

# BRAZING

Filler metals and fluxes



**STELLA**  
*WELDING ALLOYS*

CATALOGUE

# STELLA

## WELDING ALLOYS

STELLA srl is an Italian manufacturer of brazing alloys specialized in providing complete solutions in Brazing, Soldering and Welding applications. Our headquarters are located in the north of Italy from where we supply Customers in more than 60 countries worldwide. With more than 20 years of experience, we operate in plumbing, heating, air-conditioning and refrigeration, diamond and carbide tipped tools, heat exchangers, electro-mechanical, metal furniture industries and others, being a reliable source for worldwide leader original equipment manufacturers (OEMs). Our Quality System is certified ISO 9001:2008 since 1998.

We offer:

- the most comprehensive and widest range of different products, from general purpose to special applications
- variety of different make-ups, from standard forms to custom engineered forms
- conformity to the main international, technical and environmental standards
- complete source for technical information, consulting and assistance



Our activity is focused on offering flexibility, technical support, prompt and customized service.



We operate regularly in:  
Italian, English, German, French,  
Spanish and Russian.



20  
YEARS  
OF EXPERIENCE

ISO 9001:2008  
Certified Company

## INDEX

### BRAZING

|                                              |         |
|----------------------------------------------|---------|
| ● Our capabilities & services                |         |
| ● Silver based alloys - Cadmium free         | page 1  |
| ● Silver based alloys - Special applications | page 2  |
| ● Silver based alloys - Trimetals            | page 3  |
| ● Copper phosphorous alloys                  | page 4  |
| ● Brass and copper based alloys              | page 5  |
| ● Silver based alloys - Cadmium bearing (*)  | page 6  |
| ● Aluminium and zinc-aluminium alloys        | page 7  |
| ● Soft solders                               | page 8  |
| ● Nickel based alloys                        | page 10 |
| ● Powders & pastes                           | page 11 |
| ● Fluxes                                     | page 12 |
| ● Infiltration binders                       | page 14 |
| ● Contact materials                          | page 14 |

(\*) Available in European Union countries only for military and aerospace applications (EU Regulation 494/2011).



OUR CAPABILITIES & SERVICES

BARE RODS



Available in different diameters and cut to different lengths.

COATED RODS



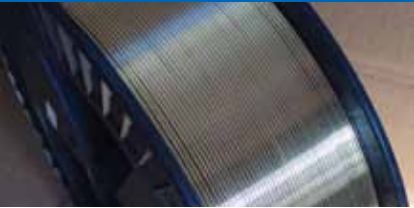
Environmentally friendly flux coated rods. Different ratios of coating available. Different colours available.

WIRE IN COIL



Different physical states available.

WIRE ON SPOOLS



On different types of spools. Precision layer available.

STRIPS



Available in a very wide combination of thickness/width in coils and on different types of spools.

RINGS



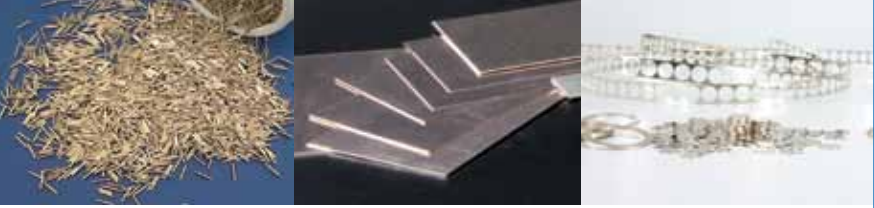
Wide variety of sizes, with open ends or closed ends, single turn, two turns or multiple turns, loose or mounted on tubes.

POWDERS AND PASTES



Powders available in different grain sizes. Pastes available with different combination of binder/flux.

PREFORMS



Wide selection of preforms from wire and strip in various shapes like slugs, shims, discs and washers.

FLUXES



Widest range of formulations. Thermo-sealed jars for preserving shelf life.

RODS MARKING



Both on bare and on coated rods.

PACKING AND LABELS



Personalized solutions for products packaging and labelling.

LABORATORY TESTING



Sample testing and analysis service to diagnose and resolve operational issues.

SILVER BASED ALLOYS - CADMIUM FREE

The following are general purpose brazing alloys, suitable to join easily a wide range of ferrous and non-ferrous base materials (iron, steel, stainless steel, copper, brass, etc.). Continuous service operating temperatures of joints brazed with these alloys range up to approx 200 °C. When joining stainless steel in wet environments, in order to avoid failure of the joint due to interfacial corrosion, it is recommended to use zinc-free alloys (Ag60Sn/1), or alloys with Nickel additions: see page 2. Available in many different presentation forms (rods, flux-coated rods, wires, strips, rings, preforms, pastes and powders), these alloys are very free flowing, ductile and strong. All these alloys do not contain Cadmium, do not present the Health & Safety concerns associated with Cadmium-Bearing Alloys and are compliant with the RoHS regulation. They are divided in two categories: alloys with Tin and alloys without Tin; Tin being used to lower the melting temperature of the alloy. When brazing in an oxidizing environment (that is: in air), the use of a proper flux is required: see page 12.



| CODE | COMPOSITION % |    |    |    |    | MELTING RANGE<br>SOL - LIQ | DENSITY | TENSILE<br>STRENGTH | CORRESPONDING<br>STANDARDS |         |          |
|------|---------------|----|----|----|----|----------------------------|---------|---------------------|----------------------------|---------|----------|
|      | Ag            | Cu | Zn | Sn | Si | °C                         | g/cm³   | kg/mm²              | ISO 17672                  | EN 1044 | AWS A5.8 |

ALLOYS WITH TIN

|          |    |    |      |     |   |         |     |    |        |        |        |
|----------|----|----|------|-----|---|---------|-----|----|--------|--------|--------|
| Ag60Sn   | 60 | 23 | 14   | 3   | - | 620-685 | 9,6 | 48 | -      | AG 101 | -      |
| Ag60Sn/1 | 60 | 30 | -    | 10  | - | 600-730 | 9,8 | -  | Ag 160 | AG 402 | BAG-18 |
| Ag56Sn   | 56 | 22 | 17   | 5   | - | 620-655 | 9,4 | 48 | Ag 156 | AG 102 | BAG-7  |
| Ag55Sn   | 55 | 21 | 22   | 2   | - | 630-660 | 9,4 | 44 | Ag 155 | AG 103 | -      |
| Ag45Sn   | 45 | 27 | 25,5 | 2,5 | - | 640-680 | 9,2 | 43 | Ag 145 | AG 104 | BAG-36 |
| Ag40Sn   | 40 | 30 | 28   | 2   | - | 650-710 | 9,1 | 44 | Ag 140 | AG 105 | BAG-28 |
| Ag38Sn   | 38 | 32 | 28   | 2   | - | 650-720 | 9,1 | 45 | Ag 138 | -      | BAG-34 |
| Ag34Sn   | 34 | 36 | 27,5 | 2,5 | - | 630-730 | 9   | 48 | Ag 134 | AG 106 | -      |
| Ag30Sn   | 30 | 36 | 32   | 2   | - | 665-755 | 8,8 | 48 | Ag 130 | AG 107 | -      |
| Ag25Sn   | 25 | 40 | 33   | 2   | - | 680-760 | 8,8 | 48 | Ag 125 | AG 108 | BAG-37 |

