriate product.

Approval:
Marine code VG 81245, section 3

Storage:
Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:
6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm.

Availability: On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 317
Silver brazing alloy, cadmium free

ISO 17672:	Ag 160
DIN EN 1044:	AG 402
EN ISO 3677:	B-Ag60CuSn-600/730
AWS A 5.8:	BAg-18
AMS:	4773 F

Composition, typical analysis (% w/w):

Ag	Cu	Sn
60	30	10

Mechanical and physical properties:

Working temperature:	740 °C
Melting range:	600 - 730 °C
Specific gravity:	9.8 g/cm³ (Metal content)
Electrical conductivity:	8.7 Sm/mm²

Characteristics / Applications:
Zinc- and cadmium-free silver brazing alloy, low vacuum-resistant. For gap brazing of alloyed and unalloyed steel, nickel and nickel alloys, malleable cast iron, copper and copper alloys. Excellent in reducing atmospheres since no contamination of the furnace can occur through the evaporation of the contents of the alloy. The paste is particularly suitable for brazing at supply circuits in aircraft construction.

Heat sources:
Oxy-acetylene torch, induction, furnace, vacuum.

Flux:
The content of our binders can be altered according to your application depending on (heat source, atmosphere, geometry of the brazing assembly etc.). We can offer flux free and flux containing binder systems. The powder characteristics can be adapted (Metal content of the paste, grain size, geometry). Our application technicians will be pleased to assist you in choosing the appropriate product.

Storage:
Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:
6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm.

Availability:
On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 350

Cadminum-free silver brazing paste

ISO 17672:	Ag 450
EN ISO 3677:	B-Ag50ZnCuNi-660/705
AWS A 5.8:	BAg-24
AMS:	4788

Composition, typical analysis (% w/w)**:**

Ag	Cu	Zn	Ni
50	20	28	2

Mechanical and physical properties:

Working temperature:	670 °C
Melting range:	660 - 705 °C
Specific gravity:	9.17 g/cm³ (Metal content)

Characteristics / Applications:

Low melting cadmium free silver brazing paste with good wetting and excellent mechanical properties. Suitable for the brazing of hard metals with steel, tungsten, tantalum and molybdenum materials. The alloy is used in the tooling industry and on stainless steel food handling equipment with close joint clearance. For brazing joints operating at temperatures up to 200 °C, respectively up to 150 °C continuous operating temperature.

Heat sources:

Oxy-acetylene torch, induction, resistance

Flux:

The content of our binders can be altered according to your application depending on (heat source, atmosphere, geometry of the brazing assembly etc.). We can offer flux free and flux containing binder systems. The powder characteristics can be adapted (Metal content of the paste, grain size, geometry). Our application technicians will be pleased to assist you in choosing the appropriate product.

Storage:

Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:

6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm.

Availability:

On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 356
Cadmium-free silver brazing alloy

EN ISO 3677: B-Ag64CuInMnNi-730/780

Composition, typical analysis (% w/w)**:**

Ag	Cu	In	Mn	Ni
64	26	6	2	2

Mechanical and physical properties:

Working temperature: 770 °C
Melting range: 730 - 780 °C
Density (metal powder): 9.6 g/cm³
Service temperature: max. 200 °C (w/out strength loss)

Characteristics / Applications:

Low melting and high silver containing brazing alloy with good flowing characteristics. The alloy is suitable for the brazing of nickel and nickel based alloys, cemented carbides and materials that are difficult to wet such as tungsten, tantalum, chromium and molybdenum. The strength of the joint depends mainly on the base metals characteristics. Typical applications can be found in the tooling industry. TiN-coating is possible.

Heat sources:

Induction, flame

Flux:

The content of our binders can be altered according to your application depending on (heat source, atmosphere, geometry of the brazing assembly etc.). We can offer flux free and flux containing binder systems. The powder characteristics can be adapted (Metal content of the paste, grain size, geometry). Our application technicians will be pleased to assist you in choosing the appropriate product.

Storage:

Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:

6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm.

Availability:

On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 47 QL/2
Aluminium brazing paste

EN ISO 17672:	Al 112
DIN EN 1044:	AL 104
DIN 8513:	L-AlSi12
EN ISO 3677:	B-Al88Si-575/585
AWS A 5.8:	BAlSi-4

Composition, typical analysis (% w/w)**:**

Al	Si
88	12

Mechanical and physical properties:

Working temperature:	590 °C
Melting range:	575 - 585 °C
Specific gravity:	2.7 g/cm³ (Metal content)

Characteristics / Applications:
Capillary active brazing alloy for structure matching and tonal joints of aluminium and rolled / cast aluminium alloys. The Mg-content must be ≤ 0.7 %. The solidus temperature should be > 630 °C. Not suitable for joints that are to be eloxadized. This brazing alloy is also suited for joints of aluminium with Cr-Ni-steel. The flux residues can be left on the assembly. The brazed joints must be protected against wetness.

Heat sources:
Inert gas furnace (N2, cracked ammonia), acetylene torch (indirect heating)

Flux:
F-LH 2 according to DIN 8511
FL 20 according to DIN EN 1045

Storage:
Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:
6 months in pots

Availability:
On request

Pots	Cartridges
☒	☐

13/10/JL/1

FONTARGEN A 604
Friction solder

DIN EN ISO 3677: S-Sn60Zn40

Composition, typical analysis (% w/w)**:**

Sn	Zn
60	Remainder

Mechanical and physical properties:

Melting range:	200 - 340 °C
Hardness (BHN):	19 HB
Electrical conductivity:	22.2 Sm/mm²
Copper:	100 N/mm²
Brass:	90 N/mm²
Steel:	90 N/mm²
Specific gravity:	7.1 g/cm³

Characteristics / Applications:
Lead-free friction solder, on aluminium without flux. Build-up possible. Step-by-step solder (first solder). Sealing of blowholes and cracks on cast iron and cast aluminium, repairs on zinc injection moulded parts, filling-up of dents in aluminium plates. Car body workshops, aluminium foundries, repair shops, etc.

Heat sources:
Acetylene torch (fuel gas excess), air-gas torch, soldering lamp, soldering iron.

Flux:
F 600 Al

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☐	☐	☐	☐	☐

13/10/JL/1

FONTARGEN A 604 KA
Friction solder, build-up soldering (lead-free)

DIN EN ISO 3677: S-Sn90Zn7Cu3

Composition, typical analysis (% w/w)**:**

Zn	Cu	Sn
7	3	Remainder

Mechanical and physical properties:

Melting range: 200 - 250 °C
Hardness (BHN): 16 HB
Electrical conductivity: 22.6 Sm/mm²
Specific gravity: 7.3 g/cm³

Characteristics / Applications:

Step-by-step solder (first solder). Sealing of blowholes and cracks on cast iron and cast aluminium, repairs on zinc injection moulded parts, filling-up of dents in aluminium plates. Auto body workshops, aluminium foundries, repair shops, etc.
In application to steel auto bodies like the correction of detriments and cracks, AP 644/12 must be applied beforehand (also see FONTARGEN work assembly auto body solder).
Friction solder, on aluminium without flux. Build-up possible. A 604 KA is an enhancement of A 604.

Heat sources:

Acetylene torch (fuel gas excess), air-gas torch, soldering lamp, soldering Iron

Flux:

F 600 Al

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☐	☐	☐	☐	☐

13/10/JL/1

FONTARGEN A 611 Silver-bearing, lead-free solder

EN ISO 9453:	S-Sn96Ag4 / Alloy-no. 701
A 611	Blank wire
AF611 F-SW 26	Cored wire with DIN EN 29454.1 (Flux) : 1.1.2 (non corrosive flux, colophony base)
AF 611 F-SW 12	Cored wire with DIN EN 29454.1 (Flux) : 3.1.1 (corrosive flux)

Composition, typical analysis (% w/w)**:**

Ag	Sn
3.5	Remainder

Mechanical and physical properties:

Melting range:	221 - 230 °C
Tensile strength (solder):	44 N/mm²
On Ms 58:	53 N/mm²
Shear strength on Cu:	30 N/mm²
On Ms:	20 N/mm²
On St:	25 N/mm²
Hardness (BHN):	15 HB
Electrical conductivity:	7.5 Sm/mm²
Specific gravity:	7.3 g/cm^3

Characteristics / Applications:

Solders on steel, stainless steel, copper and copper alloys. Foodstuffs industry, electrical industry and general apparatus engineering, refrigerating industry, copper pipe installations, hot and cold water installations, heating installations up to 100 °C, oil piping in accordance with DVGW specification sheet.

Lead- and cadmium-free eutectic solder with very good flowing properties. The solder remains brilliant even after a long period of using the soldered objects. Cold-resistant up to -200 °C.

Heat sources:

Acetylene torch (fuel gas excess), air-gas torch, soldering lamp, soldering iron, dip bath.

Flux:

F 600 - Series

Availability:

Bare rods	Cored wire	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☒	☐	☐

13/10/JL/2

FONTARGEN A 612
Antimony-free soft solder alloy

EN ISO 9453:	S-Sn60Pb40E / Alloy-no. 104
A 612	Solid wire
DIN EN 29454.1 (Flux):	F 600: 3.1.1.A (corrosive fluid, for unalloyed and low alloyed steel and heavy metals) F 600 CW: 3.1.1.C (paste-like, soldering flux, activated, limited corrosive) F 600 CC: 1.1.2. (paste-like, colophony based)
AF 612	Soft solder with active flux core
DIN EN 29454.1 (Flux):	1.1.2 (non corrosive flux, colophony based)

Composition, typical analysis (% w/w)**:**

Sn	Sb	Pb
60	0.05	Remainder

Mechanical and physical properties:

Melting range:	183 - 190 °C
Tensile strength (solder):	29 N/mm²
On Ms 58:	78 N/mm²
Hardness (BHN):	13 HB
Electrical conductivity:	7 Sm/mm²
Specific gravity (metal):	8.5 g/cm^3

Characteristics / Applications:
General soldering work on iron and copper based metals without flux. Electrical industry and construction of electrical and general apparatuses. Tin plating. Lead-bearing soft solder with very narrow melting interval. Very fluid with good wetting properties on copper and ferrous metals. AF 612 enables good bonds with cuprous base metals without additional flux.

Heat sources:
Acetylene torch (fuel gas excess), air-gas torch, soldering lamp, soldering iron.

Availability:

Bare rods	Cored Wire	Wire	Foil	Preforms	Powder	Paste
☒	☒	☒	☐	☐	☒	☐

13/10/JL/1

FONTARGEN A 618 F-SW 34

Antimony-free soft solder with activated flux core

EN ISO 9453:	S-Sn60Pb38Cu2 / Alloy-no. 161
DIN EN 29454.1 (Flux):	1.1.2 (non corrosive flux, colophony based)

Composition, typical analysis (% w/w)**:**

Sn	Cu	Sb	Pb
60	1.75	0.1	Remainder

Mechanical and physical properties:

Melting range:	183 - 190 °C
Tensile strength (solder):	38 N/mm²
Hardness (BHN):	18 HB
Electrical conductivity:	6.6 Sm/mm²
Specific gravity (metal):	8.5 g/cm^3

Characteristics / Applications:

General soldering work on copper base metals. Electrical industry and construction and general apparatuses. Solder with very narrow melting interval. Good wetting properties on copper. The copper content of 2 % ensures that the solder does not alloy with the copper of the soldering rod.

Heat sources:

Soldering iron

Availability:

Bare rods	Cored	Wire	Foil	Preforms	Powder	Paste
☐	☒	☐	☐	☐	☐	☐

13/10/JL/1

FONTARGEN A 630
Soft solder

EN ISO 9453:	S-Pb50Sn50 / Alloy-no. 111
DIN EN 29454.1 (Flux):	F 600: 3.1.1.A (corrosive fluid, for low alloyed and alloyed steel and heavy metals) F 600 CW: 3.1.1.C (paste-like, soldering flux, activated, limited corrosive) F 600 CC: 1.1.2. (paste-like, colophony based) Soft solder with active flux core 1.1.2 C. (paste-like, colophony based)

Composition, typical analysis (% w/w)**:**

Sn	Sb	Pb
50	0.12	Remainder

Mechanical and physical properties:

Melting range:	183 - 215 °C
Tensile strength (solder):	39 N/mm²
On Ms 58:	81 N/mm²
Hardness (BHN):	12 HB
Electrical conductivity:	6.7 Sm/mm²
Specific gravity (metal):	8.9 g/cm^3

Characteristics / Applications:

Tubular installations, electrical industry, thin sheet metal packages and tinning work. Soft solder with long melting interval and good gap-bridging properties. Good wetting properties on copper and copper alloys.

Heat sources:

Acetylene torch (fuel gas excess), air-gas torch, soldering lamp, soldering iron and dip bath.

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☐	☐	☐

13/10/JL/1

FONTARGEN A 631
Zinc-bearing aluminium soft solder

DIN EN ISO 3677: S-Zn98Al2
Flux (separate appl.): F 600 ZA
Highly active special flux for the soldering of aluminium. For a quality ensured soldering process, only a small amount is needed.

Composition, typical analysis (% w/w)**:**

Zn	Al
98	2

Mechanical and physical properties:
Melting range: 382 - 407 °C
Specific gravity (metal): 6,91 g/cm^3

Characteristics / Applications:
Soft solder for joints on aluminium and aluminium alloys. Suitable for aluminium/copper-joints in the heating and cooling industry. Aluminium solder with low melting point.
Removal of brazing flux residues:
Brazing flux residues can be removed by brushing in hot water.

Heat sources:
Induction, flame

Availability:

Bare rods	Cored wire	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☐	☐	☐

13/11/FG/1

FONTARGEN A 633
Zinc-bearing aluminium soft solder

DIN EN ISO 3677: S-Zn97Al3
Flux: F 600 ZA
Highly active special flux for the soldering of aluminium. For a quality ensured soldering process, only a small amount is needed.

Composition, typical analysis (% w/w)**:**

Zn	Al
97	3

Mechanical and physical properties:
Melting range: 430 - 450 °C
Specific gravity (metal): 7.1 g/cm^3

Characteristics / Applications:
Soft solder for joints on aluminium and aluminium alloys. Suitable for aluminium/copper-joints in the heating and cooling industry. Aluminium solder with low melting point.
Removal of brazing flux residues:
Brazing flux residues can be removed by brushing in hot water.

Heat sources:
Induction, flame

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☐	☐	☐	☐	☐

13/11/JL/1

FONTARGEN A 644

Copper-bearing, lead-free soft solder alloy

EN ISO 9453:	S-Sn97Cu3 / Alloy-no. 402
DIN EN 29545.1 (Flux)	F 600: 3.1.1.A (corrosive fluid, for low alloyed and alloyed steel and heavy metals) F 600 CW: 3.1.1.C (paste-like, soldering flux, activated, limited corrosive)

Composition, typical analysis (% w/w)**:**

Cu	Sn
3	Remainder

Mechanical and physical properties:

Melting range:	230 - 250 °C
Tensile strength (solder):	44 N/mm²
On Ms 58:	53 N/mm²
Shear strength on Cu:	30 N/mm²
On Ms:	20 N/mm²
On St:	25 N/mm²
Hardness (BHN):	15 HB
Electrical conductivity:	8.5 Sm/mm²
Specific gravity (metal):	7.3 g/cm^3

Characteristics / Applications:

Fittings solder for copper pipe installations and plumbing works. Work on metal goods. Suitable for the use in the foodstuffs industry. In terms of DVGW sheet GW 2 this solder is suited for copper pipe installations. Lead- and cadmium-free soft solder. The copper content ensures that the tin does not alloy with the copper of the soldering rod.