ALLOYS WITHOUT TIN

|        |      |      |      |   |      |         |      |    |        |        |        |
|--------|------|------|------|---|------|---------|------|----|--------|--------|--------|
| Ag83   | 83   | 15   | 2    | - | -    | 780-830 | 10,2 | -  | -      | -      | -      |
| Ag81   | 81   | 13   | 6    | - | -    | 725-800 | 10   | 36 | -      | -      | -      |
| Ag74   | 74   | 18   | 8    | - | -    | 740-780 | 9,8  | 41 | -      | -      | -      |
| Ag67,5 | 67,5 | 23,5 | 9    | - | -    | 700-730 | 9,7  | 47 | -      | -      | -      |
| Ag65   | 65   | 20   | 15   | - | -    | 670-720 | 9,6  | 41 | Ag 265 | -      | BAG-9  |
| Ag60   | 60   | 26   | 14   | - | -    | 695-730 | 9,5  | 45 | -      | AG 202 | -      |
| Ag45   | 45   | 30   | 25   | - | -    | 665-745 | 9,1  | 42 | Ag 245 | -      | BAG-5  |
| Ag44   | 44   | 30   | 26   | - | -    | 675-735 | 9,1  | 51 | Ag 244 | AG 203 | -      |
| Ag40   | 40   | 30   | 30   | - | -    | 660-720 | 9,1  | 46 | -      | -      | -      |
| Ag35   | 35   | 32   | 33   | - | -    | 685-755 | 9    | 48 | Ag 235 | -      | BAG-35 |
| Ag33   | 33   | 33,5 | 33,5 | - | -    | 680-750 | 9    | 55 | -      | -      | -      |
| Ag30   | 30   | 38   | 32   | - | -    | 680-765 | 8,9  | 50 | Ag 230 | AG 204 | BAG-20 |
| Ag25   | 25   | 40   | 35   | - | -    | 700-790 | 8,8  | 45 | Ag 225 | AG 205 | -      |
| Ag20   | 20   | 44   | 36   | - | 0,15 | 690-810 | 8,7  | 43 | -      | AG 206 | -      |
| Ag12   | 12   | 48   | 40   | - | 0,15 | 800-830 | 8,4  | 48 | Ag 212 | AG 207 | -      |
| Ag5    | 5    | 55   | 40   | - | 0,15 | 820-870 | 8,4  | 48 | Ag 205 | AG 208 | -      |

ALLOYS WITH 0,2 % SILICON ARE AVAILABLE

CHARACTERISTICS MAKE-UP

|                  |                                                      |                                                                          |
|------------------|------------------------------------------------------|--------------------------------------------------------------------------|
| Rods             | Ø: 0,5 → 4 mm                                        | Length: 500 / 1.000 mm / Other lengths available                         |
| Coated Rods      | Ø: 1,5 - 2 - 2,5 - 3 mm / Others diameters available | Length: 500 mm / Different kinds of coating available in various colours |
| Wires            | Ø: 0,25 → 3 mm                                       | Coils and Spools                                                         |
| Strips           | Thickness: 0,1 → 1 mm                                | Width: 1,3 → 80 mm                                                       |
| Powder and Paste | Rings                                                | Preforms from Wire and from Strip                                        |



## SILVER BASED ALLOYS - SPECIAL APPLICATIONS



The following are alloys that, thanks to the addition of specific elements, or to their particular composition, have improved characteristics that make them suitable for specific applications or to operate in difficult conditions.

In particular, the addition of Nickel helps in joining difficult-to-braze materials (such as stainless steel, tool steel, tungsten carbide, nickel and nickel alloys, etc.) and improves corrosion resistance.

Manganese helps in brazing carbides.

Alloys without Copper are ammonia resistant.

Alloys without Zinc are suitable for brazing in oven and may be used to join stainless steels in wet conditions to avoid interfacial corrosion problems.

Alloys with Indium are suitable to join pieces that will undergo TiN coating.



| CODE | COMPOSITION % |    |    |    |    |    |    | MELTING RANGE SOL - LIQ °C | DENSITY g/cm³ | TENSILE STRENGTH kg/mm² | CORRESPONDING STANDARDS |         |          |
|------|---------------|----|----|----|----|----|----|----------------------------|---------------|-------------------------|-------------------------|---------|----------|
|      | Ag            | Cu | Zn | Ni | Mn | Sn | In |                            |               |                         | ISO 17672               | EN 1044 | AWS A5.8 |

### ALLOYS WITH NICKEL (FOR STAINLESS STEEL AND HARDMETALS)

|            |    |    |    |     |     |   |   |         |     |    |        |        |        |
|------------|----|----|----|-----|-----|---|---|---------|-----|----|--------|--------|--------|
| Ag27MnNi   | 27 | 38 | 20 | 5,5 | 9,5 | - | - | 680-830 | 8,7 | -  | Ag 427 | AG 503 | -      |
| Ag38MnNi   | 38 | 26 | 24 | 4,5 | 7,5 | - | - | 650-690 | 8,9 | -  | -      | -      | -      |
| Ag40Ni     | 40 | 30 | 28 | 2   | -   | - | - | 670-780 | 8,9 | -  | Ag 440 | -      | BAG-4  |
| Ag49MnNi   | 49 | 16 | 23 | 4,5 | 7,5 | - | - | 680-705 | 8,9 | 55 | Ag 449 | AG 502 | BAG-22 |
| Ag49MnNi/1 | 49 | 27 | 21 | 0,5 | 2,5 | - | - | 670-690 | 8,9 | -  | -      | -      | -      |
| Ag50Ni     | 50 | 20 | 28 | 2   | -   | - | - | 660-705 | 9,0 | 45 | Ag 450 | -      | BAG-24 |
| Ag54Ni     | 54 | 40 | 5  | 1   | -   | - | - | 720-855 | 9,6 | -  | Ag 454 | -      | BAG-13 |

### ALLOYS WITHOUT COPPER (AMMONIA RESISTANT)

|        |    |   |    |   |    |   |   |         |     |    |        |        |        |
|--------|----|---|----|---|----|---|---|---------|-----|----|--------|--------|--------|
| Ag72Zn | 72 | - | 28 | - | -  | - | - | 710-730 | 8,4 | 44 | -      | -      | -      |
| Ag85Mn | 85 | - | -  | - | 15 | - | - | 960-970 | 10  | -  | Ag 485 | AG 501 | BAG-23 |

### ALLOYS WITHOUT ZINC (SUITABLE FOR BRAZING IN OVEN)

|            |       |    |   |   |   |    |   |         |      |    |           |           |                |
|------------|-------|----|---|---|---|----|---|---------|------|----|-----------|-----------|----------------|
| Ag40Ni/1   | 40    | 58 | - | 2 | - | -  | - | 780-900 | 9,6  | 35 | -         | -         | -              |
| Ag60Sn/1   | 60    | 30 | - | - | - | 10 | - | 600-730 | 9,8  | -  | Ag 160    | AG 402    | BAG-18         |
| Ag72Cu     | 72    | 28 | - | - | - | -  | - | 780     | 10   | 35 | Ag 272    | AG 401    | BAG-8          |
| Ag72Cu V1* | 72    | 28 | - | - | - | -  | - | 780     | 10   | 35 | Ag 272 V1 | AG 401 V1 | BVAg-8 Grade 1 |
| Ag72Cu V2* | 72    | 28 | - | - | - | -  | - | 780     | 10   | 35 | Ag 272 V2 | AG 401 V2 | BVAg-8 Grade 2 |
| Ag99,99    | 99,99 | -  | - | - | - | -  | - | 960     | 10,5 | -  | -         | -         | -              |

(\*): Vacuum grade

### ALLOYS WITH INDIUM (FOR TIN COATING)

|            |    |    |   |     |   |   |      |         |     |   |   |        |   |
|------------|----|----|---|-----|---|---|------|---------|-----|---|---|--------|---|
| Ag56InNi   | 56 | 27 | - | 2,5 | - | - | 14,5 | 600-710 | 9,6 | - | - | AG 403 | - |
| Ag64MnNiIn | 64 | 26 | - | 2   | 2 | - | 6    | 730-780 | 9,6 | - | - | -      | - |

### CHARACTERISTICS MAKE-UP

|                  |                                                      |                                                                          |
|------------------|------------------------------------------------------|--------------------------------------------------------------------------|
| Rods             | Ø: 0,5 → 4 mm                                        | Length: 500 / 1.000 mm / Other lengths available                         |
| Coated Rods      | Ø: 1,5 - 2 - 2,5 - 3 mm / Others diameters available | Length: 500 mm / Different kinds of coating available in various colours |
| Wires            | Ø: 0,25 → 3 mm                                       | Coils and Spools                                                         |
| Strips           | Thickness: 0,1 → 1 mm                                | Width: 1,3 → 80 mm                                                       |
| Powder and Paste | Rings                                                | Preforms from Wire and from Strip                                        |

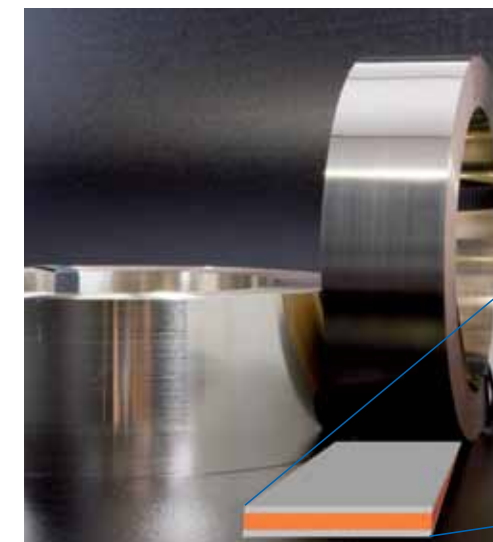
## SILVER BASED ALLOYS - TRIMETALS

Trimetals strips consist of two layers of silver brazing alloy clad onto a copper core and are very popular for brazing of carbides onto steel, especially large pieces.

The copper core of the strip absorbs and relieves the stresses caused by the difference in thermal expansion between carbide and base metal, thus helping to prevent cracking.

Higher joint tensile strength performances are obtainable with Ag49MnNi/1 TR TOP, thanks to its modified copper central core.

For very large carbide pieces, or very hard carbide types, Ag49MnNi/1 TR 161, with higher copper percentage, is advised for the maximum reduction of internal stresses.



Micrographic image of a trimetal strip cross section



| CODE | COMPOSITION % (external layers) |    |    |    |    | MELTING RANGE SOL - LIQ °C | DENSITY g/cm³ | JOINT SHEAR STRENGTH* N/mm² | NOTES |
|------|---------------------------------|----|----|----|----|----------------------------|---------------|-----------------------------|-------|
|      | Ag                              | Cu | Zn | Ni | Mn |                            |               |                             |       |

### TRIMETALS (FOR HARDMETALS)

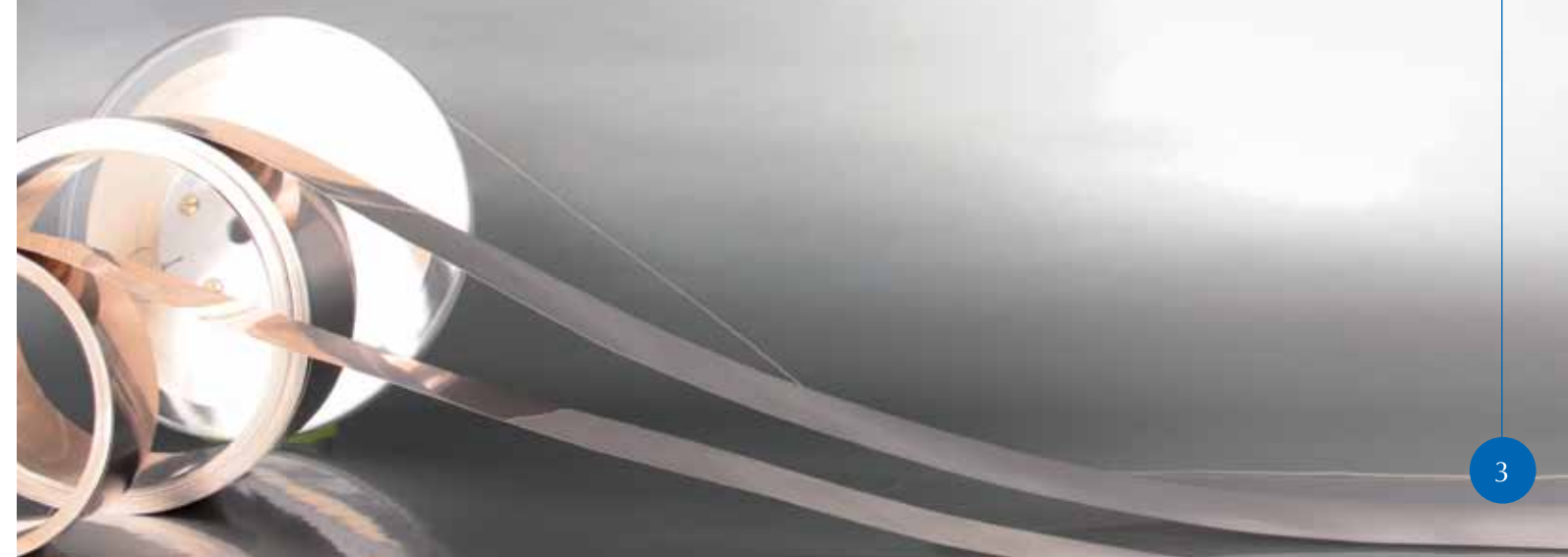
|                   |    |      |      |     |     |         |     |         |                                    |
|-------------------|----|------|------|-----|-----|---------|-----|---------|------------------------------------|
| Ag49MnNi/1 TR     | 49 | 27,5 | 20,5 | 0,5 | 2,5 | 670-690 | 9,0 | 150-300 | Copper Core - Ratio 1:2:1          |
| Ag49MnNi/1 TR TOP | 49 | 27,5 | 20,5 | 0,5 | 2,5 | 670-690 | 9,0 | 200-300 | Modified Copper Core - Ratio 1:2:1 |
| Ag49MnNi/1 TR 161 | 49 | 27,5 | 20,5 | 0,5 | 2,5 | 670-690 | 9,0 | -       | Copper Core - Ratio 1:6:1          |
| Ag49MnNi/1 TR 111 | 49 | 27,5 | 20,5 | 0,5 | 2,5 | 670-690 | 9,0 | -       | Copper Core - Ratio 1:1:1          |
| Ag40Ni TR         | 40 | 30   | 28   | 2   | -   | 670-780 | 8,9 | -       | Copper Core - Ratio 1:2:1          |
| Ag38MnNi TR       | 38 | 26   | 24   | 4,5 | 7,5 | 650-690 | 8,9 | -       | Copper Core - Ratio 1:2:1          |

(\*): Average value. Actual joint strength is a function of various factors, such as: type of base metals to be joined, joint design, joint clearance, brazing procedure, etc.

OTHER ALLOYS AVAILABLE UPON REQUEST

### CHARACTERISTICS MAKE-UP

|                     |                       |                    |
|---------------------|-----------------------|--------------------|
| Strips              | Thickness: 0,1 → 1 mm | Width: 1,3 → 80 mm |
| Preforms from Strip |                       |                    |



## COPPER PHOSPHOROUS ALLOYS

The Copper-Phosphorous alloys are extensively used to join copper and copper alloy base metals (brass, bronzes).

They have self-fluxing properties when used on copper and may or may not contain Silver.