Heat sources:

Acetylene torch (fuel gas excess), air-gas torch, soldering lamp, soldering iron, induction, resistance heating, dip bath.

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 665
Zinc-bearing aluminium soft solder

DIN EN ISO 3677: S-ZnAl22-420/480
Flux: F 600 ZA
Highly active special flux for the soldering of aluminium. For a quality ensured soldering process, only a small amount is needed.
Flux activity range: 400 – 500°C

Composition, typical analysis (% w/w)**:**

Zn	Al
78	22

Mechanical and physical properties:
Melting range: 420 - 480 °C
Specific gravity: 5.4 g/cm^3

Characteristics / Applications:
Soft solder for joints on aluminium and aluminium alloys. Suitable for aluminium/copper-joints in the heating and cooling industry. Aluminium solder with low melting point.
Removal of brazing flux residues:
Brazing flux residues can be removed by brushing in hot water.

Heat sources:
Induction, flame

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☐	☐	☐	☐	☐

13/10/JL/1

FONTARGEN AP 604/12
Tinning soldering paste, pure tin

DIN EN 29453 (*): S-Sn99,9 (* leaning on)

Composition, typical analysis (% w/w)**:**

Sn
99.9

Mechanical and physical properties:

Working temperature: 235 °C
Melting point: 232 °C
Specific gravity: 7.3 g/cm³ (Metal content)

Characteristics / Applications:

AP 604/12 contains pure tin powder (lead free) mixed with a highly activating and corrosive flux. The coated surfaces remain brilliant and have a good corrosion resistance. Used for tin coating and soldering of copper, brass, steel, stainless steel.
Flux residues can be removed with hot water.

Heat sources:

Oxyacetylene torch (excess of fuel gas), air-gas torch, soldering iron, soldering lamp

Flux:

3.1.1 acc. DIN EN 29454.1

Storage:

Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:

6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm.

Availability:

On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 638/26

Flux containing tin-copper solder paste

DIN EN 29453: S-Sn99Cu1 / Alloy-no.: 23

Composition, typical analysis (% w/w)**:**

Cu	Sn
0.85	Remainder

Mechanical and physical properties:

Melting range: 230 - 240 °C
Specific weight: 7.3 g/cm³ (metal content)
Metal content: approx. 89 %

Characteristics / Applications:

AP 638/26 is a solder with a high metal content, packed in a non corrosive flux rosin (colophony) binder system. This solder paste is used for soldering of Cu/Cu assemblies in the cold and hot water industry segment and preferably on solar absorbers.

Heat sources:

Induction, solder iron, oven

Flux:

1.1.2 acc. DIN EN 29454.1 (colophony)

Storage:

Keep sealed, under stable temperatures in dry rooms. Temperature 20 °C. Stir well before use.

Shelf life:

Approx. 4 months

Availability:

On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 644/12

Lead free highly activating tin copper solder paste

DIN EN 29453: S-Sn97Cu3 / Alloy-no. 24

Composition, typical analysis (% w/w)**:**

Cu	Sn
3	Rest

Mechanical and physical properties:

Working temperature: 300 °C
Melting range: 230 - 250 °C
Electrical conductivity: 8.5 Sm/mm²
Specific weight: 7.3 g/cm³ (metal content)

Characteristics / Applications:

The lead and cadmium free solder paste AP 644/12 contains a highly activating and corrosive flux. The flux residues are corrosive and must be removed after brazing. Used for tin coating and soldering of metal products. The paste is suitable for products used in the food industry. The paste must be well stirred before use.
Flux residues can be removed with hot water.

Heat sources:

Oxyacetylene torch (excess of fuel gas), gas-air torch, soldering iron, soldering lamp

Flux:

3.1.1 acc. DIN EN 29454.1

Storage:

Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:

6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm.

Availability:

On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 644/21

Lead free tin copper solder paste

DIN EN 29453: S-Sn97Cu3 / Alloy-no. 24

Composition, typical analysis (% w/w)**:**

Cu	Sn
3	Remainder

Mechanical and physical properties:

Working temperature: 300 °C
Melting range: 230 - 250 °C
Electrical conductivity: 8.5 Sm/mm²
Specific weight: 7.3 g/cm³ (metal content)

Characteristics / Applications:

For soldering with copper tube installations for hot and cold water supplies, including drinking water. The paste is suitable for applications in the food industry, sanitary (plumbing works - hot water up to 110 °C) and miscellaneous metal products. If used in copper tube installations, additional solid wire of solder A 644 S-Sn97Cu3 needs to be added to guarantee maximum penetration.
Removal of flux residues: Wash with warm water.

Heat sources:

Oxyacetylene torch (excess of fuel gas), air-gas torch, soldering iron, soldering lamp

Flux:

3.1.1 acc. DIN EN 29454.1

Storage:

Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:

6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm.

Availability:

On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN AP 653/12

Lead free highly activating solder paste

DIN EN 29453: S-Sn96Ag4 / Alloy-no.: 28

Composition, typical analysis (% w/w)**:**

Ag	Sn
3.5	Remainder

Mechanical and physical properties:

Working temperature: 221 °C
Electrical conductivity: 8.1 Sm/mm²
Specific weight: 7.3 g/cm³ (metal content)

Characteristics / Applications:

AP 653/12 contains a highly activating and corrosive flux. The alloy remains brilliant. The flux residues are corrosive and must be removed. Tin coating and soldering of copper, brass, steel, stainless steel, food industry, air conditioning. The paste must be well stirred before use.
Flux residues can be removed with hot water.

Heat sources:

Oxyacetylene torch (excess of fuel gas), air-gas torch, soldering iron, soldering lamp

Flux:

3.1.1 acc. DIN EN 29454.1

Storage:

Keep sealed, under stable temperatures in dry rooms. Optimum temperature range is between 5 and 20 °C. Stir well before use.

Shelf life:

6 months in pots; 3 months in cartridges > 175 ccm; 6 weeks in cartridges < 175 ccm.

Availability:

On request

Pots	Cartridges
☒	☒

13/10/JL/1

FONTARGEN A 200 L
Copper brazing alloy

ISO 17672:	Cu 141
DIN EN 1044:	CU 104
DIN 8513:	L-SF Cu
EN ISO 3677:	B-Cu100(P)-1085
AWS A 5.8:	BCu1f / BVCu1x
Material-no.:	2.0040

Composition, typical analysis (% w/w)**:**

Cu	P
> 99.9 (oxygen-free)	< 0.025

Mechanical and physical properties:

Working temperature:	1100 °C
Melting range:	1083 °C (Eutectic)
Specific gravity:	8.9 g/cm³
Tensile strength on S235:	340 N/mm
Electrical conductivity:	56 - 58 Sm/mm²

Characteristics / Applications:
Alloy suitable for gap brazing subjected to tough conditions. High-temperature brazing of alloyed and unalloyed steel.

Heat sources:
Inert-gas and vacuum furnace, induction

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒		☒	✕	\	✕	☒

13/10/JL/1

FONTARGEN A 200 L 58

Copper brazing alloy

ISO 17672:	Cu 110
DIN EN 1044:	CU 101
DIN 8513:	L-Cu
EN ISO 3677:	B-Cu100-1085
DIN EN 17933-52:	Cu-ETP
Material-no.:	2.0065 / 2.0060

Composition, typical analysis (% w/w):

Cu	P
> 99.9 (oxygenic)	< 0.025

Mechanical and physical properties:

Working temperature:	1100 °C
Melting range:	1083 °C (Eutectic)
Specific gravity:	8.9 g/cm³
Tensile strength on S235:	340 N/mm
Electrical conductivity:	56 - 58 Sm/mm²

Characteristics / Applications:

Alloy suitable for gap brazing subjected to tough conditions. High-temperature brazing of alloyed and unalloyed steel.

Heat sources:

Inert-gas furnace, induction

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☐	☐	☒	☐	☒	☐	☐

10/13/JL/1

FONTARGEN A 203/6 L

Copper-based high-temperature brazing alloy

DIN EN ISO 17672:	Cu 922
DIN EN 1044:	CU 201
DIN 8513:	L-CuSn6
Material-no.:	2.1021
EN ISO 3677:	B-Cu94Sn(P)-910/1040

Composition, typical analysis (% w/w)**:**

Cu	Sn	P
93.55	6.25	0.2

Mechanical and physical properties:

Working temperature:	1040 °C
Melting range:	910 - 1040 °C
Specific gravity:	8.9 g/cm³
Tensile strength:	334 - 363 N/mm²
Elongation:	> 30 %
Electrical conductivity:	9 Sm/mm²
Heat conductivity:	35 W/mK
Hardness:	> 80 HB
Thermal elongation:	18.10^{-6} °C

Characteristics / Applications:
High-temperature brazing alloy for copper, iron and nickel.

Heat sources:
Inert-gas furnace, induction

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☒	☒	☒	☒

13/10/JL/1

FONTARGEN A 203/12 L

Copper-based high-temperature brazing alloy

DIN EN ISO 17672:	Cu 925
DIN EN 1044:	CU 202
DIN 8513:	L-CuSn12
EN ISO 3677:	B-Cu88Sn(P)-825/990
Material-no.:	2.1055

Composition, typical analysis (% w/w)**:**

Cu	Sn	P
87.8	12	0.2

Mechanical and physical properties:

Working temperature:	1000 °C
Melting range:	825 - 990 °C
Specific gravity:	8.9 g/cm³
Tensile strength:	392 - 441 N/mm²
Elongation:	25 - 28 %
Electrical conductivity:	6 Sm/mm²
Heat conductivity:	61 W/mK
Hardness:	95 - 105 HB

Characteristics / Applications:

High-temperature brazing alloy for brazing of copper, iron and nickel.

Heat sources:

Inert-gas furnace, induction

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☒	☐	☒	☐	☒	☒	☒

13/10/JL/1

FONTARGEN A 205
Copper-based high-temperature brazing alloy

EN ISO 3677: B-Cu86MnNi-970/990
Material-no.: 2.1362

Composition, typical analysis (% w/w)**:**

Cu	Mn	Ni
86	12	2

Mechanical and physical properties:

Working temperature: 990 °C
Melting range: 970 - 990 °C
Specific gravity: 8.4 g/cm³
Tensile strength: 390 N/mm²

Characteristics / Applications:

Manganese bearing copper based alloy for capillary brazing of alloyed and unalloyed steel. Well suited for hard metal / steel joints.

Heat sources:

Inert-gas furnace, induction, resistance-heating

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☐	☐	☒	☐	☐	☐	☐

13/10/JL/1

FONTARGEN A 206

Copper-based high-temperature brazing alloy

EN ISO 3677: B-Cu87MnCo-980/1030

Composition, typical analysis (% w/w)**:**

Cu	Mn	Co
87	10	3

Mechanical and physical properties:

Working temperature: 1020 °C
Melting range: 980 - 1030 °C
Specific gravity: 8.8 g/cm³

Characteristics / Applications:

Manganese and Cobalt bearing copper based alloy for capillary brazing of hard metal, steel and Nickel alloys. Processing through controlled atmosphere furnace should be applied. A206 suits well to carbide/steel applications where high mechanical stresses are encountered (i.e. mining or road construction).

Heat sources:

Protective gas furnace, induction-heating, resistance-heating

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☐	☐	☒	☐	☒	☐	☐

13/11/FG/1

FONTARGEN A 842
High temperature gold based brazing alloy

EN ISO 17672:	Au 827
EN ISO 3677:	B-Au82Ni-950
AWS A 5.8:	BAu-4
AMS:	4787 A
Pratt & Whitnay:	698

Composition, typical analysis (% w/w)**:**

Au	Ni
82	18

Mechanical and physical properties:

Working temperature:	1000 °C
Melting range:	950 °C (Eutectic)
Specific gravity:	9.8 g/cm³
Shear strength:	441 N/mm
Gap width:	0.04 - 0.08 mm
Oxidation resistance:	815 °C

Characteristics / Applications:

The main application area of this alloy is the beam engine construction. It is used for joints of alloyed steel and nickel alloys where high strength as well as high temperature corrosion resistance is demanded. Suitable for the following materials: Fe/Cr, Mo/W, Ni, Ni/Cu, Ni/Fe, Fe/Co, steel, kovar and vacon.

Heat sources:

Inert gas furnace:	Oxygen (dew point: -51 °C) Argon (dew point: -63 °C)
Vacuum furnace:	Vacuum 0.15 Pa (1 x 10^{-3} Torr)

Availability:

Bare rods	Coated rods	Wire	Foil	Preforms	Powder	Paste
☐	☐	☒	☒	☐	☐	☐

13/10/JL/1

FONTARGEN AP 20 AL DB

Copper high-temperature brazing paste

DIN EN ISO 17672:	Cu 110
DIN EN 1044:	CU 101
DIN 8513:	L-Cu
EN ISO 3677:	B-Cu100-1085

Composition, typical analysis (% w/w)**:**

Cu
99.9

Mechanical and physical properties:

Working temperature:	1100 - 1150 °C
Melting range:	1083 °C
Gap width:	≤ 0.15 mm
Viscosity range:	190.000 - 220.000 mPas
Metal content:	≈ 90 %

Characteristics / Applications:

Flux-free copper brazing paste with high metal content. The brazing paste has a high viscosity and dries slowly on air. Suited for workpieces made of unalloyed, high-alloyed as well as low-carbon steel.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2	Inert-gas continuous furnace Cracked ammonia atmosphere
☒	☒	☒

Availability:

Paste	Powder
☒	☒

13/10/JL/1

FONTARGEN AP 21 AL
Copper high-temperature brazing alloy

DIN EN ISO 17672:	Cu 110
DIN EN 1044:	CU 101
DIN 8513:	L-Cu
EN ISO 3677:	B-Cu100-1085

Composition, typical analysis (% w/w)**:**

Cu
99.9

Mechanical and physical properties:

Working temperature:	1100 - 1150 °C
Melting range:	1083 °C
Gap width:	≤ 0.15 mm
Viscosity range:	120.000 - 145.000 mPas
Metal content:	≈ 89 % w/w
Tensile strength:	316 N/mm^2 (Assembly gap 0.05mm)
(Steel St 37-2 / Tensile test according to DIN50145)	272 N/mm^2 (Assembly gap 0.15mm)

Characteristics / Applications:

Flux-free copper brazing paste with high metal content. The paste has a medium viscosity and dries very slowly on air. Suited for unalloyed, low-alloyed and high-alloyed steel as well as nickel and nickel alloys. Easy to dispense and good adherence on the workpiece. Suitable for thin and thick workpieces.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2	Inert-gas continuous furnace Cracked ammonia atmosphere
☒	☒	☒

Availability:

Paste	Powder
☒	☒

13/10/JL/1

FONTARGEN AP 21 AL C

Copper high-temperature brazing alloy

EN ISO 17672:	Cu 110
DIN 8513:	L-Cu
EN ISO 3677:	B-Cu100-1085

Composition, typical analysis (% w/w)**:**

Cu
99.9

Mechanical and physical properties:

Working temperature:	1100 - 1150 °C
Melting range:	1083 °C
Gap width:	≤ 0.15 mm
Viscosity range:	145.000 - 165.000 mPas
Metal content:	≈ 89 % w/w

Characteristics / Applications:

Flux-free copper brazing paste with high metal content. The paste has a medium viscosity and dries slowly on air. Suitable for workpieces made of unalloyed, low-alloyed and high-alloyed steel. Easy to dispense and good adherence on the workpiece.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace Cracked ammonia atmosphere	Inert-gas continuous furnace H_2/N_2
☒	☒	☒

Availability:

Paste	Powder
☒	☒

13/10/JL/1

FONTARGEN AP 21 CL
Copper high-temperature brazing alloy

ISO 17672:	Cu 141
DIN EN 1044:	CU 104
DIN 8513:	L-SFCu
EN ISO 3677:	B-Cu100(P)-1085

Composition, typical analysis (% w/w)**:**

Cu
99.9

Mechanical and physical properties:

Working temperature:	1100 - 1150 °C
Melting range:	1083 °C
Gap width:	≤ 0.1 mm
Viscosity range:	150.000 - 165.000 mPas
Metal content:	≈ 87 % w/w
Tensile strength:	371 N/mm^2 (Assembly gap)
(Steel St 37-2 / Tensile test according to DIN50145)	356 N/mm^2 (Assembly gap)

Characteristics / Applications:
Flux-free copper brazing paste with high metal content. The paste has a high viscosity and dries slowly on air. Suitable for workpieces made of unalloyed, low-alloyed and high-alloyed steel.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2 Cracked ammonia atmosphere	Vacuum furnace
☐	☒	☒

Application:
Manually or automatically with pneumatical or mechanical dispensing units.