A flux is required when joining brass or bronze. Continuous service operating temperatures of joints brazed with these alloys range up to approx 200 °C. Corrosion resistance is satisfactory, except when the joints are exposed to sulfurous environments, especially at elevated temperatures. Copper-Phosphorous alloys should not be used on ferrous, nickel based alloys, or copper-nickel alloys with more of 10% nickel, in order to avoid premature failure of the joint due to the formation of brittle intermetallic phases. They are available in rods, wires, rings, preforms, pastes and powders.

Ag15CuP is also available in strip form.



Brazing of copper return bends

| CODE | COMPOSITION % |    |   |    | MELTING RANGE<br>SOL - LIQ | FLOW<br>POINT | DENSITY           | TENSILE<br>STRENGTH | CORRESPONDING<br>STANDARDS |         |          |
|------|---------------|----|---|----|----------------------------|---------------|-------------------|---------------------|----------------------------|---------|----------|
|      | Ag            | Cu | P | Sn | °C                         | °C            | g/cm <sup>3</sup> | kg/mm <sup>2</sup>  | ISO 17672                  | EN 1044 | AWS A5.8 |

### COPPER-PHOSPHORUS

|      |   |     |     |   |         |     |     |    |         |        |        |
|------|---|-----|-----|---|---------|-----|-----|----|---------|--------|--------|
| CuP5 | - | Bal | 5   | - | 710-925 | 790 | 8,1 | -  | CuP 178 | -      | -      |
| CuP6 | - | Bal | 6,3 | - | 710-890 | 760 | 8,1 | 56 | CuP 179 | CP 203 | -      |
| CuP7 | - | Bal | 7,3 | - | 710-820 | 730 | 8,1 | 58 | CuP 180 | CP 202 | BCuP-2 |
| CuP8 | - | Bal | 7,8 | - | 710-770 | 720 | 8   | 60 | CuP 182 | CP 201 | -      |

### COPPER-PHOSPHORUS-TIN

|        |   |     |   |   |         |     |   |    |         |        |          |
|--------|---|-----|---|---|---------|-----|---|----|---------|--------|----------|
| CuP7Sn | - | Bal | 7 | 7 | 650-700 | 700 | 8 | 60 | CuP 386 | CP 302 | ~ BCuP-9 |
|--------|---|-----|---|---|---------|-----|---|----|---------|--------|----------|

### SILVER-COPPER-PHOSPHORUS

|            |     |     |      |   |         |     |     |    |         |        |        |
|------------|-----|-----|------|---|---------|-----|-----|----|---------|--------|--------|
| Ag0,4CuP   | 0,4 | Bal | 6,6  | - | 650-810 | 750 | 8,2 | 58 | -       | -      | -      |
| Ag2CuP     | 2   | Bal | 6,5  | - | 645-825 | 740 | 8,1 | 55 | CuP 279 | CP 105 | -      |
| Ag2CuP HP  | 2   | Bal | 7    | - | 643-788 | 740 | 8,1 | -  | CuP 280 | -      | BCuP-6 |
| Ag5CuP     | 5   | Bal | 6    | - | 645-815 | 710 | 8,2 | 55 | CuP 281 | CP 104 | BCuP-3 |
| Ag5CuP HP  | 5   | Bal | 6,75 | - | 643-771 | 710 | 8,2 | -  | CuP 282 | -      | BCuP-7 |
| Ag6CuP LP  | 6   | Bal | 6,2  | - | 643-800 | 720 | 8,3 | -  | -       | -      | -      |
| Ag6CuP     | 6   | Bal | 7    | - | 643-813 | 720 | 8,3 | 55 | CuP 283 | -      | BCuP-4 |
| Ag10CuP    | 10  | Bal | 6    | - | 650-750 | 720 | 8,3 | 65 | -       | -      | -      |
| Ag15CuP    | 15  | Bal | 4,9  | - | 645-800 | 700 | 8,4 | 54 | CuP 284 | CP 102 | BCuP-5 |
| Ag15CuP HP | 15  | Bal | 5,1  | - | 645-800 | 700 | 8,4 | 54 | CuP 284 | CP 102 | BCuP-5 |
| Ag18CuP LP | 18  | Bal | 6,3  | - | 643-666 | 670 | 8,4 | 50 | CuP 285 | -      | BCuP-8 |
| Ag18CuP    | 18  | Bal | 7    | - | 645     | 650 | 8,4 | 50 | CuP 286 | CP 101 | -      |

STABILIZED, NOT SPARKING ALLOYS ARE ALSO AVAILABLE (PLUS VERSION).  
ALLOYS WITH DIFFERENT PHOSPHORUS CONTENT ARE AVAILABLE.

### CHARACTERISTICS MAKE-UP

|                  |                       |                                   |
|------------------|-----------------------|-----------------------------------|
| Rods             | Ø; □: 1,5 → 4 mm      | Length: 500 / 1.000 mm            |
| Coated Rods      | Ø: 1,5 - 2 mm         | Length: 500 mm                    |
| Wires            | Ø: 0,5 → 3 mm         | Coils and Spools                  |
| Strips (Ag15CuP) | Thickness: 0,1 → 1 mm | Width: 1,3 → 120 mm               |
| Powder and Paste | Rings                 | Preforms from Wire and from Strip |

## BRASS AND COPPER BASED ALLOYS

This group includes four different categories of high-temp brazing alloys:

- General Purpose Brasses
- Brasses with addition of Nickel
- High temperature Copper Alloys for special applications
- Copper for furnace brazing

All these alloys are economical to use and can be generally supplied in a variety of forms (rods, wires, strips, preforms, powder and pastes). General purpose brasses can be used for brazing and for the Oxy-Fuel Gas Braze-Welding process, with liquid flux spread through the torch flame.

| CODE | COMPOSITION % |    |    |    |    |    |    |       | MELTING<br>RANGE<br>SOL - LIQ | DENSITY           | TENSILE<br>STRENGTH | CORRESPONDING<br>STANDARDS |         |          |
|------|---------------|----|----|----|----|----|----|-------|-------------------------------|-------------------|---------------------|----------------------------|---------|----------|
|      | Cu            | Zn | Ag | Ni | Mn | Sn | Si | Other | °C                            | g/cm <sup>3</sup> | kg/mm <sup>2</sup>  | ISO 17672                  | EN 1044 | AWS A5.8 |

### GENERAL PURPOSE BRASSES

|            |    |     |   |   |      |     |     |   |         |     |    |          |          |            |
|------------|----|-----|---|---|------|-----|-----|---|---------|-----|----|----------|----------|------------|
| Cu60Zn     | 60 | Bal | - | - | -    | -   | 0,3 | - | 875-895 | 8,4 | 40 | Cu 470a  | CU 301   | -          |
| Cu59ZnSn   | 59 | Bal | - | - | -    | 0,4 | 0,3 | - | 875-895 | 8,4 | 45 | Cu 470   | CU 302   | RBCuZn-A   |
| Cu59ZnMn   | 60 | Bal | - | - | 0,15 | -   | 0,3 | - | 870-900 | 8,4 | 45 | Cu 670   | CU 303   | -          |
| Cu59ZnSnMn | 59 | Bal | - | - | 0,7  | 0,4 | 0,3 | - | 870-890 | 8,4 | 45 | ~ Cu 471 | ~ CU 304 | ~ RBCuZn-C |
| Cu59ZnAg   | 59 | Bal | 1 | - | 0,1  | 0,1 | 0,1 | - | 860-890 | 8,4 | 45 | -        | -        | -          |

### BRASSES WITH NICKEL

|             |    |     |   |    |   |   |     |   |         |     |    |        |        |          |
|-------------|----|-----|---|----|---|---|-----|---|---------|-----|----|--------|--------|----------|
| Cu48ZnNi10  | 48 | Bal | - | 10 | - | - | 0,3 | - | 890-920 | 8,7 | 54 | Cu 773 | CU 305 | RBCuZn-D |
| Cu48ZnNi9Ag | 48 | Bal | 1 | 9  | - | - | 0,2 | - | 890-920 | 8,7 | 54 | -      | -      | -        |
| Cu53ZnNi6   | 53 | Bal | - | 6  | - | - | 0,2 | - | 900-920 | 8,5 | 49 | -      | -      | -        |

### HIGH TEMPERATURE COPPER ALLOYS

|              |      |     |   |     |    |   |     |        |           |     |   |        |        |   |
|--------------|------|-----|---|-----|----|---|-----|--------|-----------|-----|---|--------|--------|---|
| Cu97Ni3B     | 97   | -   | - | 3   | -  | - | -   | B 0,03 | 1085-1100 | 8,9 | - | Cu 186 | CU 105 | - |
| Cu87MnCo3    | 87   | -   | - | -   | 10 | - | -   | Co 3   | 980-1030  | 8,7 | - | -      | -      | - |
| Cu86MnNi2    | 86   | -   | - | 2   | 12 | - | -   | -      | 960-990   | 8,8 | - | Cu 595 | -      | - |
| Cu85MnNi3    | 85   | -   | - | 3   | 12 | - | -   | -      | 960-990   | 8,8 | - | Cu 595 | -      | - |
| Cu67MnNi9    | 67   | -   | - | 9   | 24 | - | -   | -      | 950-955   | 8,2 | - | -      | -      | - |
| Cu58ZnMnCo2  | 57,5 | Bal | - | -   | 2  | - | -   | Co 2   | 880-930   | 8,2 | - | -      | -      | - |
| Cu55ZnMn4Ni6 | 55   | Bal | - | 6   | 4  | - | 0,3 | -      | 880-920   | 8,9 | - | -      | -      | - |
| CuMn38Ni9,5  | 52,5 | -   | - | 9,5 | 38 | - | -   | -      | 880-925   | 7,7 | - | -      | -      | - |

### COPPER (FURNACE BRAZING)

|        |         |   |   |   |   |   |   |         |      |     |   |        |          |        |
|--------|---------|---|---|---|---|---|---|---------|------|-----|---|--------|----------|--------|
| OF-Cu  | ≥ 99,95 | - | - | - | - | - | - | -       | 1085 | 8,9 | - | Cu 102 | CU 102   | BCu-3  |
| ETP-Cu | ≥ 99,90 | - | - | - | - | - | - | -       | 1085 | 8,9 | - | Cu 110 | CU 101   | BCu-1b |
| DHP-Cu | 99,90   | - | - | - | - | - | - | P<0,075 | 1085 | 8,9 | - | Cu 141 | ~ CU 104 | BCu-1  |

### CHARACTERISTICS MAKE-UP

|                            |                             |                                                                          |
|----------------------------|-----------------------------|--------------------------------------------------------------------------|
| Rods                       | Ø: 1,5 → 10 mm              | Length: 500 / 1.000 mm / Other lengths available                         |
| Coated / Micro Coated Rods | Ø: 1,5 - 2 - 2,5 - 3 - 4 mm | Length: 500 mm / Different kinds of coating available in various colours |
| Wires                      | Ø: 1 → 6 mm                 | Coils and Spools                                                         |
| Strips                     | Thickness: 0,2 → 1 mm       | Width: 1,3 → 70 mm                                                       |
| Powder and Paste           | Rings                       | Preforms from Wire and from Strip                                        |

## SILVER BASED ALLOYS - CADMIUM BEARING

The brazing alloys presented in this page are very versatile, high-strength, free-flowing and exhibit the lowest melting points of all silver based alloys.

They can be used to join a wide range of base materials.

Continuous service operating temperatures of joints brazed with these alloys range up to approx 200 °C.

Because of the presence of Zinc and Cadmium, and the possible failure of the joint due to the mechanism of interfacial corrosion, these alloys are not recommended for the joining of stainless steels in wet conditions; in these conditions, zinc free and cadmium free alloys, or alloys with nickel additions are preferred: see page 2.

Since Cadmium and its oxides are toxic, special safety precautions must be followed during brazing operations (e.g. mechanical ventilation and/or respiratory mask).

The use of these alloys in applications where food, beverages and/or human health in general is involved, is forbidden.

AVAILABLE IN EUROPEAN UNION COUNTRIES ONLY FOR MILITARY AND AEROSPACE APPLICATIONS (EU COMMISSION REGULATION NO. 494/2011): PLEASE CONTACT OUR TECHNICAL AND COMMERCIAL STAFF TO GET AN ADVICE ON SELECTING THE MOST APPROPRIATE CADMIUM-FREE SUBSTITUTES.

| CODE     | COMPOSITION % |      |      |      |     |    | MELTING RANGE<br>SOL - LIQ<br>°C | DENSITY<br>g/cm³ | TENSILE<br>STRENGTH<br>kg/mm² | CORRESPONDING<br>STANDARDS |          |          |
|----------|---------------|------|------|------|-----|----|----------------------------------|------------------|-------------------------------|----------------------------|----------|----------|
|          | Ag            | Cu   | Zn   | Cd   | Si  | Ni |                                  |                  |                               | ISO 17672                  | EN 1044  | AWS A5.8 |
| Ag50CdNi | 50            | 15,5 | 15,5 | 16   | -   | 3  | 635-655                          | 9,5              | 45                            | Ag 351                     | AG 351   | BAG-3    |
| Ag50Cd   | 50            | 15,5 | 16,5 | 18   | -   | -  | 625-635                          | 9,5              | 43                            | Ag 350                     | AG 301   | BAG-1a   |
| Ag45Cd   | 45            | 15   | 16   | 24   | -   | -  | 605-620                          | 9,4              | 43                            | Ag 345                     | AG 302   | BAG-1    |
| Ag42Cd   | 42            | 17   | 16   | 25   | -   | -  | 605-620                          | 9,4              | 42                            | -                          | AG 303   | -        |
| Ag40Cd   | 40            | 19   | 21   | 20   | -   | -  | 595-630                          | 9,3              | 42                            | Ag 340                     | AG 304   | -        |
| Ag38Cd   | 38            | 20   | 22   | 20   | -   | -  | 610-650                          | 9,2              | 40                            | -                          | -        | -        |
| Ag34Cd   | 34            | 22   | 24   | 20   | -   | -  | 610-670                          | 9,1              | 40                            | ~ Ag 335                   | ~ AG 305 | ~ BAG-2  |
| Ag30Cd   | 30            | 28   | 21   | 21   | -   | -  | 600-690                          | 9,1              | 38                            | Ag 330                     | AG 306   | ~ BAG-2a |
| Ag25Cd   | 25            | 30   | 27,5 | 17,5 | -   | -  | 605-720                          | 8,8              | 40                            | Ag 326                     | AG 307   | BAG-33   |
| Ag21Cd   | 21            | 35   | 27   | 17   | 0,5 | -  | 620-730                          | 8,7              | 42                            | -                          | AG 308   | -        |
| Ag20Cd   | 20            | 40   | 25   | 15   | -   | -  | 620-750                          | 8,7              | 40                            | -                          | AG 309   | -        |
| Ag19Cd   | 19            | 39   | 28   | 14   | -   | -  | 630-730                          | 8,8              | 40                            | -                          | -        | -        |
| Ag17Cd   | 17            | 41   | 26   | 16   | -   | -  | 620-760                          | 8,7              | 42                            | -                          | -        | -        |
| Ag13Cd   | 13            | 44   | 33   | 10   | -   | -  | 605-795                          | 8,7              | 42                            | -                          | -        | -        |

ALLOYS WITH 0,2 % SILICON ARE AVAILABLE

### CHARACTERISTICS MAKE-UP

|                                                                                                 |                                                                                                                       |                                                                                          |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
|  Rods        | Ø: 0,5 → 4 mm                                                                                                         | Length: 500 / 1.000 mm / <a href="#">Other lengths available</a>                         |
|  Coated Rods | Ø: 1,5 - 2 - 2,5 - 3 mm / <a href="#">Others diameters available</a>                                                  | Length: 500 mm / <a href="#">Different kinds of coating available in various colours</a> |
|  Wires       | Ø: 0,25 → 3 mm                                                                                                        | Coils and Spools                                                                         |
|  Strips      | Thickness: 0,1 → 1 mm                                                                                                 | Width: 1,3 → 80 mm                                                                       |
|  Rings       |  Preforms from Wire and from Strip |                                                                                          |

## ALUMINIUM AND ZINC-ALUMINIUM ALLOYS

Alloys based on Aluminium and/or Zinc for brazing of Aluminium.