Availability:

Paste	Powder
☒	☒

13/10/JL/1

FONTARGEN AP 21 CLP (CS)

Copper high-temperature brazing paste

DIN EN ISO 17672	Cu 141
DIN EN 1044:	CU 104
DIN 8513:	L-SFCu
EN ISO 3677:	B-Cu100(P)-1085

Composition, typical analysis (% w/w)**:**

Cu
99.9

Mechanical and physical properties:

Working temperature:	1100 - 1150 °C
Melting range:	1083 °C
Gap width:	≤ 0.15 mm
Viscosity range:	175.000 - 185.000 mPas
Metal content:	≈ 87 % w/w
Tensile strength:	371 N/mm^2 (Assembly gap 0.05mm)
(Steel St 37-2 / Tensile test according to DIN50145)	356 N/mm^2 (Assembly gap 0.15mm)

Characteristics / Applications:

Flux-free copper brazing paste with high metal content. The paste has a high viscosity and dries slowly on air. Suitable for workpieces made of unalloyed, alloyed and high-alloyed steel.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2	Inert-gas continuous furnace Cracked ammonia atmosphere
☒	☒	☒

Availability:

Paste	Powder
☒	☐

13/10/JL/1

FONTARGEN AP 21 CL-5

Copper high-temperature brazing alloy

ISO 17672:	Cu 141
DIN EN 1044:	CU 104
DIN 8513:	L-SFCu
EN ISO 3677:	B-Cu100(P)-1085

Composition, typical analysis (% w/w)**:**

Cu
99.9

Mechanical and physical properties:

Working temperature:	1100 - 1150 °C
Melting range:	1083 °C
Gap width:	≤ 0.1 mm
Viscosity range:	150.000 - 165.000 mPas
Metal content:	≈ 85 % w/w

Characteristics / Applications:

Flux-free brazing paste with high metal content. The paste has a high viscosity and dries slowly on air. Suitable for workpieces made of unalloyed and alloyed steel.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2	Inert-gas continuous furnace Cracked ammonia atmosphere
☒	☒	☒

Availability:

Paste	Powder
☒	☒

13/10/JL/1

FONTARGEN AP 21 DL / DS

Copper- nickel- high-temperature brazing paste

DIN EN ISO 17672:	Cu 186
DIN EN 1044:	CU 105
EN ISO 3677:	B-Cu97Ni(B)-1085/1100

Composition, typical analysis (% w/w)**:**

Cu	Ni	B
97	2.5	0.02 - 0.05

Mechanical and physical properties:

Working temperature:	1120 °C
Melting range:	1085 - 1100 °C
Gap width:	0.05 - 0.2 mm
Viscosity range:	105.000 - 120.000 mPas
Metal content:	≈ 88 % w/w
Tensile strength:	301 N/mm^2 (Assembly gap 0.05mm)
(Steel St 37-2 / Tensile test according to DIN50145)	408 N/mm^2 (Assembly gap 0.15mm)

Characteristics / Applications:

Flux-free copper- nickel- brazing paste with high metal content. The paste has a high viscosity and dries slowly on air. The alloy is particularly well suited for bridging wide gaps (max. 0.2 mm). Suitable for workpieces made of alloyed and unalloyed steel, wolfram, molybdenum, tantalum and hard metals (e.g. drill bits exposed to high mechanical stress). The contained nickel facilitates the wetting on hard metals.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2 Cracked ammonia atmosphere	Vacuum furnace
☒	☒	☒

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Producttypes:

AP 21 **DL**	AP 21 **DS**
Slow drying paste	Quick drying paste

Availability:

Paste	Powder
☒	☒

13/10/JL/1

FONTARGEN AP 21 ESB2*

Copper- manganese- nickel brazing paste

EN ISO 3677: B-Cu87MnNi-980/1030

Composition, typical analysis (% w/w)**:**

Cu	Ni	Mn
87	3	10

Mechanical and physical properties:

Working temperature: 1120 °C
Melting range: 980 - 1030 °C
Gap width: 0.05 - 0.2 mm
Viscosity range: 105.000 - 115.000 mPas
Metal content: ≈ 88 % w/w
Tensile strength: 456 N/mm^2 (Assembly gap 0.05mm)
(Steel St 37-2 / Tensile test according to DIN50145) 323 N/mm^2 (Assembly gap 0.15mm)

Characteristics / Applications:

Flux-free copper- manganese- nickel- brazing paste with high metal content. This paste has a medium viscosity and dries slowly on air. Suitable for workpieces made of steel, hard metal, wolfram, molybdenum and tantalum. The paste has good wetting, flowing and gap bridging properties

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2	Vacuum furnace
☒	☒	☐

Availability:

Paste	Powder
☒	☒

13/10/JL/1

FONTARGEN AP 21 GL / GS

Copper- tin- high-temperature brazing paste

DIN ISO 3677: B-Cu96Sn-960/1060

Composition, typical analysis (% w/w)**:**

Cu	Sn
96	4

Mechanical and physical properties:

Working temperature: 1060 - 1100 °C
Melting range: 960 - 1060 °C
Gap width: 0.05 - 0.2 mm
Viscosity range: 90.000 - 110.000 mPas (GL)
45.000 - 55.000 mPas (GS)
Metal content: ≈ 87 % w/w

Characteristics / Applications:

Flux-free copper- tin- brazing paste with high metal content. The paste is easy to dispense and available in two different drying rates. Suitable for brazing of low-alloyed, medium-alloyed and high-alloyed steel. Good wetting and flowing properties.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2	Vacuum furnace (Watch vapour pressure curve!)
☒	☒	☒

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Producttypes:

AP 21 **GL**	AP 21 **GS**
Slow drying paste	Quick drying paste

Availability:

Paste	Powder
☒	☒

13/10/JL/1

FONTARGEN AP 21 HL / HS

Copper- tin- high-temperature brazing paste

DIN EN ISO 17672:	Cu 922
DIN EN 1044:	CU 201
DIN 8513:	L-CuSn6
EN ISO 3677:	B-Cu94Sn(P)-910/1040

Composition, typical analysis (% w/w)**:**

Cu	Sn
94	6

Mechanical and physical properties:

Working temperature:	1040 °C
Melting range:	910 - 1040 °C
Gap width:	0.1 - 0.2 mm
Viscosity range:	90.000 - 120.000 mPas
Metal content:	≈ 88 % w/w
Tensile strength:	417 N/mm^2 (Assembly gap 0.05mm)
(Steel St 37-2 / Tensile test according to DIN50145)	326 N/mm^2 (Assembly gap 0.15mm)

Characteristics / Applications:

Flux-free copper- tin- brazing paste with high metal content. The paste is easy to dispense and available in two different drying rates. The brazing temperature range is a little lower compared to AP 21 GL (L-CuSn4). Suitable for brazing of unalloyed and alloyed steel.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2	Vacuum furnace
☒	☒	☐

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Producttypes:

AP 21 **HL**	AP 21 **HS**
Slow drying paste	Quick drying paste

Availability:

Paste	Powder
☒	☒

13/10/JL/1

FONTARGEN AP 21 KL
Copper- tin- brazing paste

ISO 17672:	Cu 925
DIN EN 1044:	CU 202
DIN 8513:	L-CuSn12
EN ISO 3677:	B-Cu88Sn(P)-825/990

Composition, typical analysis (% w/w)**:**

Cu	Sn	P
88	12	0.01 - 0.4

Mechanical and physical properties:

Working temperature:	990 °C
Melting range:	825 - 990 °C
Gap width:	≤ 0.15 mm
Viscosity range:	100.000 - 110.000 mPas
Metal content:	88 %
Tensile strength:	276 N/mm^2 (Assembly gap 0.05mm)
(Steel St 37-2 / Tensile test according to DIN50145)	238 N/mm^2 (Assembly gap 0.15mm)

Characteristics / Applications:

Flux-free copper- tin- brazing paste with high metal content. The paste has a high viscosity and dries slowly on air. Due to the low melting range the paste is particularly well suited for brazing of unalloyed and alloyed steel, copper and copper-plated workpieces as well as copper- nickel- alloys. Interesting for workpieces that have to be processed at low temperatures.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2	Vacuum furnace
☒	☒	☒

Availability:

Paste	Powder
☒	☒

13/10/JL/1

FONTARGEN AP 22 GS
Copper- tin- brazing paste

EN ISO 3677: B-Cu96Sn-960/1060

Composition, typical analysis (% w/w)**:**

Cu	Sn
96	4

Mechanical and physical properties:

Working temperature: 1060 - 1100 °C
Melting range: 960 - 1060 °C
Gap width: 0.05 - 0.2 mm
Viscosity range: 45.000 - 55.000 mPas
Metal content: 84 %

Characteristics / Applications:

Flux-free copper- tin- brazing paste with high metal content. The paste has a low viscosity, is easy to dispense and dries quickly on air. Good wetting and flowing properties.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Exogas	Inert-gas continuous furnace H_2/N_2	Vacuum furnace
☒	☒	☐

Availability:

Paste	Powder
☒	☐

13/10/JL/1

FONTARGEN HTL 1

Nickel-based high-temperature brazing paste

DIN EN 1044:	NI 101
DIN 8513:	L-Ni1
EN ISO 3677:	B-Ni74CrFeSiB(C)-980/1060
AWS:	BNi-1
AMS:	4775 G
Boing:	BTS 1025-4

Composition, typical analysis (% w/w)**:**

Cr	Si	B	Fe	C	P	Ni
14	4.5	3.2	4.5	0.75	< 0.02	Remainder

Mechanical and physical properties:

Working temperature:	1066 - 1204 °C
Melting range:	980 - 1060 °C
Gap width:	0.05 - 0.15 mm
Viscosity range:	55.000 - 65.000 mPas
Metal content:	≈ 90 % w/w
Oxidationresistant up to:	1200 °C
Shear strength:	383 N/mm^2 (1.4006)
(at room temperature)	334 N/mm^2 (1.4301)

Characteristics / Applications:

This brazing alloy achieves good stability, is heat- and oxidationresistant and offers good diffusibility. Suitable for joints which are exposed to high thermal and dynamic stress, e.g. turbine blades as well as assemblies in the hot area of steel engines. Steel-, nickel-, cobalt and special materials. Suitable for workpieces with thicker cross sections.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☐	☒	☒

Availability:

Paste HTL 1 AP	Powder HTL 1
☒	☒

13/10/JL/1

FONTARGEN HTL 1A

Nickel-based high-temperature brazing paste

DIN EN ISO 17672:	Ni 610
DIN EN 1044:	NI 1A1
DIN 8513:	L-Ni1a
EN ISO 3677:	B-Ni74CrFeSiB-980/1070
AWS:	BNi-1A
AMS:	4776 F
Boing:	BTS 1025-5

Composition, typical analysis (% w/w)**:**

Cr	Si	B	Fe	C	P	Ni
14	4.5	3.2	4.5	< 0.06	< 0.02	Remainder

Mechanical and physical properties:

Working temperature:	1077 - 1204 °C
Melting range:	980 - 1070 °C
Gap width:	0.05 - 0.1 mm
Viscosity range:	55.000 - 65.000 mPas
Metal content:	≈ 90 % w/w
Oxidationresistant up to:	1200 °C
Shear strength [N/mm^2]:	383 (1.4006)
(at room temperature)	334 (1.4301)

Characteristics / Applications:

HTL1A is an alloy whose composition is identical to HTL 1, however, with a max. C-content of 0.06 %. This brazing alloy is utilised for parts which are used in the high-temperature range as well as in the cooling technology. This brazing alloy shows good gap bridging properties. Suitable for slowly heated assemblies made of steel, nickel, cobalt and special metals. This brazing alloy achieves good stability, is heat- and oxidationresistant and offers good diffusibility. Better flowing properties compared to HTL 1.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☒	☒	☒

Availability:

Paste HTL 1A AP	Powder HTL 1A
☒	☒

13/10/JL/1

FONTARGEN HTL 2

Nickel-based high-temperature brazing paste

DIN EN ISO 17672:	Ni 620
DIN EN 1044:	NI 102
DIN 8513:	L-Ni2
EN ISO 3677:	B-Ni82CrSiBFe-970/1000
AWS:	BNi-2
AMS:	4777
Rolls Royce:	9500/97

Composition, typical analysis (% w/w)**:**

Cr	Si	B	Fe	C	P	Ni
7	4.5	3.1	3	< 0.06	< 0.02	Remainder

Mechanical and physical properties:

Working temperature:	1010 - 1170 °C, rec. brazing temp. 1080 °C
Melting range:	970 - 1000 °C
Gap width:	0.02 - 0.20 mm
Viscosity range:	55.000 - 65.000 mPas
Metal content:	≈ 90 % w/w
Oxidationresistant up to:	982 °C
Shear strength:	383 N/mm^2 (1.4006)
(at room temperature)	255 N/mm^2 (1.4301)

Characteristics / Applications:

This brazing alloy has good flowing properties and offers good diffusibility and is easy to dispense. Suitable for joints which are exposed to high thermal and dynamic stress. The brazing alloy allows optimal processing on e.g. turbine blades as well as on assemblies for the hot area in steel engines. Iron-, nickel-, cobalt and special materials.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☒	☒	☒

Availability:

Paste HTL 2 AP	Powder HTL 2
☒	☒

13/10/JL/1

FONTARGEN HTL 2 AP Nr. 4

Nickel-based high-temperature brazing paste

DIN EN ISO 17672:	Ni 620
DIN EN 1044:	NI 102
DIN 8513:	L-Ni2
EN ISO 3677:	B-Ni82CrSiBFe-970/1000
AWS:	BNi-2
AMS:	4777
Rolls Royce:	9500/97

Composition, typical analysis (% w/w)**:**

Cr	Si	B	Fe	C	P	Ni
7	4.5	3.1	3	< 0.06	< 0.02	Remainder

Mechanical and physical properties:

Working temperature:	1010 - 1170 °C,rec. brazing temp. 1080°C
Melting range:	970 - 1000 °C
Gap width:	0.02 - 0.15 mm
Viscosity range:	100.000 - 115.000 mPas
Metal content:	≈ 90 % w/w
Oxidationresistant up to:	982 °C
Shear strength:	383 N/mm^2 (1.4006)
(at room temperature)	255 N/mm^2 (1.4301)

Characteristics / Applications:

This brazing alloy has good flowing properties and offers good diffusibility. It is easy to dispense and dries slowly on air. Suitable for joints which are exposed to high thermal and dynamic stress. The brazing alloy allows optimal processing on e.g. turbine blades, as well as on assemblies for the hot area in steel engines. Iron-,
nickel-, cobalt and special materials.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☒	☒	☒

Availability:

Paste HTL 2 AP Nr. 4	Powder
☒	☐

13/10/JL/1

FONTARGEN HTL 5

Nickel-based high-temperature brazing paste

DIN EN ISO 17672:	Ni 650
DIN EN 1044:	NI 105
DIN 8513:	L-Ni5
EN ISO 3677:	B-Ni71CrSi-1080/1135
AWS:	BNi-5
AMS:	4782 B

Composition, typical analysis (% w/w)**:**

Cr	B	Si	C	P	Ni
19	< 0.03	10.1	< 0.06	< 0.02	Remainder

Mechanical and physical properties:

Working temperature:	1149 - 1204 °C, rec. brazing temp. 1190 °C
Melting range:	1080 - 1135 °C
Gap width:	0.02 - 0.10 mm
Viscosity range:	55.000 - 65.000 mPas
Metal content:	≈ 90 % w/w
Shear strength: (at room temperature)	676 N/mm^2 (1.4006)

Characteristics / Applications:

HTL 5 is a well suited brazing alloy for joints exposed to high stress. It has a good oxidation resistance. The absence of boron allows its use in the nuclear power area. Suited for joints made of iron-, nickel-, cobalt and special materials.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☐	☐	☒

Availability:

Paste HTL 5 AP	Powder HTL 5
☒	☒

13/10/JL/1

FONTARGEN HTL 5 CR

Nickel-based high-temperature brazing paste

Composition, typical analysis (% w/w)**:**

Cr	Si	P	Ni
29	4	6	Remainder

Mechanical and physical properties:

Working temperature:	1070 - 1090°C, rec. brazing temp. 1100 °C
Gap width:	0.02 - 0.35 mm
Viscosity range:	90000 - 115000 mPas
Metal content:	≈ 89 % w/w

Characteristics / Applications:

HTL 5 CR is a brazing alloy suited for corrosion resistant joints. It has excellent wetting properties and high tec. strength. HTL 5 CR is also used for wide gap brazing. The corrosion and oxidation resistance is better than B-Ni 5 but the brazing temperature is lower.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☒	☒	☒

Availability:

Paste HTL 5 CR AP	Powder HTL 5 CR
☒	☒

13/10/JL/1

FONTARGEN HTL 5 M

Nickel-based high-temperature brazing paste

Composition, typical analysis (% w/w)**:**

Cr	Si	P	Ni
18	8	2	Remainder

Mechanical and physical properties:

Working temperature:	1050 - 1070 °C, rec. brazing temp. 1060 °C
Melting range:	971 - 1051 °C
Gap width:	0.02 - 0.10 mm
Viscosity range:	55.000 - 65.000 mPas
Metal content:	≈ 89 % w/w

Characteristics / Applications:

HTL 5 is a brazing alloy suited for corrosionresistant joints.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☒	☒	☒

Availability:

Paste HTL 5 M AP	Powder HTL 5 M
☒	☒

13/10/JL/1

FONTARGEN HTL 6

Nickel-based high-temperature brazing paste

DIN EN ISO 17672:	Ni 700
DIN EN 1044:	NI 106
DIN 8513:	L-Ni6
EN ISO 3677:	B-Ni89P-875
AWS:	BNi-6

Composition, typical analysis (% w/w)**:**

P	C	Ni
11	< 0.06	Remainder

Mechanical and physical properties:

Working temperature:	927 - 1093 °C, rec. brazing temp. 980 °C
Melting range:	875 °C
Gap width:	up to 0.05 mm
Viscosity range:	60.000 - 80.000 mPas
Metal content:	≈ 90 % w/w
Oxidationresistant up to:	760 °C

Characteristics / Applications:

The brazing alloy HTL 6 has outstanding wetting properties. No erosion occurs while brazing on Fe- or Ni-based materials. The brazing alloy is applicable on currentless NiP-coated assemblies. Iron-, nickel-, cobalt- and special materials. Suited for workpieces which come in contact with food. Good flowing properties at low diffusibility.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Exogas / cracked NH_3	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☒	☒	☒

Availability:

Paste HTL 6 AP	Powder HTL 6

13/10/JL/1

FONTARGEN HTL 6 AP B

Nickel-based high-temperature brazing paste

DIN EN ISO 17672:	Ni 700
DIN EN 1044:	NI 106
DIN 8513:	L-Ni6
EN ISO 3677:	B-Ni89P-875
AWS:	BNi-6

Composition, typical analysis (% w/w)**:**

P	C	Ni
11	< 0.06	Remainder

Mechanical and physical properties:

Working temperature:	927 - 1093 °C, rec. brazing temp. 980 °C
Melting range:	875 °C
Gap width:	up to 0.05 mm
Viscosity range:	90.000 - 115.000 mPas
Metal content:	≈ 90 % w/w
Oxidationresistant up to:	760 °C

Characteristics / Applications:

The brazing alloy HTL 6 offers outstanding wetting properties. No erosion occurs while brazing on Fe- or Ni-based materials. The brazing alloy is applicable on currentless NiP-coated assemblies. Iron-, nickel-, cobalt- and special materials. Suited for workpieces which come in contact with food. Good flowing properties at low diffusibility.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Induction
☐	☐	☒

Availability:

Paste HTL 6 AP B	Powder
☒	☐

13/10/JL/1

FONTARGEN HTL 7

Nickel-based high-temperature brazing alloy

DIN EN ISO 17672:	Ni 710
DIN EN 1044:	NI 107
DIN 8513:	L-Ni7
EN ISO 3677:	B-Ni76CrP-890
AWS:	BNi-7

Composition, typical analysis (% w/w)**:**

Cr	P	C	Fe	Si	B	Ni
14	10.1	< 0.06	< 0.2	< 0.1	< 0.01	Remainder

Mechanical and physical properties:

Working temperature:	927 - 1093 °C,rec. brazing temp. 980 °C
Melting range:	890 °C
Gap width:	up to 0.05 mm
Viscosity range:	60.000 - 80.000 mPas
Metal content:	≈ 90 % w/w
Oxidationresistant up to:	855 °C

Characteristics / Applications:

The brazing alloy HTL 7 is used for thin-walled tubes, honeycomb-structures as well as assemblies for the nuclear technology. It is easy to dispense and dries slowly on air. It is very well suited for high-tensile, vacuum-sealed, high-temperature- and corrosionresistant joints. Suited for parts which come in contact with food. The ductility of the brazing joint can be enhanced by an extension of the exposure time. Iron-, nickel-, cobalt and special materials are applicable. Good flowing properties at low diffusibility.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace cracked NH_3	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☒	☒	☒

Availability:

Paste HTL 7 AP	Powder HTL 7
☒	☒

13/10/JL/1

FONTARGEN HTL 8

Nickel-based high-temperature brazing paste

DIN EN ISO 17672:	Ni 800
DIN EN 1044:	NI 108
DIN 8513:	L-Ni8
EN ISO 3677:	B-Ni66MnSiCu-980/1010
AWS:	BNi-8

Composition, typical analysis (% w/w)**:**

Mn	Cu	Si	C	P	Ni
23	4.5	7	< 0.06	< 0.02	Remainder

Mechanical and physical properties:

Working temperature:	1010 - 1093 °C, rec. brazing temp. 1065 °C
Melting range:	890 - 1010 °C
Gap width:	up to 0.05 mm
Oxidationresistant up to:	816 °C

Characteristics / Applications:

The flux-free brazing alloy HTL 8 is used for brazing of heat exchangers, honeycomb-structures as well as temperable or stainless steel. The operation of this brazing alloy requires a very good furnace atmosphere. Iron-, nickel-, cobalt- and special materials are to be brazed with this alloy. Good flowing properties at low diffusibility.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☐	☒	☐

Availability:

Paste HTL 8 AP	Powder HTL 8
☒	☒

13/10/JL/1

FONTARGEN HTL 9

Copper-based high-temperature brazing paste

AMS: 4764 E

Composition, typical analysis (% w/w)**:**

Cu	Ni	Mn
52.5	9.5	Remainder

Mechanical and physical properties:

Working temperature: 1010 - 1093 °C, rec. brazing temp. 1065 °C
Melting range: 879 - 927 °C
Gap width: up to 0.02 - 0.08 mm
Oxidationresistant: 538 °C

Characteristics / Applications:

The flux-free brazing alloy HTL 9 is used for joints on Cu-, Fe- and Ni-based alloys as well as on stainless Cr-Ni-steel. This brazing alloy is used especially in the aviation, nuclear technology and the chemical industry. It is easy to dispense and dries slowly on air.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☐	☒	☐

Availability:

Paste HTL 9 AP	Powder HTL 9
☒	☒

13/10/JL/1

FONTARGEN HTL 10

Copper-based high-temperature brazing paste

EN ISO 3677: B-Cu68MnNi-910/932

Composition, typical analysis (% w/w)**:**

Cu	Ni	Mn
67.5	9	Remainder

Mechanical and physical properties:

Working temperature:	954 - 1093 °C
Melting range:	910 - 932 °C
Gap width:	up to 0.02 - 0.08 mm
Metal content:	≈ 90 % w/w
Oxidationresistant up to:	538 °C

Characteristics / Applications:

The flux-free brazing alloy HTL 10 is used for joints on Cu-, Fe- and Ni-based alloys as well as on stainless Cr-Ni-steels. This brazing alloy is mostly used in aviation, nuclear technology and chemical industry.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☐	☒	☒

Availability:

Paste HTL 10 AP	Powder HTL 10
☒	☒

13/10/JL/1

FONTARGEN HTL 14

Gold-based high-temperature brazing paste

DIN EN ISO 17672:	Au 827
DIN EN 1044:	AU 105
EN ISO 3677:	B-Au82Ni-950
AWS:	BAu-4

Composition, typical analysis (% w/w)**:**

Au	Ni
82	Remainder

Mechanical and physical properties:

Working temperature:	950 °C
Melting range:	949 - 1004 °C
Gap width:	up to 0.04 - 0.10 mm
Metal content:	≈ 90 % w/w
Oxidationresistant up to:	815 °C

Characteristics / Applications:

The flux-free brazing alloy HTL 14 has a wide range of applications in the steel engine construction. This standard Au-Ni brazing alloy is universally used for brazing of alloyed steel and Ni-alloys where high stability and good high-temperature corrosion resistance is demanded.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☐	☒	☒

Availability:

Paste HTL 14 AP	Powder HTL 14
☒	☒

13/10/JL/1

FONTARGEN HTL 17

Copper-based high-temperature brazing paste

EN ISO 3677: B-Cu87MnNi-980/1030

Composition, typical analysis (% w/w)**:**

Mn	Ni	Cu
10	3	Remainder

Mechanical and physical properties:

Working temperature:	982 - 1010 °C
Melting range:	980 - 1030 °C
Gap width:	up to 0.05 - 0.25 mm
Viscosity range:	100.000 - 120.000 mPas
Metal content:	≈ 91 % w/w

Characteristics / Applications:

The flux-free brazing alloy HTL 17 is an easy to dispense brazing paste with high metal content. This brazing alloy is particularly well suited for joints made of hard to wet base materials e.g. hard metals and for joining of workpieces with big brazing gaps. The binder dries slowly on air and combusts, depending on the brazing atmosphere, residue-free. Good wetting and flowing properties. Also suited for resistance-heating processes with inert-gas.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace cracked NH_3	Inert-gas continuous furnace H_2/N_2	Vacuum furnace
☒	☒	☒

Availability:

Paste HTL 17 AP	Powder HTL 17
☒	☒

13/10/JL/1

FONTARGEN HTL 170

Nickel-based high temperature brazing paste

Composition, typical analysis (% w/w)**:**

B	Cr	Si	P	Fe	Ni
1.4	14	2	5.6	2	Remainder

Mechanical and physical properties:

Working temperature:	980 - 1050 °C
Melting range:	866 - 881 °C
Gap width:	0.02 - 0.2 mm
Viscosity range:	90.000 - 110.000 mPas
Metal content:	≈ 90 % w/w

Characteristics / Applications:

The flux-free brazing alloy HTL 170 is an easy to dispense brazing paste of medium viscosity with a high metal content and good gap bridging properties. The alloy is particularly well suited for brazing of high-alloyed steel. The paste dries slowly on air.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace cracked NH_3	Inert-gas continuous furnace H_2/N_2	Vacuum furnace
☒	☒	☒

Availability:

Paste HTL 170 AP	Powder HTL 170
☒	☐

13/10/JL/1

FONTARGEN HTL 270

Nickel-based high-temperature brazing paste

Composition, typical analysis (% w/w)**:**

Cu	Cr	P	Ni
10	11.8	8	Remainder

Mechanical and physical properties:

Working temperature:	980 - 1050 °C
Melting range:	870 - 890 °C
Gap width:	up to 0.2 mm
Viscosity range:	90.000 - 110.000 mPas
Metal content:	81 % w/w

Characteristics / Applications:

The flux-free brazing alloy HTL 270 AP is an easy to dispense brazing paste with medium viscosity and high metal content. It dries slowly on air and has good gap bridging properties. This brazing alloy is particularly well suited for stainless steel processing.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☐	☒	☐

Availability:

Paste HTL 270 AP	Powder HTL 270
☒	☒

13/10/JL/1

FONTARGEN HTL 310

Copper- nickel-based high-temperature paste

Composition, typical analysis (% w/w)**:**

Ni	Cu	Mn	Si	B	Remainder
42.2	40.5	14.1	1.8	1.2	< 0.2

Mechanical and physical properties:

Working temperature:	1100 °C
Melting range:	> 910 °C
Gap width:	up to 0.1 mm
Viscosity range:	80.000 - 90.000 mPas
Metal content:	≈ 90 % w/w

Characteristics / Applications:

The flux-free brazing alloy HTL 310 is an easy to dispense brazing paste with medium viscosity and high metal content. It dries slowly on air. It is used for brazing of steel sinter materials.

Application:

Manually or automatically with pneumatical or mechanical dispensing units.