Continuous service operating temperatures of joints brazed with Al/Si alloys range up to approx 150 °C.

Zinc-Aluminum alloys are also suitable for copper-aluminium and brass-aluminium joints.

| CODE | COMPOSITION % |    |    |    |    | MELTING<br>RANGE<br>SOL - LIQ<br>°C | CORRESPONDING<br>STANDARDS |         |          |
|------|---------------|----|----|----|----|-------------------------------------|----------------------------|---------|----------|
|      | Al            | Si | Mg | Mn | Zn |                                     | ISO 17672                  | EN 1044 | AWS A5.8 |

### ALUMINIUM ALLOYS

|           |      |   |   |   |   |         |   |                      |                  |
|-----------|------|---|---|---|---|---------|---|----------------------|------------------|
| Al99,5    | 99,5 | - | - | - | - | 647-658 | - | SG-Al99,5 (DIN 1732) | 1050 (AWS A5.10) |
| Al99,5 FC | 99,5 | - | - | - | - | 647-658 | - | SG-Al99,5 (DIN 1732) | 1050 (AWS A5.10) |

### ALUMINIUM-SILICON ALLOYS

|              |     |    |   |   |   |         |          |          |                    |
|--------------|-----|----|---|---|---|---------|----------|----------|--------------------|
| AlSi5        | Bal | 5  | - | - | - | 575-630 | Al 105   | AL 101   | 4043 (AWS A5.10)   |
| AlSi5 FC     | Bal | 4  | - | - | - | 575-630 | ~ Al 105 | ~ AL 101 | ~ 4043 (AWS A5.10) |
| AlSi12       | Bal | 12 | - | - | - | 575-585 | Al 112   | AL 104   | BAISi-4            |
| AlSi12 FC-NC | Bal | 12 | - | - | - | 575-585 | Al 112   | AL 104   | BAISi-4            |

### ZINC-ALUMINIUM ALLOYS

|              |    |   |   |   |    |         |   |   |   |
|--------------|----|---|---|---|----|---------|---|---|---|
| AlZn98       | 2  | - | - | - | 98 | 420-480 | - | - | - |
| AlZn98 FC-NC | 2  | - | - | - | 98 | 420-480 | - | - | - |
| AlZn98 FG-NC | 2  | - | - | - | 98 | 420-480 | - | - | - |
| AlZn85       | 15 | - | - | - | 85 | 380-405 | - | - | - |
| AlZn78       | 22 | - | - | - | 78 | 415-475 | - | - | - |
| AlZn78 FC-NC | 22 | - | - | - | 78 | 415-475 | - | - | - |
| AlZn78 FG-NC | 22 | - | - | - | 78 | 415-475 | - | - | - |

FC: Flux Cored    FG: Flux Grooved    NC: Non-Corrosive Flux

### SELF FLUXING ROD FOR LOW TEMPERATURE JOINING AND REPAIR OF ALUMINIUM

|           |   |   |   |   |   |     |   |   |   |
|-----------|---|---|---|---|---|-----|---|---|---|
| ST 380 AL | - | - | - | - | - | 380 | - | - | - |
|-----------|---|---|---|---|---|-----|---|---|---|



### CHARACTERISTICS MAKE-UP

|                                                                                                                 |                 |                               |
|-----------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------|
|  Rods                      | Ø: 1,6 → 5 mm   | Length: 500 / 1.000 mm        |
|  Wires                     | Ø: 0,8 → 3,2 mm | On Spools DIN 300 and DIN 100 |
|  Flux-cored rods & wires   | Ø: 2 → 5 mm     |                               |
|  Flux-grooved rods & wires | Ø: 1,6 → 2 mm   |                               |
|  Powder and Paste          |                 | AlSi12 - AlZn98               |
|  Rings                     |                 |                               |



# SOFT SOLDERS

Alloys based on Tin for Soft-Soldering.  
 Lead bearing alloys have particular Health and Safety limitations in applications and uses.  
 Lead-free alloys, compliant to RoHS regulation, are available. Available as ingots, bars, sticks, wires and flux-cored wires.

Flux cored wires are available with different cores for various applications:

- General purpose soldering
- Soldering of stainless steel
- Soldering of aluminium
- Electromechanics
- Electrical Engineering
- Electronics (no clean)
- Others



| CODE                  | COMPOSITION % |      |     |        | MELTING RANGE<br>SOL - LIQ<br>°C | CORRESPONDING STANDARDS |               |
|-----------------------|---------------|------|-----|--------|----------------------------------|-------------------------|---------------|
|                       | Sn            | Pb   | Ag  | Other  |                                  | ISO 9453                | EN 29453      |
| TIN                   |               |      |     |        |                                  |                         |               |
| Sn100                 | 99,9          | -    | -   | -      | 232                              | -                       | -             |
| TIN - COPPER          |               |      |     |        |                                  |                         |               |
| SnCu97/3              | 97            | -    | -   | Cu 3   | 230-250                          | No. 402                 | S-Sn97Cu3     |
| Sn99Cu1               | 99,3          | -    | -   | Cu 0,7 | 227                              | No. 401                 | S-Sn99Cu1     |
| TIN - SILVER          |               |      |     |        |                                  |                         |               |
| Ag2Sn                 | 98            | -    | 2   | -      | 221-225                          | -                       | -             |
| Ag3,5Sn               | 96,5          | -    | 3,5 | -      | 221                              | No. 703                 | S-Sn97Ag3     |
| Ag5Sn                 | 95            | -    | 5   | -      | 221-235                          | No. 704                 | -             |
| Ag10Sn                | 90            | -    | 10  | -      | 221-300                          | -                       | -             |
| TIN - SILVER - COPPER |               |      |     |        |                                  |                         |               |
| Ag1SnCu4              | 95,6          | -    | 0,4 | Cu 4   | 225-258                          | -                       | -             |
| Ag3SnCu0,5            | 96,5          | -    | 3   | Cu 0,5 | 217-220                          | No. 711                 | -             |
| Sn99Cu1Ag             | 99            | -    | 0,3 | Cu 0,7 | 217-227                          | -                       | -             |
| TIN - SILVER - LEAD   |               |      |     |        |                                  |                         |               |
| Ag1,4SnPb             | 63            | 35,6 | 1,4 | -      | 178                              | -                       | -             |
| Ag1,5SnPb             | 5             | 93,5 | 1,5 | -      | 296-301                          | -                       | -             |
| TIN - ANTIMONY        |               |      |     |        |                                  |                         |               |
| SnSb95/5              | 95            | -    | -   | Sb 5   | 230-240                          | No. 201                 | S-Sn95Sb5     |
| TIN - LEAD            |               |      |     |        |                                  |                         |               |
| SnPb80/20             | 80            | 20   | -   | -      | 183-205                          | -                       | -             |
| SnPb63/37             | 63            | 37   | -   | -      | 183                              | No. 101                 | S-Sn63Pb37    |
| SnPb60/40             | 60            | 40   | -   | -      | 183-190                          | No. 103                 | S-Sn60Pb40    |
| SnPb50/50             | 50            | 50   | -   | -      | 183-215                          | No. 111                 | S-Pb50Sn50    |
| SnPb40/60             | 40            | 60   | -   | -      | 183-235                          | No. 114                 | S-Pb60Sn40    |
| SnPb33/67             | 33            | 67   | -   | -      | 183-242                          | -                       | -             |
| SnPb30/70             | 30            | 70   | -   | -      | 183-255                          | No. 116                 | S-Pb70Sn30    |
| SnPb8/92              | 8             | 92   | -   | -      | 280-305                          | -                       | S-Pb92Sn8     |
| TIN - LEAD - COPPER   |               |      |     |        |                                  |                         |               |
| Sn60Pb38Cu2           | 60            | 38   | -   | Cu 2   | 183-190                          | No. 161                 | S-Sn60Pb38Cu2 |
| TIN - ZINC            |               |      |     |        |                                  |                         |               |
| SnZn80/20             | 80            | -    | -   | Zn 20  | 200-288                          | -                       | -             |
| LEAD                  |               |      |     |        |                                  |                         |               |
| Pb100                 | -             | 99,9 | -   | -      | 327                              | -                       | -             |