Heat sources:

Inert-gas continuous furnace Argon	Inert-gas continuous furnace Hydrogen	Vacuum furnace
☐	☒	☐

Availability:

Paste HTL 310 AP	Powder HTL 310
☒	☐

13/10/JL/1

Group 2

Fluxes

a) **Brass and German silver fluxes**

b) **Silver fluxes**

c) **Aluminium-fluxes**

d) **Soldering fluxes**

Fluxes

a) Brass and German silver fluxes

Type	*DIN EN 8511 / DIN 1045*	*Page*
F 100 - Serie Rapidflux - Series		114

b) Silver fluxes

Type	*DIN EN 8511 / DIN 1045*	*Page*
F 300 - Series		115

c) Aluminium-fluxes

Type	*DIN EN 8511 / DIN 1045*	*Page*
F 400 - Series		116

d) Soldering-fluxes

Type	*DIN EN 8511 / DIN 29454*	*Page*
F 600 - Series		117

Brass and German silver fluxes
in accordance with DIN EN 1045 (DIN 8511)

The following fluxes are available as standard brazing fluxes for brass and German silver:

F 100 (FH 21 / F-SH2) white paste, non-corrosive
for brazing of steel, cast iron, malleable cast iron, nickel and nickel alloys.

F 110 (not standardised) red powder
for welding of cast iron with FONTARGEN A 110.

F 120 (FH 21 / F-SH2) white powder, non-corrosive
for brazing of steel, cast iron, malleable cast iron, nickel and nickel alloys. Mixed with distilled water, the powder becomes an easy to spread flux paste.

Rapidflux (FH 21 / F-SH2) clear liquid, non-corrosive
for brazing of steel, cast iron, malleable cast iron, nickel and nickel alloys. The liquid is used in conjunction with the appropriate RAPIDFLUX equipment and is fed through the burner directly to the brazing joint.

Rapidflux NT (FH 21 / F-SH2) clear, nontoxic liquid, non-corrosive
for brazing of steel, cast iron, malleable cast iron, nickel and nickel alloys. The liquid is used in conjunction with the appropriate RAPIDFLUX equipment and is fed through the burner directly to the brazing joint.
13/10/JL/1

Silver brazing fluxes
in accordance with DIN EN 1045 (DIN 8511)

The fluxes featured in the FONTARGEN program are adjusted to match the working temperature of the silver brazing alloy or to suit the base material being brazed.

F 300 (FH 10 / F-SH1) white powder, corrosive
for brazing of copper and copper alloys, nickel and nickel alloys, alloyed and unalloyed steel. Mixed with distilled water, the powder becomes an easy to spread flux paste.

F 300 H Ultra (FH 10 / F-SH1) white, easy to spread paste, corrosive
for brazing of copper and copper alloys, nickel and nickel alloys, alloyed and unalloyed steel. Slightly increased temperature stability in comparison to F 300 S.

F 300 H Ultra NT (FH 10 / F-SH1)white, easy to dose flux paste, non toxic and corrosive for brazing of copper and copper alloys, nickel and nickel alloys, alloyed and unalloyed steel. Well suited for mechanical brazing e.g. flame brazing.

F 300 HF Ultra (FH 12 / F-SH1) dark, easy to spread paste, corrosive
for brazing of copper and copper alloys, nickel and nickel alloys, alloyed and unalloyed steel as well as hard metals. Particularly well suited for higher temperatures of max. 850 °C.

F 300 DN (FH 10 / F-SH1) white, easy to dose flux paste, corrosive
for brazing of copper and copper alloys, nickel and nickel alloys, alloyed and unalloyed steel. Well suited for mechanical brazing e.g. flame brazing.

F 3400 S (not standardised) clear sprayable liquid, slightly corrosive
for brazing of copper and copper alloys. The flux supports the fluidity of the solder in conjunction with RAPIDFLUX and copper-phosphor-silver alloys.
13/10/JL/2

Aluminium fluxes
in accordance with DIN EN 1045 (DIN 8511)

The FONTARGEN fluxes for light metals have been developed to suit the characteristic properties of aluminium.

F 400 NH (FL 20 / F-LH2) white powder, non-corrosive
for brazing of aluminium and aluminium alloys with a Mg-content of max. 0.5 %. The powder is non-hygroscopic and mixed with distilled water the powder becomes an easy to spread flux paste. The brazing joints must be protected from wetness.

F 400 M (FL 10 / F-LH1) white powder, corrosive
for brazing of aluminium and aluminium alloys with a Mg-content of max. 3.0 %. The powder is highly hygroscopic. Flux residues are corrosive and must be removed immediately after the work is completed.

F 400 MD (FL 10 / F-LH1) white, easy to dose paste, corrosive
for brazing of aluminium and aluminium alloys with a Mg-content of max. 3.0 %. The paste is highly hygroscopic and should be kept in tight closed containers. Flux residues must be removed immediately after work is completed.
13/10/JL/1

Soft soldering fluxes
in accordance with DIN EN 29454 (DIN 8511)

The following soft soldering fluxes are featured in the FONTARGEN program:

F 600 (3.1.1.A / F-SW12) easy to spread liquid, corrosive
Brazing of copper and copper alloys, alloyed and unalloyed steel.

F 600 S15 (3.2.2.A / F-SW11) liquid, corrosive
Brazing of copper and copper alloys, alloyed and unalloyed steel. Suitable for galvanised plate.

F 600 CW (3.1.1.A / F-SW21) solder oil, non-corrosive
High quality flux for soldering of pipe installation e.g. copper pipes. DVGW-approved.

F 600 C (3.1.1.A / F-SW21) solder oil, slightly corrosive
Brazing of copper.

F 600 CC (1.1.2.C / F-SW26) paste, non-corrosive
Colophony-based flux, suitable for brazing in the electrical engineering and electronics.

F 600 AL (2.1.2.A / F-LW3) oil, non-corrosive
Brazing of aluminium, copper and copper alloys.

F 600 ZN (not standardised) paste, non-corrosive
Brazing of aluminium, aluminium alloys and aluminium-copper alloys with zinc-aluminium solders at a temperature of approx. 380 - 500 °C.
13/10/JL/2

Group 3

Wire electrodes

a) Copper and copper alloys

b) Aluminium and aluminium alloys

a) Copper and copper alloys

Type	*ISO 24373*	*Page*
A 200 M	S Cu 1897 (CuAg1)	122
A 200 SM	S Cu 1898 (CuSn1)	123
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b) Aluminium and aluminium alloys

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FONTARGEN A 200 M

Copper wire electrode for MIG-welding

ISO 24373:	S Cu 1897 (CuAg1)
AWS A 5.7:	ERCu
Material-no.:	2.1211

Composition, typical analysis (% w/w)**:**

Ag	Mn	Cu
1	0.1	Remainder

Characteristics / Applications:

Joint and build-up welding on copper, for example material numbers: 2.0060 (E-Cu 57), 2.0070 (SE-Cu), 2.0090 (SF-Cu), 2.0110 (SD-Cu), 2.0150 (SB-Cu), 2.0170 (SA-Cu), 2.1202 (Cu Ag), plates, profiles, containers.

Very easily processed copper alloy. Semi-fluid. Suited for difficult welding positions. The welding pool is clean and clear. The welding deposit is tough and non-porous. Colour and structure of the welding deposit like copper. For workpieces that must be polished, use in limited fashion, as silver can cause blackening. Preheat large workpieces to 350 - 600 °C; use Ar-He inert-gas mixture if necessary.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	1070 - 1080 °C
Tensile strength:	200 N/mm²
Elongation limit (0.2 %):	80 N/mm²
Elongation (l=5d):	30 %
Thermal elongation:	17.7 • 10^{-6}/K
Hardness (Brinell):	60 HB
Electrical conductivity:	44 - 46 Sm/mm²
Heat conductivity:	220 - 315 W/m • K
Specific gravity:	8.9 g/cm³
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon), I 3 (Ar-He mixture)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6/2.4
Spool type:	B300, S300
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 200 SM

Copper wire electrode for MIG-welding

ISO 24373:	S Cu 1898 (CuSn1)
AWS A 5.7:	ERCu
Material-no.:	2.1006

Composition, typical analysis (% w/w)**:**

Sn	Si	Mn	Cu
0.8	0.3	0.3	Remainder

Characteristics / Applications:

Joint and build-up welding on oxygen-free copper and copper alloys of material numbers: 2.0040, 2.0060, 2.0070, 2.0080, 2.0090, 2.0100, 2.0120, 2.0150, 2.0170, 2.1202, 2.1322, 2.1325, 2.1491. Suitable for out-of position welding. Clean base materials in the welding spheres and preheat if over 3 mm (per mm of plate thickness approx. 100 °C, but not more than 600 °C). Suitable for welding of galvanised steel (MIG-brazing).

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	1020 - 1050 °C
Tensile strength:	200 - 240 N/mm²
Elongation (l=5d):	30 %
Thermal elongation:	18.1 • 10^{-6}/K
Impact energy (ISO-V):	75 J
Hardness (Brinell):	50 - 60 HB
Electrical conductivity:	15 - 20 Sm/mm²
Heat conductivity:	120 - 145 W/m • K
Specific gravity:	8.9 g/cm³
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon), I 3 (Ar-He mixture)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6
Spool type:	B300, S300
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 202 M

Copper-silicon wire electrode for MIG-brazing

ISO 24373:	S Cu 6560 (CuSi3Mn1)
AWS A 5.7:	ERCuSi-A
Material-no.:	2.1461

Composition, typical analysis (% w/w)**:**

Si	Sn	Zn	Mn	Fe	Cu
2.9	0.1	0.1	1.2	0.2	Remainder

Characteristics / Applications:
MIG-brazing of zinc or aluminium plated and uncoated steel plates. Applications: Auto body, air condition and container building. The corrosion resistance of zinc plated surfaces remains unaffected . Little deformation of thin steel sheets.

Mechanical properties of pure brazing deposit (Min. values at room temperature):

Melting range:	965 - 1032 °C
Tensile strength:	350 N/mm²
Yield strength:	120 N/mm²
Elongation (l=5d):	40 %
Thermal elongation:	18.1 • 10^{-6}/K
Hardness (Brinell):	80 HB
Impact energy (ISO-V):	60 J
Electrical conductivity:	3 - 4 Sm/mm²
Heat conductivity:	35 W/m • K
Specific gravity:	8.5 g/cm³
Brazing process:	MIG-/MAGM-/Laser-brazing
Shielding gas (DIN EN 439):	I 1 (Argon), M 12 (Ar + 2.5 % CO_2), M 12 (Ar + 1 - 3 % O_2)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6
Spool type:	B300, S300, S560, Drum
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 202 MS

Copper-silicon wire electrode for laser brazing

ISO 24373:	S Cu 6560 (CuSi3Mn1)
AWS A 5.7:	ERCuSi-A
Material-no.:	2.1461

Composition, typical analysis (% w/w)**:**

Si	Sn	Zn	Mn	Fe	Cu
2.9	0.1	0.1	1.2	0.2	Remainder

Characteristics / Applications:
Laser-brazing of zinc-galvanised, aluminized and uncoated steel plates. Applications: Auto body and thin sheet brazing in the automotive industry. The corrosion resistance of zinc-galvanised surfaces remains unaffected. Little deformation of thin steel sheets.

Mechanical properties of pure welding deposit
(Min. values at room temperature):

Melting range:	965 - 1032 °C
Tensile strength:	350 N/mm²
Yield strength:	120 N/mm²
Elongation (l=5d):	40 %
Thermal elongation:	18.1 • 10^{-6}/K
Hardness (Brinell):	80 HB
Impact energy (ISO-V):	60 J
Electrical conductivity:	3 - 4 Sm/mm²
Heat conductivity:	35 W/m • K
Specific gravity:	8.5 g/cm³
Welding process:	Laser-brazing, laser-hybrid
Shielding gas (DIN EN 439):	I 1 (Argon)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6
Spool type:	B300 S300 S560 Drum
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
╲	☒	╳	☐	╲	☒	☐

13/10/JL/1

FONTARGEN A 207 M

Cu-Si-Mn wire electrode for MIG-Brazing

fontargen brazing

ISO 24373: S Cu 6511 (CuSi2Mn)
Material-no.: 2.1522

Composition, typical analysis (% w/w)**:**

Si	Sn	Mn	Cu
1.8	0.2	1	Remainder

Characteristics / Applications:

Very easy to weld. High temperature- and corrosion resistance as well as good behaviour under compression stress. Good wetting of the base material with lower working temperature compared to copper. Flat seams due to Si content and little pore formation.

Welding of galvanised auto body steel sheets (MIG brazing), un-alloyed and low-alloyed steels, cast iron as well as copper and copper alloys. With MIG burner: Weld sharp, not dragging.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range: 1030 - 1050 °C
Tensile strength: 285 N/mm²
Yield strength: 140 N/mm²
Elongation (l=5d): up to 40 %
Impact energy: 75 J
Hardness (Brinell): 62 HB
Thermal conductivity: 40 W/m • K
Specific gravity: 8.7 g/cm³
Linear expansion: $18.1 \cdot 10^{-6}$/K

Welding process: MIG

Shielding gas (DIN EN 439): I 1 (Argon)

Current mode: DC (+pole)

Availability: Diameter (mm): 0.8/1.0/1.2/1.6/2.4

Spool type: B300
S300

Welding position: according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 203/6 M

Copper-tin wire electrode for MIG-welding

ISO 24373:	S Cu 5180 A (CuSn6P)
AWS A 5.7:	ERCuSn-A
Material-no.:	2.1022

Composition, typical analysis (% w/w)**:**

Sn	P	Cu
6	0.2	Remainder

Characteristics / Applications:

Welding of copper materials, e.g. CuSn-alloys, CuSnZnPb-cast alloys. Particularly well suited for the joint welding of brass on brass or brass on Cu-alloys, Fe-materials and cast iron. Suitable for welding of galvanised steel (MIG-brazing). Further applications include: Building-up of bearing bushes, sliding rails, repairs of phosphor bronze parts. For tin-bronze parts of > 10 mm thickness, we recommend preheating. Suitable for material numbers: 2.1010, 2.1016, 2.1020, 2.1030, 2.1050, 2.1052, 2.1056, 2.1080, 2.1086, 2.1090, 2.1096. Build-up welding on Fe materials should be performed by pulsed arc welding.

Corrosion- and overheating-resistant tin-bronze alloy. A 203/6 M is very easily machined and produces a clear weld pool. The welding deposit is tough and non-porous. Keep arc short. To eliminate contraction strains (in materials with high tin content) peen the seam.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	910 - 1040 °C
Tensile strength:	260 N/mm²
Elongation (l=5d):	20 %
Thermal elongation:	18.1 • 10^{-6}/K
Hardness (Brinell):	80 HB
Electrical conductivity:	6 - 7 Sm/mm²
Heat conductivity:	75 W/m • K
Specific gravity:	8.7 g/cm³
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6/2.0/2.4
Spool type:	B300, S300
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 203/12 M

Copper-tin wire electrode for MIG-welding

ISO 24373:	S Cu 5410 (CuSn12P)
AWS A 5.7:	RCuSn-D
Material-no.:	2.1056

Composition, typical analysis (% w/w)**:**

Sn	P	Cu
12	0.2	Remainder

Characteristics / Applications:

Welding of copper materials, e.g. copper and Sn-bronze. Particularly well suited for joint welding of brass on brass or brass on Cu alloys and Fe materials. Building-up of bearing bushes, sliding rails and repairs of phosphor bronze parts. Welding deposit nearly of same colour as welding of red brass Rg 5. Suitable for material numbers: 2.1010, 2.1020, 2.1050, 2.1056, 2.1086, 2.1016, 2.1030, 2.1052, 2.1080. Build-up welding on Fe materials should be performed with pulsed arc welding.

Corrosion- and overheating-resistant tin-bronze alloy. A 203/12 M is very easily machined and produces a clear weld pool that is smooth, clear and non-porous.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	825 - 990 °C
Tensile strength:	320 N/mm²
Elongation (l=5d):	5 %
Thermal elongation:	18.5 • 10^{-6}/K
Hardness (Brinell):	120 HB
Impact energy:	8 J
Electrical conductivity:	3 - 5 Sm/mm²
Heat conductivity:	40 - 50 W/m • K
Specific gravity:	8.6 g/cm³
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6/2.0/2.4
Spool type:	B300 S300

Welding position: according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 2115/5 Ni M

Copper-aluminium wire electrode for MIG-brazing

ISO 24373: S Cu 6061 (CuAl5Ni2Mn)

Composition, typical analysis (% w/w)**:**

Al	Ni	Mn	Cu
5	2	0.2	Remainder

Characteristics / Applications:

Welded joints and deposit welding on aluminium bronze with 5 - 6 % Al, high-strength brass, copper and copper-alloys, ferritic and austentic steel, steel, aluminium-coated steel, gray cast. Suitable for welding of galvanized steel (MIG-welding). Preheating is only necessary for big assemblies. Pulsed arc welding is recommended for the first layer of deposit welding on ferrous materials.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	1060 - 1085 °C
Tensile strength:	360 - 450 N/mm²
Elongation (l=5d):	45 %
Hardness (Brinell):	160 HB
Thermal conductivity:	61 W/m • K
Electrical conductivity:	8.0 - 8.8 Sm/mm²
Specific gravity:	8.2 g/cm³
Linear expansion:	17.5 • 10^{-6}/K
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon), M 12 (Ar + 2 % CO_2), M 12 (Ar + 1 % O_2)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6/2.4
Spool type:	B300 S300 Drum
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 2115/8 M

Copper-aluminium wire electrode for MIG-brazing

ISO 24373:	S Cu 6100 (CuAl7)
AWS A 5.7:	ERCuAl-A1
Material number:	2.0921

Composition, typical analysis (% w/w)**:**

Al	Ni	Mn	Fe	Cu
8	0.5	0.2	0.2	Remainder

Characteristics / Applications:

MIG-brazing of aluminium plated and uncoated steel plates. Applications: Auto body, magnetic solenoids, air conditioning and container building. The corrosion resistance galvanized steel plates remain unaffected. Little deformation of thin steel sheets.

Suitable for joining of aluminium-bronze, high-strength brass and steel. Range of applications: Car body, ship building, heating and cooling as well as container building.

Mechanical properties of pure brazing deposit (Min. values at room temperature):

Melting range:	1030 - 1040 °C
Tensile strength:	380 - 450 N/mm²
Elongation (l=5d):	45 %
Thermal elongation:	17 • 10^{-6}/K
Hardness (Brinell):	60 - 80 HB
Electrical conductivity:	8 Sm/mm²
Heat conductivity:	35 W/m • K
Specific gravity:	7.7 g/cm³
Brazing process:	MIG-brazing
Shielding gas (DIN EN 439):	I 1 (Argon)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2
Spool type:	B300, S300, Drum
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 216 M

Copper-aluminium-nickel wire

ISO 24373:	S Cu 6327 (CuAl8Ni2Fe2Mn2)
AWS A 5.17:	ERCuNiAl
Material-no.:	2.0922

Composition, typical analysis (% w/w)**:**

Al	Ni	Mn	Fe	Cu
8	2	1.8	1.8	Remainder

Characteristics / Applications:

Joint and build-up welding on multi-alloyed aluminium-bronze, for example material numbers: 2.0916, 2.0920, 2.0928, 2.0932, 2.0936, 2.0940, 2.0960, 2.0962, 2.0966, 2.0970, 2.0975, 2.0978 and 2.0980. Build-up welding on steel and copper alloys. Fusion welding between steel and aluminium-bronze (also multi-alloys). Suitable for MIG-brazing of aluminium surfaced and galvanised steels. For use in shipbuilding, machine, apparatus and pump construction; for example ship propellers, pump casings, valve control casings and food containers. Preheating necessary only with large workpieces. For the first run of build-up welds on ferrous base material we recommend pulsed-arc welding.

The welding deposit is saltwater- and corrosion resistant as well as wear resistant. Well suited if subjected to wear by salt water, cavitation and erosion at the same time.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	1030 - 1050 °C
Tensile strength:	530 - 590 N/mm²
Yield strength (0.2 %):	290 N/mm²
Elongation (l=5d):	30 %
Impact energy (ISO-V):	70 J
Hardness (Brinell):	130 - 150 HB
Electrical conductivity:	5 Sm/mm²
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6/2.4
Spool type:	B300 S300
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 746 NiM

Copper-manganese-silicon electrode for MIG-brazing

DIN EN ISO 24373: CuZ (CuMn12Ni2)
Material No.: 2.1362

Composition, typical analysis (% w/w)**:**

Ni	Mn	Other	Cu
2,0 – 2,5	12,0 – 13,0	0,1	Remainder

Characteristics / Applications:
High yield strength, ductility and crack resistance. Joining of steel plates and high Mn-alloyed bronzes. Surfacing of rotation-symmetric blanks for solenoids.

Mechanical properties of pure welding deposit (Min. values at RT):

Melting range: 950 – 970°C
Tensile strength: 350 – 450 N/mm²
Yield strength: 250 – 320 N/mm²
Elongation: > 10%
Specific gravity: 7,4 g/cm³
Electrical conductivity: 2,3 Sm/mm²
Heat conductivity: 22 w/(m • k)

Process: MIG-brazing

Shielding gas (EN 439): I1 (welding grade argon)

Heat sources: Acetylene torch

Availability: Diameter (mm): 0,8/1,0/1,2/1,6

Spool type: B300, S300

Welding position: according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

09/10/SR/0

FONTARGEN A 400 Ti M

Aluminium wire electrode for MIG-welding

ISO 18273: S Al 1450 (Al99,5Ti)
Material-no.: 3.0805

Composition, typical analysis (% w/w)**:**

Fe	Si	Cu	Zn	Ti	Al
0.4	0.2	0.05	0.07	0.1	Remainder

Characteristics / Applications:
Aluminium alloy with good fluidity. Weldable in all positions. The Ti-content ensures a grain refinement of the welding deposit. Joint welding of base materials: Al 98; Al 99; Al 99,5; Al 99,8 und Al 99,7. For plates thicker than 15 mm preheat to a min. of 150 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	647 - 658 °C
Tensile strength:	65 N/mm²
Yield strength (0.2 %):	30 N/mm²
Elongation (l=5d):	35 %
Electrical conductivity:	34 - 36 Sm/mm²
Heat conductivity:	210 - 230 W/m • K
Specific gravity:	2.71 g/cm³
Linear expansion:	23.5 • 10^{-6}/K
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	Direct current (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6/2.4
Spool type:	B300
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 402 M

Aluminium-magnesium wire electrode for MIG-welding

ISO 18273:	S Al 5754 (AlMg3)
AWS A 5.10:	ER5754
Material-no.:	3.3536

Composition, typical analysis (% w/w)**:**

Mg	Mn	Fe	Si	Cr	Ti	Al
3	0.3	0.2	0.2	0.1	0.1	Remainder

Characteristics / Applications:

Corrosion- and saltwater-proof alloy. Suitable for anodising.
Welding of rolled and cast aluminium-magnesium alloys such as Al Mg 3, Al Mg Mn, Al Mg 1, Al Mg 2, Al Mg Si 0,5, Al Mg Si 0,8, G - Al Mg 3, G - Al Mg 3 (Cu), G - Al Mg 3 Si. Tank construction, aluminium constructions, constructions of vehicles, shipbuilding, window and door frames construction. Plates thicker than
15 mm must be preheated to approx. 150 °C - 200 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	610 - 642 °C
Tensile strength:	200 N/mm²
Yield strength (0.2 %):	80 N/mm²
Elongation (l=5d):	20 %
Electrical conductivity:	21 Sm/mm²
Heat conductivity:	130 - 170 W/m • K
Specific gravity:	2.66 g/cm³
Linear expansion:	$23.7 \cdot 10^{-6}$/K

Welding process: MIG

Shielding gas (DIN EN 439): I 1 (Argon)
I 3 (Argon/Helium mixture)

Current mode: Direct current (+pole)

Availability: Diameter (mm): 0.8/1.0/1.2/1.6/2.4

Spool type: B300

Welding positions: according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 404 M

Aluminium-magnesium wire electrode for MIG-welding

ISO 18273:	S Al 5356 (AlMg5Cr(A))
AWS A 5.10:	ER5356
Material-no.:	3.3556

Composition, typical analysis (% w/w)**:**

Mg	Mn	Fe	Si	Cr	Ti	Al
5	0.1	0.2	0.2	0.1	0.1	Remainder

Characteristics / Applications:

Corrosion- and saltwater-proof alloy. Suitable for anodising. Welding of rolled and cast aluminium-magnesium alloys according to DIN 1725 Bl. 1 and Bl. 2, like Al Mg 3, Al Mg 5, Al Mg Mn, Al Zn Mg 1, G-Al Mg 3/+Si/+Cu, G-Al Mg 5/+Si, G-Al Mg 10, Al Mg Si 1. Tank construction, construction of vehicles, aluminium constructions, shipbuilding, windows, etc. For plates thicker than 15 mm, preheat to min. 150 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	575 - 633 °C
Tensile strength:	250 N/mm²
Yield strength (0.2 %):	110 N/mm²
Elongation (l=5d):	25 %
Electrical conductivity:	15 - 19 Sm/mm²
Heat conductivity:	110 - 150 W/m • K
Specific gravity:	2.64 g/cm³
Linear expansion:	23.7 • 10^{-6}/K
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	Direct current (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6/2.4
Spool type:	B300
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 404/4,5 M

Aluminium-magnesium wire electrode for MIG-welding

ISO 18273:	S Al 5183 (AlMg4,5Mn0,7(A))
AWS A 5.10:	ER5183
Material-no.:	3.3548

Composition, typical analysis (% w/w)**:**

Mg	Mn	Fe	Si	Cr	Ti	Al
4.5	0.7	0.2	0.2	0.1	0.1	Remainder

Characteristics / Applications:

Filler metal for joints which demand highest toughness. The welding deposit has a good resistance to atmospheric influences and seawater. Joint welding on rolled and cast aluminium-magnesium alloys, e.g. Al Mg 4,5 Mn, Al Mg 5, Al Zn 4,5 Mg 1, G-Al Mg 3/+Si/+Cu, G-Al Mg 5/+Si, G-Al Mg 10, Al Mg Si 1. If plates are thicker than 15 mm, preheat to a min. of 150 °C.

Filler metal for joints with highest toughness demands. The welding deposit has a good resistance to atmospheric influences and saltwater.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	574 - 638 °C
Tensile strength:	280 N/mm²
Yield strength:	140 N/mm²
Elongation (l=5d):	20 %
Electrical conductivity:	16 - 19 Sm/mm²
Heat conductivity:	110 - 120 W/m • K
Specific gravity:	2.66 g/cm³
Linear expansion:	23.7 • 10^{-6}/K
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	DC (+pole)
Approval:	DB (61.046.02/QS)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6/2.4
Spool type:	B300
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 404/4,5 Zr M

Aluminium-magnesium wire electrode for MIG-welding

ISO 18273:	S Al 5087 (AlMg4,5MnZr)
AWS A 5.10:	ER5087
Material-no.:	3.3546

Composition, typical analysis (% w/w)**:**

Mg	Mn	Fe	Si	Cr	Ti	Zr	Al
4.7	0.9	0.2	0.1	0.1	0.1	0.15	Remainder

Characteristics / Applications:

Zirconic welding deposit for joints which demand highest toughness. Zirconium increases the heat crack-resistance. The welding filler can be used advantageously for complicated welding constructions involving unfavourable restraint conditions. The welding deposit has a good resistance to atmospheric influences and seawater.

Joint welding on rolled and cast aluminium-magnesium alloys, e.g. Al Mg 3, G-Al Mg 3, Al Mg 4,5 Mn, Al Mg 5, G-Al Mg 5, Al-Cu Mg 1, Al Mg Si 1, Al Zn 4,5 Mg 1. If plates are thicker than 10 mm, preheat to 150 °C - 200 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	574 - 638 °C
Tensile strength:	300 N/mm²
Yield strength (0.2 %):	140 N/mm²
Elongation (l=5d):	20 %
Electrical conductivity:	17 - 19 Sm/mm²
Heat conductivity:	110 - 120 W/m • K
Specific gravity:	2.66 g/cm³
Linear expansion:	23.7 • 10^{-6}/K
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6/2.4
Spool type:	B300
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 405 M

Aluminium-silicon wire electrode for MIG-welding

ISO 18273:	S Al 4043 (AlSi5)
AWS A 5.10:	ER4043
Material-no.:	3.2245

Composition, typical analysis (% w/w)**:**

Fe	Si	Cu	Ti	Al
0.5	5.2	0.1	0.1	Remainder

Characteristics / Applications:

Welding of Al Si 5, Al Mg Si 0,5, Al Mg Si 0,8, Al Mg Si 1. Al and Al alloys with an alloy content of less than 2 %. Al cast alloy with Si content of max. 7 %. Plates thicker than 15 mm, preheat to approx. 150 °C. When welding heat-treatable alloys, do not put the weld seam in areas subjected to high mechanical stress. Al-Si alloy with good fluidity. Discolouring when anodised.

Mechanical and physical properties:

Melting range:	573 - 625 °C
Tensile strength:	160 N/mm²
Yield strength (0.2 %):	40 N/mm²
Elongation (l=5d):	15 %
Electrical conductivity:	24 - 32 Sm/mm²
Heat conductivity:	170 W/m • K
Specific gravity:	2.68 g/cm³
Linear expansion:	22.1 • 10^{-6}/K
Welding process:	MIG
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	DC (+pole)
Availability:	Diameter (mm): 0.8/1.0/1.2/1.6/2.4
Spool type:	B300
Approval:	DB (61.046.01/QS)
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

FONTARGEN A 407 M

Aluminium-silicon wire electrode for MIG-welding

ISO 18273:	S Al 4047 (AlSi12(A))
AWS A 5.10:	ER4047
Material-no.:	3.2585

Composition, typical analysis (% w/w)**:**

Si	Fe	Mn	Cu	Zn	Ti	Al
12	0.5	0.1	0.1	0.1	0.1	Remainder

Characteristics / Applications:

Al-Si alloy with good fluidity. Structure and colour matching. Not suited for joints that are subsequently anodised. Al-Si cast alloys with more than 7 % weight content of silicon. In special cases also Al and Al alloys with less than 2 % alloying elements. Tank constructions, air-conditioning equipment, household appliances, sheets, pipes, profiles. Preheat thick plates and large workpieces to approx. 150 °C - 180 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	573 - 585 °C
Tensile strength:	180 N/mm²
Yield strength (0.2 %):	80 N/mm²
Elongation (l=5d):	5 %
Electrical conductivity:	17 - 27 Sm/mm²
Heat conductivity:	150 - 170 W/m • K
Specific gravity:	2.65 g/cm³
Linear expansion:	20 • 10^{-6}/K

Welding process: MIG

Shielding gas (DIN EN 439): I 1 (Argon)
I 3 (Argon/Helium mixture)

Current mode: DC (+pole)

Availability: Diameter (mm): 0.8/1.0/1.2

Spool type: B300

Welding position: according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/10/JL/1

Group 4

Welding rods

a) Copper and copper alloys

b) Aluminium and aluminium alloys

a) Copper and copper alloys

Type	*ISO 24373*	*Page*
A 200 W	S Cu 1897 (CuAg1)	144
A 200 SW	S Cu 1898 (CuSn1)	145
A 202 W	S Cu 6560 (CuSi3Mn1)	146
A 207 W	S Cu 6511 (CuSi2Mn1)	147
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b) Aluminium and aluminium alloys

Type	*ISO 18273*	*Page*
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A 407 W	S Al 4047 (AlSi12)	159
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FONTARGEN A 200 W

Copper welding rod

ISO 24373:	S Cu 1897 (CuAg1)
AWS A 5.7:	ERCu
Material-no.:	2.1211

Composition, typical analysis (% w/w)**:**

Ag	P	Mn	Cu
1	0.02	0.1	Remainder

Characteristics / Applications:

Joint and build-up welding on copper, for example material numbers: 2.0040 (OF-Cu), 2.0060 (E-Cu 57), 2.0070 (SE-Cu), 2.0090 (SF-Cu), 2.0110 (SD-Cu), 2.0150 (SB-Cu), 2.0170 (SA-Cu), 2.1202 (Cu Ag), plates, profiles, containers. Suited for copper pipe installations in accordance with DVGW work sheet GW 2.