OTHER ALLOYS AVAILABLE UPON REQUEST

| (*) TYPE OF CORING |            |                            |
|--------------------|------------|----------------------------|
| TYPE               | EN 29454-1 | APPLICATION                |
| SN1                | 3.1.1      | For Stainless Steel        |
| SN35               | 2.1.2      | For Aluminium              |
| SN6                | 2.1.3      | For Electromechanics       |
| SN61               | 2.1.2      | General Use                |
| SN7                | 1.1.2      | Electrical Engineering     |
| SN71               | 1.1.3      | For Electronics - NO CLEAN |
| SN72               | 1.1.1      | Colophony                  |

| CHARACTERISTICS MAKE-UP |               |                                                  |
|-------------------------|---------------|--------------------------------------------------|
| Ingots, bars and sticks |               |                                                  |
| Solid Wires             | Ø: 0,5 → 3 mm |                                                  |
| Flux-cored wires        | Ø: 0,8 → 3 mm | Different kinds of coring available (*see table) |
| Strips                  |               |                                                  |
| Powder and Paste        | Rings         | Preforms from Wire and from Strip                |

# NICKEL BASED ALLOYS

These brazing alloys are generally used when specifications require good corrosion resistance and/or extreme service temperature (both high and subzero) properties. Ideal for brazing of stainless steels and nickel based alloys. They find numerous applications in the manufacturing of heat exchangers, diamond tools, and high-tech sectors such as aerospace industry. Brazing is performed under a protective, reducing atmosphere, or in vacuum.



| CODE | COMPOSITION % |    |     |     |     |     |    |    |     |  | MELTING RANGE SOL - LIQ °C | CORRESPONDING STANDARDS |          |
|------|---------------|----|-----|-----|-----|-----|----|----|-----|--|----------------------------|-------------------------|----------|
|      | Ni            | Cr | Fe  | Si  | B   | C   | P  | Mn | Cu  |  |                            | ISO 17672               | AWS A5.8 |
| Ni1  | Bal           | 14 | 4,5 | 4,5 | 3,1 | 0,7 | -  | -  | -   |  | 977-1038                   | -                       | BNi-1    |
| Ni1a | Bal           | 14 | 4,5 | 4,5 | 3,1 | -   | -  | -  | -   |  | 977-1077                   | Ni 610                  | BNi-1a   |
| Ni2  | Bal           | 7  | 3   | 4,1 | 3   | -   | -  | -  | -   |  | 971-999                    | Ni 620                  | BNi-2    |
| Ni3  | Bal           | -  | -   | 4,5 | 2,9 | -   | -  | -  | -   |  | 982-1037                   | Ni 630                  | BNi-3    |
| Ni4  | Bal           | -  | -   | 3,5 | 1,9 | -   | -  | -  | -   |  | 982-1066                   | Ni 631                  | BNi-4    |
| Ni5  | Bal           | 19 | -   | 10  | -   | -   | -  | -  | -   |  | 1080-1135                  | Ni 650                  | BNi-5    |
| Ni6  | Bal           | -  | -   | -   | -   | -   | 11 | -  | -   |  | 875-875                    | Ni 700                  | BNi-6    |
| Ni7  | Bal           | 14 | -   | -   | -   | -   | 10 | -  | -   |  | 890-890                    | Ni 710                  | BNi-7    |
| Ni8  | Bal           | -  | -   | 7   | -   | -   | -  | 23 | 4,5 |  | 982-1010                   | Ni 800                  | BNi-8    |
| Ni9  | Bal           | 15 | -   | -   | 3,6 | -   | -  | -  | -   |  | 1055                       | Ni 612                  | BNi-9    |

AVAILABLE AS POWDER AND PASTE  
SOME OF THESE ALLOYS ARE ALSO AVAILABLE AS AMORPHOUS BRAZING FOILS  
SOME OF THESE ALLOYS ARE ALSO AVAILABLE AS RINGS

## PARTICLE SIZE COMPARISON TABLE

| PARTICLE SIZE |                  |        | MESH                       |                     |                       |
|---------------|------------------|--------|----------------------------|---------------------|-----------------------|
| MICRONS [μ]   | MILLIMETRES [mm] | INCHES | US STANDARD MESH [No.] (*) | TYLER STANDARD MESH | BRITISH STANDARD MESH |
| 33            | 0,0330           | 0,0013 | 425                        | -                   | -                     |
| 38            | 0,0380           | 0,0015 | 400                        | -                   | -                     |
| 45            | 0,0450           | 0,0018 | 325                        | 325                 | -                     |
| 53            | 0,0530           | 0,0021 | 270                        | 270                 | 300                   |
| 63            | 0,0630           | 0,0025 | 230                        | 250                 | -                     |
| 75            | 0,0750           | 0,0030 | 200                        | 200                 | -                     |
| 90            | 0,0900           | 0,0035 | 170                        | 170                 | 170                   |
| 106           | 0,1060           | 0,0042 | 140                        | 150                 | 150                   |
| 125           | 0,1250           | 0,0049 | 120                        | 115                 | 120                   |
| 150           | 0,1500           | 0,0059 | 100                        | -                   | -                     |
| 180           | 0,1800           | 0,0071 | 80                         | -                   | 85                    |
| 212           | 0,2120           | 0,0083 | 70                         | -                   | 72                    |
| 250           | 0,2500           | 0,0098 | 60                         | -                   | -                     |
| 300           | 0,3000           | 0,0118 | 50                         | -                   | -                     |
| 350           | 0,3500           | 0,0138 | 45                         | 42                  | 44                    |
| 420           | 0,4200           | 0,0165 | 40                         | -                   | -                     |
| 500           | 0,5000           | 0,0197 | 35                         | -                   | 30                    |
| 600           | 0,6000           | 0,0236 | 30                         | 28                  | -                     |
| 710           | 0,7100           | 0,0280 | 25                         | 20                  | -                     |
| 850           | 0,8500           | 0,0335 | 20                         | -                   | -                     |

(\*) a "+" sign before the sieve mesh number indicates that the particles are retained by the sieve.  
a "-" sign before the sieve mesh number indicates that the particles pass through the sieve. For instance if the particle size of a powder is described as -140 +325 mesh, then 90% or more of the powder will pass through a 140 mesh sieve (particles smaller than 106 μ) and will be retained by a 325 mesh sieve (particles larger than 45 μ). If a powder is described as -100 mesh, then 90% or more of the powder will pass through a 100 mesh sieve (particles smaller than 150 μ).