Preheat large work pieces to 350 °C - 600 °C; use Ar-He inert-gas mixture if necessary.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	1070 - 1080 °C
Tensile strength:	200 N/mm²
Yield strength (0.2 %):	80 N/mm²
Elongation (l=5d):	30 %
Hardness (BHN):	60 HB
Impact energy:	75 J
Heat conductivity:	220 - 315 W/m • K
Electrical conductivity (20 °C):	44 - 46 Sm/mm²
Thermal elongation:	17.7 • 10^{-6}/K
Specific gravity:	8.9 kg/dm³
Welding process:	TIG, gas welding
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Flux:	F 100 (Paste) at preheating to > 300 °C
Current mode:	DC (-pole)
Availability:	Diameter (mm): 1.6/2.0/2.4/3.2 Length (mm): 1000
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	╲	☒	☐

13/11/JL/1

FONTARGEN A 200 SW

Copper-tin welding rod

ISO 24373:	S Cu 1898 (CuSn1)
AWS A 5.7:	ERCu
Material-no.:	2.1006

Composition, typical analysis (% w/w)**:**

Sn	Si	Mn	P	Cu
0.8	0.3	0.3	0.01	Remainder

Characteristics / Applications:

Joint and build-up welding on copper and copper alloys of material numbers: 2.0040, 2.0060, 2.0070, 2.0080, 2.0090, 2.0100, 2.0120, 2.0150, 2.0170, 2.1202, 2.1322, 2.1325, 2.1491. Suitable for copper pipe installations according to DVGW work sheet GW 2. The base materials in the welding spheres should be cleaned and preheated if over 3 mm (per mm of plate thickness approx. 100 °C, but not over 600 °C). For preheating temperatures of over 300 °C, flux should be used.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	1020 - 1050 °C
Tensile strength:	200 N/mm²
Elongation (l=5d):	30 %
Hardness (BHN):	60 HB
Impact energy:	75 J
Heat conductivity:	120 - 145 W/m • K
Electrical conductivity (20 °C):	15 - 20 Sm/mm²
Thermal elongation:	18 • 10^{-6}/K
Welding process:	TIG, gas welding
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Flux:	F 100 (Paste) at preheating > 300 °C
Current mode:	DC (-pole)
Availability:	Diameter (mm): 1.6/2.0/2.4/3.2 Length (mm): 1000
Welding positions:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 202 W

Copper-silicon welding rod

ISO 24373:	S Cu 6560 (CuSi3Mn1)
AWS A 5.7:	ERCuSi-A
Material-no.:	2.1461

Composition, typical analysis (% w/w)**:**

Si	Sn	Zn	Mn	Fe	Cu
2.9	0.1	0.1	1	0.1	Remainder

Characteristics / Applications:

High temperature- and corrosion resistance as well as good behaviour to compression stress. Thanks to high silicon content liquid welding deposit that results in flat seams.

Joint and build-up welding on copper alloys of material numbers 2.0853, 2.0855, 2.0857, 2.1243, 2.1245, 2.1247, 2.1265, 2.1266, 2.1267, 2.1270, 2.1285, 2.1322, 2.1323, 2.1363, 2.1366, 2.1522, 2.1525, 2.1545, 2.1546, brass as well as build-up welding on unalloyed or low-alloyed steels and cast iron. To avoid hot cracks keep welding pool small and feed fast. Preheat thick workpieces to 350 - 600 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	910 - 1025 °C
Tensile strength:	350 N/mm²
Yield strength (0.2 %):	120 N/mm²
Elongation (l=5d):	40 %
Thermal elongation:	18 • 10^{-6}/K
Hardness (Brinell):	85 - 100 HB
Electrical conductivity:	3 - 4 Sm/mm²
Heat conductivity:	35 W/m • K
Specific gravity:	8.5 g/cm³
Welding process:	TIG
Shielding gas (DIN EN 439):	I 1 (Argon)
Current mode:	DC (-pole)
Availability:	Diameter (mm): 1.6/2.0/2.4/3.2 Length (mm): 1000
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 207 W

Copper-silicon-manganese welding rod

fontargen brazing

ISO 24373: S Cu 6511 (CuSi2Mn1)
Material-no.: 2.1522

Composition, typical analysis (% w/w)**:**

Si	Sn	Mn	Cu
1.8	0.2	1	Remainder

Characteristics / Applications:

Easy to weld. High temperature- and corrosion resistance as well as good behaviour under compression stress. Good wetting of the base material with low working temperature compared to copper. Flat seams due to silicon content. Little pore formation. Welding deposit has good modelling properties. Welding of galvanised autobody steel sheets, other steels as well as copper, copper alloys and cast iron.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range: 1030 - 1050 °C
Tensile strength: 285 N/mm²
Yield strength (0.2 %): 140 N/mm²
Elongation (l=5d): 45 %
Hardness (Brinell): 62 HB
Electrical conductivity: 4.7 - 5.3 Sm/mm^2
Heat conductivity: 40 W/m • K
Specific gravity: 8.7 g/cm³
Coefficient of expansion: 18.1 •10^{-6}/K

Welding process: TIG

Shielding gas (DIN EN 439): I 1 (Argon)

Current mode: DC (-pole)

Availability: Diameter (mm): 1.6/2.0
Length (mm): 1000

Welding position: according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 203/6 W

Copper-tin welding rod

ISO 24373:	S Cu 5180 (CuSn6P)
AWS A 5.7:	ERCuSn-A
Material-no.:	2.1022

Composition, typical analysis (% w/w)**:**

Sn	P	Cu
6	0.2	Remainder

Characteristics / Applications:

Welding of copper materials, e.g. copper and Sn bronze. Particularly well suited for joint welding of brass on brass or brass on other Cu alloys, (Rg), Fe materials and cast iron. Other applications include: Building-up of bearing bushes, sliding rails and repairs of tin bronze parts. For tin bronze parts of more than 8 mm thickness we recommend preheating. Suitable for material numbers: 2.1010, 2.1016, 2.1020, 2.1030, 2.1050, 2.1052, 2.1056, 2.1080, 2.1086, 2.1090, 2.1096.

Corrosion- and overheating-resistant tin-bronze alloy. A 203/6 W is very easily machined and produces a clear weld pool. The welding deposit is tough and non-porous.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	910 - 1040 °C
Tensile strength:	330 N/mm²
Elongation (l=5d):	30 %
Hardness (Brinell):	80 HB
Electrical conductivity:	7 - 9 Sm/mm²
Thermal conductivity:	75 W/m • K
Linear expansion:	18.5 • 10^{-6}/K
Welding process:	TIG, gas welding
Shielding gas (DIN EN 439):	I 1 (Argon)
Current mode:	DC (-pole)
Availability:	Diameter (mm): 1.6/2.0/2.4/3.2/4.0 Length (mm): 1000
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 203/12 W

Copper-tin welding rod

ISO 24373:	S Cu 5410 (CuSn12P)
AWS A 5.13:	ERCuSn-D
Material-no.:	2.1056

Composition, typical analysis (% w/w)**:**

Sn	P	Cu
12	0.2	Remainder

Characteristics / Applications:

Welding of copper materials, e.g. copper and Sn-bronze. Particularly well suited for joint welding of brass or brass on Cu alloys and Fe materials. Building-up of bearing bushes, sliding rails and repairs of phosphor bronze parts. Welding deposit very similar coloured as welding of red brass Rg 5. Suitable for material numbers: 2.1020, 2.1050, 2.1056, 2.1086, 2.1016, 2.1030, 2.1052, 2.1080.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	825 - 990 °C
Tensile strength:	320 N/mm²
Elongation (l=5d):	5 %
Hardness (BHN):	120 HB
Heat conductivity:	40 - 50 W/m • K
Electrical conductivity (20 °C):	3 - 5 Sm/mm²
Linear expansion:	18.5 • 10^{-6}/K
Specific gravity:	8.6 kg/dm³
Welding process:	TIG, gas welding
Shielding gas (DIN EN 439):	I 1 (Argon)
Current mode:	DC (-pole)
Availability:	Diameter (mm): 1.6/2.0/2.4/3.2 Length (mm): 1000
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 215/8 W

Copper-aluminium welding rod

EN DIN 14640:	S Cu 6100 (CuAl8)
AWS A 5.7:	ERCuAl-A1
Material-no.:	2.0921

Composition, typical analysis (% w/w)**:**

Al	Ni	Mn	Fe	Cu
8	0.5	0.2	0.2	Remainder

Characteristics / Applications:

Corrosion- and seawater-resistant alloy with very good glide properties (metal-metal). A 215/8 W is very easy to handle and ensures a perfect weld in the root pass and a clean top surface. The seam is smooth and non-porous. Joint and build-up welding on aluminium-bronze, high-strength brass, steel and cast iron. For use in the machine-, chemical- as well as shipbuilding industries. Joint welding: Corrosion-resistant aluminium-bronze or high-strength brass pipework. Joining of copper conduits with steel. Joining of material numbers 2.0916, 2.0920, 2.0928. Preheat thick workpieces to 200 °C. Build-up welding: Building-up of ship propellers, kid rails, running surfaces, bearings, valves, slide gates, fittings, etc.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	1030 - 1040 °C
Tensile strength:	380 N/mm²
Yield strength (0.2 %):	200 N/mm²
Elongation (l=5d):	45 %
Hardness (Brinell):	11 HB
Electrical conductivity:	8 Sm/mm²
Thermal conductivity:	65/m • K
Specific gravity:	7.7 g/cm³
Linear expansion:	$17 \cdot 10^{-6}$ / K
Welding process:	TIG
Shielding gas (DIN EN 439):	I 1 (Argon)
Current mode:	DC (-pole) Recommendation: Utilization of flux F 200
Availability:	Diameter (mm): 2.0 Length (mm): 1000
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 216 W

Copper-aluminium nickel rod

ISO 24373:	S Cu 6327 (CuAl8Ni2Fe2Mn2)
AWS A 5.17 :	ERCuNiAl
Material-no.:	2.0922

Composition, typical analysis (% w/w)**:**

Al	Ni	Mn	Fe	Cu
8	2	1.5	1.5	Remainder

Characteristics / Applications:

Joint and build-up welding on multi-alloyed aluminium-bronze, for example material numbers: 2.0916, 2.0920, 2.0928, 2.0932, 2.0936, 2.0940, 2.0960, 2.0962, 2.0966, 2.0970, 2.0975, 2.0978 and 2.0980. Build-up welding on steel and copper alloys. Fusion welding between steel and aluminium-bronze (also multi-alloys). Suitable for welding (MIG brazing) of aluminium surfaced and galvanised steels. For use in shipbuilding, machine, apparatus and pump construction; for example ship propellers, pump casings, valve control casings and food containers. Preheating necessary only with large workpieces. For the first run of build-up welds on ferrous base material we recommend pulsed-arc welding.

The welding deposit is saltwater- and corrosion resistant as well as wear resistant. Well suited if at the same time subjected to wear by salt water, cavitation and erosion.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	1030 - 1050 °C
Tensile strength:	530 N/mm²
Yield strength (0.2 %):	290 N/mm²
Elongation (l=5d):	30 %
Impact energy (ISO-V):	70 J
Hardness (Brinell):	140 HB
Electrical conductivity:	5 Sm/mm²
Thermal conductivity:	58 W/m • K
Linear expansion:	$17 \cdot 10^{-6}$ / K

Welding process: TIG

Shielding gas (DIN EN 439): I 1 (Argon)

Current mode: DC (-pole)
Recommendation: Utilization of flux F 200

Availability: Diameter (mm): 2.0
Length (mm): 1000

Welding position: according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

11/11/SR/0

FONTARGEN AF 216 MK

Copper-aluminium nickel rod, flux coated

EN DIN 14640:	S Cu 6327 (CuAl8Ni2)
Material-no.:	2.0922

Composition, typical analysis (% w/w)**:**

Al	Ni	Mn	Fe	Cu
8	2	1.5	1.5	Remainder

Characteristics / Applications:

Joint and build-up welding on multi-alloyed aluminium-bronze, for example material numbers: 2.0916, 2.0920, 2.0928, 2.0932, 2.0936, 2.0940, 2.0960, 2.0962, 2.0966, 2.0970, 2.0975, 2.0978 and 2.0980. Build-up welding on steel and copper alloys. Fusion welding between steel and aluminium-bronze (also multi-alloys). Suitable for welding (MIG brazing) of aluminium surfaced and galvanised steels. For use in shipbuilding, machine, apparatus and pump construction; for example ship propellers, pump casings, valve control casings and food containers. Preheating necessary only with large workpieces. For the first run of build-up welds on ferrous base material we recommend pulsed-arc welding. The welding deposit is saltwater- and corrosion resistant as well as wear resistant. Well suited if at the same time subjected to wear by salt water, cavitation and erosion. Due to the added flux, the wetting characteristics are improved. Pore-free welding seam.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	1030 - 1050 °C
Tensile strength:	530 N/mm²
Yield strength (0.2 %):	290 N/mm²
Elongation (l=5d):	30 %
Impact energy (ISO-V):	70 J
Hardness (Brinell):	140 HB
Electrical conductivity:	5 Sm/mm²
Thermal conductivity:	58 W/m • K
Linear expansion:	17 • 10^{-6} / K
Flux:	F 200 (Special flux)
Welding process:	TIG
Shielding gas (DIN EN 439):	I 1 (argon)
Current mode:	DC (-pole), AC Recommendation: Utilization of flux F 200
Availability:	Diameter (mm): 2.0 Length (mm): 1000
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
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13/11/JL/1

FONTARGEN A 400 Ti W

Aluminium welding rod

ISO 18273:	S Al 1450 (Al99,5Ti)
Material-no.:	3.0805

Composition, typical analysis (% w/w)**:**

Fe	Si	Cu	Zn	Ti	Al
0.4	0.2	0.05	0.05	0.1	Remainder

Characteristics / Applications:

Aluminium alloy with good fluidity. Weldable in all positions. The Ti-content ensures a grain refinement of the welding deposit. Joint welding of base materials: Al 98; Al 99; Al 99,5; E Al; Al 99,8 und Al 99,7. For plates thicker than 15 mm, preheat to a min. of 150 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	647 - 658 °C
Tensile strength:	65 N/mm²
Yield strength (0.2 %):	20 N/mm²
Elongation (l=5d):	35 %
Electrical conductivity:	34 Sm/mm²
Specific gravity:	2.71 g/cm³
Welding process:	TIG
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	AC
Availability:	Diameter (mm): On request Length (mm): 1000
Welding positions:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 402 W

Aluminium welding rod

ISO 18273:	S Al 5754 (AlMg3)
AWS A 5.10:	ER5754
Material-no.:	3.3536

Composition, typical analysis (% w/w)**:**

Mg	Mn	Fe	Si	Cr	Ti	Al
3	0.3	0.2	0.2	0.1	0.1	Remainder

Characteristics / Applications:

Corrosion- and saltwater-proof alloy. Easily anodised. Welding of rolled and cast aluminium-magnesium alloys e.g. Al Mg 3, Al Mg Mn, Al Mg 1, Al Mg 2, Al Mg Si 0,5, Al Mg Si 0,8, G-Al Mg 3, G-Al Mg 3 (Cu), G-Al Mg 3 Si. Manufacturing of containers, aluminium constructions, constructions of vehicles, ship building, window and door frames. Plates thicker than 15 mm must be preheated to approx. 150 °C - 200 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	615 - 642 °C
Tensile strength:	190 N/mm²
Yield strength (0.2 %):	80 N/mm²
Elongation (l=5d):	20 %
Electrical conductivity:	20 - 23 Sm/mm²
Specific gravity:	2.66 g/cm³
Welding process:	TIG
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	AC
Availability:	Diameter (mm): 1.6/2.0/2.4/3.2 Length (mm): 1000
Welding positions:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 404 W

Aluminium-magnesium welding rod

ISO 18273:	S Al 5356 (AlMg5Cr(A))
AWS A 5.10:	ER5356
Material-no.:	3.3556

Composition, typical analysis (% w/w)**:**

Mg	Mn	Fe	Si	Cr	Ti	Al
5	0.1	0.2	0.2	0.1	0.1	Remainder

Characteristics / Applications:

Corrosion- and saltwater-proof alloy. Easily anodised. Welding of rolled and cast aluminium-magnesium alloys according to DIN 1725 Bl. 1 and Bl. 2, like Al Mg 3, Al Mg 5, Al Mg Mn, Al Zn Mg 1, G-Al Mg 3/+Si/+Cu, G-Al Mg 5/+Si, G-Al Mg 10, Al Mg Si 1. Tank constructions, construction of vehicles, aluminium constructions, shipbuilding, windows, etc. For plates thicker than 15 mm preheat, to min. 150 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	575 - 633 °C
Tensile strength:	235 N/mm²
Yield strength (0.2 %):	110 N/mm²
Elongation (l=5d):	8 %
Electrical conductivity:	15 - 19 Sm/mm²
Specific gravity:	2.64 g/cm³
Welding process:	TIG
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	AC
Availability:	Diameter (mm): 1.6/2.0/2.4/3.2 Length (mm): 1000
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 404/4,5 W

Aluminium-magnesium welding rod

ISO 18273:	S Al 5183 (AlMg4,5Mn0,7(A))
AWS A 5.10:	ER5183
Material-no.:	3.3548

Composition, typical analysis (% w/w)**:**

Mg	Mn	Fe	Si	Cr	Ti	Al
4.5	0.7	0.2	0.2	0.1	0.1	Remainder

Characteristics / Applications:

Filler metal for joints that have high demands of toughness. The welding deposit has a good resistance to atmospheric influences and sea water. Joint welding on rolled and cast aluminium-magnesium alloys, e.g. Al Mg 4,5 Mn, Al Mg 5, Al Zn 4,5 Mg 1, G-Al Mg 3/+Si/+Cu, G-Al Mg 5/+Si, G-Al Mg 10, Al Mg Si 1. For plates thicker than 15 mm, preheat to min. 150 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	574 - 638 °C
Tensile strength:	275 N/mm²
Yield strength (0.2 %):	125 N/mm²
Elongation (l=5d):	17 %
Electrical conductivity:	16 - 19 Sm/mm²
Specific gravity:	2.66 g/cm³
Welding process:	TIG
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	AC
Availability:	Diameter (mm): 1.6/2.0/2.4/3.2 Length (mm): 1000
Approval:	DB (61.046.02/QS)
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 404/4,5 Zr W

Aluminium-magnesium welding rod

ISO 18273:	S Al 5087 (AlMg4,5MnZr)
AWS A 5.10:	ER5087
Material-no.:	3.3546

Composition, typical analysis (% w/w)**:**

Mg	Mn	Fe	Si	Cr	Ti	Zr	Al
4.7	0.9	0.2	0.1	0.1	0.1	0.15	Remainder

Characteristics / Applications:

Zirconic welding deposit for joints of very high toughness. The welding deposit has a good resistance to atmospheric influences and sea water. Joint welding on rolled and cast aluminium-magnesium alloys, e.g. Al Mg 4,5 Mn, Al Mg 5, Al Zn 4,5 Mg 1, G-Al Mg 3/+Si/+Cu, G-Al Mg 5/ +Si, G-Al Mg 10, Al Mg Si 1. For plates thicker than 15 mm, preheat to 150 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	574 - 638 °C
Tensile strength:	275 N/mm²
Yield strength (0.2 %):	125 N/mm²
Elongation (l=5d):	27 %
Electrical conductivity:	17 - 19 Sm/mm²
Specific gravity:	2.66 g/cm³
Welding process:	TIG
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	AC
Availability:	Diameter (mm): On request Length (mm): 1000
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 405 W

Aluminium-silicon welding rod

ISO 18273:	S Al 4043 (AlSi5)
AWS A 5.10:	ER4043
Material-no.:	3.2245

Composition, typical analysis (% w/w)**:**

Fe	Si	Cu	Ti	Al
0.5	5.2	0.1	0.1	Remainder

Characteristics / Applications:

Al-Si alloy with good fluidity. Welding on pure aluminium without surface-melting the base material is possible. Discolouring when anodised.
Welding of Al Si 5, Al Mg Si 0,5, Al Mg Si 0,8, Al Mg Si 1. Al and Al alloys with an alloy content of max. 7 %. For plates thicker than 15 mm, preheat to 150 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	573 - 625 °C
Tensile strength:	120 N/mm²
Yield strength (0.2 %):	40 N/mm²
Elongation (l=5d):	8 %
Electrical conductivity:	24 - 32 Sm/mm²
Heat conductivity:	170 W/m • K
Specific gravity:	2.68 g/cm³
Linear expansion:	22.1 • 10^{-6}/K
Welding process:	TIG, gas welding
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	AC
Flux:	For gas welding use flux F 400 M (powder, corrosive, low melting point).
Availability:	Diameter (mm): 1.6/2.0/2.4/3.2 Length (mm): 1000
Approval:	DB (61.046.01/QS)
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 407 W

Aluminium-silicon welding rod

ISO 18273:	S Al 4047 (AlSi12(A))
AWS A 5.10:	ER4047
Material-no.:	3.2585

Composition, typical analysis (% w/w)**:**

Si	Fe	Mn	Cu	Zn	Ti	Al
12	0.5	0.1	0.1	0.1	0.1	Remainder

Characteristics / Applications:

Al-Si alloy with good fluidity. Not suitable for joints that are subsequently anodised, since the seam turns grey. Al-Si cast alloys with more than 7 % weight content of silicon. In special cases also Al and Al alloys with less than 2 % alloying elements. Tank construction, air-conditioning equipment, household articles, plates, pipes, profiles. Preheat thick plates and large workpieces to approx. 150 °C - 200 °C.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	573 - 585 °C
Tensile strength:	130 N/mm²
Yield strength (0.2 %):	60 N/mm²
Elongation (l=5d):	5 %
Electrical conductivity:	17 - 27 Sm/mm²
Specific gravity:	2.65 g/cm³
Welding process:	TIG, gas welding
Shielding gas (DIN EN 439):	I 1 (Argon) I 3 (Argon/Helium mixture)
Current mode:	AC
Availability:	Diameter (mm): 1.6/2.0/2.4/3.2 Length (mm): 1000
Welding position:	according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

FONTARGEN A 411

Magnesium welding rod

AWS A 5.10:	ER AZ 61 A
AMS:	4350 F
B.S.:	1354
Material-no.:	3.5612

Composition, typical analysis (% w/w)**:**

Al	Si	Mn	Zn	Mg
6,5	0,2	0,4	1,0	Remainder

Characteristics / Applications:

A 411 is easy to handle. The bonding is achieved without melting the base material. The welding deposit is free from cracks and pores, colour match to Mg alloys. Corrosion-resistant.

Joint and building up of magnesium and magnesium alloys. Plates, profiles, castings.

Mechanical properties of pure welding deposit (Min. values at room temperature):

Melting range:	594 – 610°C
Tensile strength:	180 N/mm²
Yield strength (0,2%):	100 N/mm²
Elongation (l=5d):	5 %
Hardness:	50 – 55 HB

Sources of heat: Oxyacetylene torch and TIG procedure

Shielding gas (DIN EN 439): I 1 (argon)

Current mode: Alternating current

Fluxes: F 400 (powder, corrosive)
F 400 M (powder, corrosive, low melting point)

Availability: Diameter (mm): 3,0
Length (mm): 914

Welding position: according to DIN EN 287

PA	PB	PC	PD	PE	PF	PG
☒	☒	☒	☐	☒	☒	☐

13/11/JL/1

Group 5

Technical advice for the practitioner

Physical property values of some elements

Element	*Symbol*	*Melting point (°C)*	*Boiling point (°C) at 0,1 MPa*	*Density*
Aluminium	Al	660	2060	2,7
Antimony	Sb	630,5	1440	6,62
Beryllium	Be	1280	2770	1,82
Lead	Pb	327,4	1740	11,34
Boron	B	2300	2550	3,3
Chromium	Cr	1890	2500	7,19
Iron	Fe	1539	2740	7,87
Gold	Au	1063	2970	19,32
Indium	In	156	2075	7,306
Iridium	Ir	2454	5300	22,50
Cadmium	Cd	321	765	8,65
Cobalt	Co	1495	2900	8,90
Carbon	C	3500	-	3,51
Copper	Cu	1083	2600	8,96
Lithium	Li	186	1370	0,53
Magnesium	Mg	650	1110	1,74
Manganese	Mn	1245	2150	7,43
Molybdenum	Mo	2625	4800	10,20
Nickel	Ni	1455	2730	8,90
Niobium	Nb	2415±15	3300	8,57
Palladium	Pd	1554	4000	12,00
Phosphorus	P	44	282	1,82
Platinum	Pt	1773,50	4410	21,45
Mercury	Hg	-38,87	357	13,55
Sulfur	S	112,8	444,6	2,05
Silver	Ag	960,5	2210	10,49
Silicium	Si	1430	2300	2,33
Strontium	Sr	770	1380	2,60
Tantalum	Ta	3000	5300	16,60
Titanium	Ti	1730	-	4,54
Vanadium	V	1735	3400	6,00
Bismuth	Bi	271,3	1420	9,80
Wolfram	W	3410	5930	19,30
Zink	Zn	419,50	906	7,136
Tin	Sn	231,90	2270	7,298
Zirconium	Zr	1750	2900	6,50

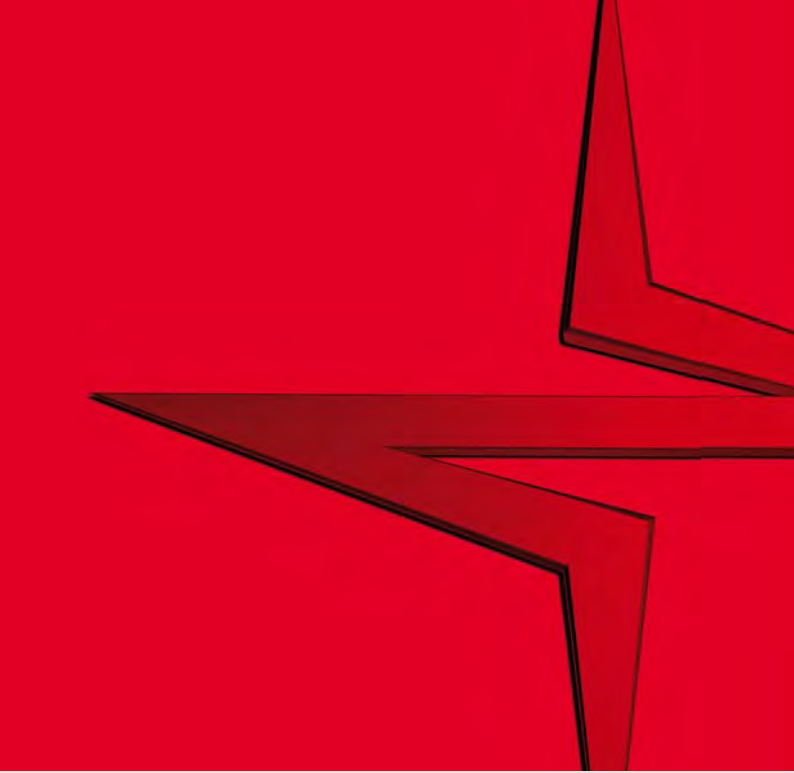
Physical property values of some alloys

Name	*Tensile strength (N/mm2)*	*Melting point (°C)*	*Density*
Steel	*340 – 1800*	*1450 – 1520*	*7,7 – 7,85*
Cast iron	*150 – 400*	*1150 – 1250*	*7,1 – 7,3*
Austenitic Cr-Ni-Steel	*600 – 800*	*1440 – 1460*	*7,8 – 7,9*
Mg-Alloys	*180 – 300*	*590 – 650*	*1,8 – 1,83*
Al-Alloys	*100 – 400*	*570 – 655*	*2,6 – 2,85*
Zn-Alloys	*140 – 300*	*380 – 420*	*5,7 – 7,2*
Brass	*250 – 600*	*900 – 950*	*8,25*
Bronze	*200 – 300*	*880 – 1040*	*8,56 – 8,9*

During the brazing process the necessary fluxes and metals can endanger the brazing technician due to their characteristics and composition as well as improper handling.
Therefore eye-, skin- and mucous membrane contact should be avoided at all costs.

Inevitably, brazing leads to flux and metal vaporization and in regard to brazing powders fine metal dust, which can also have negative effects on your health. As a protection for the fabricator the basic rules of work hygiene and UVV-VGW 15 „Welding, cutting and similar processes“ must be strictly adhered to. Further information on each product is provided via technical data sheets and safety data sheets according to EU directive 91/155/EWG. Those are being updated regularly and apply to effective technical rules.

All information concerning our products, equipment and processes is based on extensive research work and application technology experience. We provide these results orally and in writing in all conscience; this not however exempting the consumer from the obligation to check our products and processes on his own responsibility, especially if the application and process has not been expressly approved by us in writing. The test certificates enclosed do not exempt the user from carrying out correct incoming goods inspections in accordance with Sections 377/378 *HGB* (German commercial code). Numbers 10 and 11 of our General Terms of Sale and Delivery have validity for any damaging events.



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ONE STEP AHEAD.