# POWDERS & PASTES

A wide range of filler metals in powder and paste is available. Brazing is performed in air, under protective atmosphere, or in vacuum, by flame, induction or in furnace. Powders are available in different grain sizes, from coarse to fine. Pastes can be supplied with and without flux, with various binders and with different metal content percentages, in order to fulfill the most demanding applications. To select the most appropriate brazing paste, many factors have to be taken into account, such as: type and dimensions of pieces, materials to be joined, heating method, type of atmosphere, etc. Consequently technical testing is generally required to select the most appropriate paste for the specific customer application.

## PASTES SELECTION CHART

|                           | AVAILABLE ALLOYS                                                    | AVAILABLE MAKE UP |                                                                                                                |                   |
|---------------------------|---------------------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------|-------------------|
| SILVER BASED ALLOYS       | Ag-Cu; Ag-Cu-Sn; Ag-Cu-Zn; Ag-Cu-Zn-Sn; Ag-Cu-Zn-Ni; Ag-Cu-Zn-Mn-Ni | Powder            | Paste                                                                                                          |                   |
|                           |                                                                     |                   | Torch                                                                                                          | Induction Furnace |
| ACTIVE BRAZING ALLOYS     | Ag-Cu-Ti; Ni1; Ni1a; Ni2                                            | Powder            | Paste                                                                                                          |                   |
|                           |                                                                     |                   | -                                                                                                              | Induction Furnace |
| COPPER-PHOSPHOROUS ALLOYS | Cu-P; Cu-P-Sn; Ag-Cu-P                                              | Powder            | Paste                                                                                                          |                   |
|                           |                                                                     |                   | Torch                                                                                                          | Induction Furnace |
| COPPER                    | Cu                                                                  | -                 | Paste                                                                                                          |                   |
|                           |                                                                     |                   | -                                                                                                              | - Furnace         |
| BRONZE                    | CuSn6 - CuSn8 - CuSn12                                              | Powder            | Paste                                                                                                          |                   |
|                           |                                                                     |                   | -                                                                                                              | - Furnace         |
| COPPER BASED              | Cu-Zn; Cu-Zn-Ni; Cu-Mn-Ni                                           | Powder            | Paste                                                                                                          |                   |
|                           |                                                                     |                   | Torch                                                                                                          | Induction Furnace |
| ALUMINIUM                 | Al-Si; Al-Zn                                                        | Powder            | Paste                                                                                                          |                   |
|                           |                                                                     |                   | Torch                                                                                                          | Induction Furnace |
| SOFT SOLDERS              | Sn; Ag-Sn; Sn-Cu; Sn-Pb                                             | Powder            | Paste, with following flux types:<br>3.1.1.C (general purpose)<br>2.1.2.C (for aluminium)<br>1.1.2 (colophony) |                   |



# FLUXES

Our range:

- Fluxes for Silver Based Alloys
- Fluxes for Brass and Copper Based Alloys
- Liquid Fluxes for Braze-Welding
- Fluxes for Aluminium alloys
- Fluxes for Soft Soldering alloys

Available in different presentations, such as:  
Powder, Paste and Liquid form.



## FLUXES FOR SILVER BASED ALLOYS

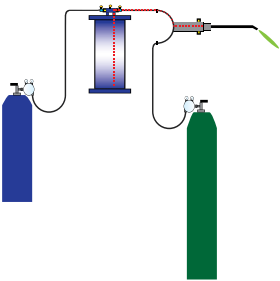
| CODE      | ACTIVITY RANGE | MAKE-UP |       | STANDARD | DESCRIPTION                                                                            |
|-----------|----------------|---------|-------|----------|----------------------------------------------------------------------------------------|
|           | °C             | Powder  | Paste | EN 1045  |                                                                                        |
| FLUX AG1  | 550-800        | ✓       | ✓     | FH 10    | General purpose                                                                        |
| FLUX AG3  | 600-850        | ✓       | ✓     | FH 10    | For high temperatures                                                                  |
| FLUX AG4  | 550-850        | ✓       | ✓     | FH 10    | General purpose - Very wide range of temperatures                                      |
| FLUX AG5  | 700-1000       | ✓       | ✓     | FH 20    | For very high temperatures                                                             |
| FLUX AG6  | 550-850        | ✓       | -     | FH 11    | For Aluminium Bronze                                                                   |
| FLUX AG7  | 550-800        | ✓       | ✓     | FH 10    | General purpose. Also for Stainless Steel.                                             |
| FLUX AG8  | 550-850        | -       | ✓     | FH 12    | For Stainless Steel and Hard Metal - Brown paste                                       |
| FLUX AG11 | 550-800        | -       | ✓     | FH 10    | General purpose. Also for Stainless Steel - For use with automatic dispensing machines |
| FLUX AG12 | 550-850        | -       | ✓     | FH 12    | For Stainless Steel and Hard Metal - For use with automatic dispensing machines        |
| ANTIFLUX  | -              | -       | ✓     | -        | Prevents wetting of brazing alloy                                                      |

## FLUXES FOR BRASS AND COPPER BASED ALLOYS

| CODE     | ACTIVITY RANGE | MAKE-UP |       | STANDARD | DESCRIPTION                |
|----------|----------------|---------|-------|----------|----------------------------|
|          | °C             | Powder  | Paste | EN 1045  |                            |
| FLUX BR1 | 800-1000       | ✓       | ✓     | FH 21    | Brazing with Brass         |
| FLUX BR4 | 700-1200       | ✓       | ✓     | FH 21    | For high temperatures      |
| FLUX BR7 | 760-1200       | -       | ✓     | FH 21    | For very high temperatures |

## LIQUID FLUXES FOR BRAZING AND FOR BRAZE-WELDING

| CODE         | ACTIVITY RANGE | STANDARD | DESCRIPTION                                                   |
|--------------|----------------|----------|---------------------------------------------------------------|
|              | °C             | EN 1045  |                                                               |
| FLUX LI1     | 550-1100       | FH 21    | For Brazing with Vaporizer systems. Medium Concentration      |
| FLUX LI2     | 550-1100       | FH 21    | For Brazing with Vaporizer systems. Medium-High Concentration |
| FLUX LI3     | 550-1100       | FH 21    | For Brazing with Vaporizer systems. High Concentration        |
| FLUX LI1 ECO | 550-1100       | FH 21    | Non-toxic formulation. Medium concentration                   |
| FLUX LI2 ECO | 550-1100       | FH 21    | Non-toxic formulation. Medium-High concentration              |
| FLUX LI3 ECO | 550-1100       | FH 21    | Non-toxic formulation. High concentration                     |



## FLUXES FOR ALUMINIUM

| CODE        | ACTIVITY RANGE | MAKE-UP |       | STANDARD | DESCRIPTION                                                          |
|-------------|----------------|---------|-------|----------|----------------------------------------------------------------------|
|             | °C             | Powder  | Paste | EN 1045  |                                                                      |
| FLUX AL1/d  | 550-650        | ✓       | ✓     | FL 10    | Corrosive flux for flame brazing                                     |
| FLUX AL1 NC | 550-650        | ✓       | ✓     | FL 20    | Non-corrosive flux for flame, induction and furnace (C.A.B.) brazing |
| FLUX AL3    | 550-650        | ✓       | -     | FL 10    | Autogenous welding of pure aluminium                                 |
| FLUX AL4    | 550-650        | ✓       | -     | FL 10    | Autogenous welding of Al-Si and Al-Mg alloys                         |
| FLUX AL6    | 440-470        | -       | ✓     | -        | Non-corrosive flux for brazing with Zinc-Aluminium alloys            |

## FLUXES FOR SOFT SOLDERS

| CODE      | MAKE-UP |        | STANDARD |            | DESCRIPTION                                    |
|-----------|---------|--------|----------|------------|------------------------------------------------|
|           | Paste   | Liquid | DIN 8511 | EN 29454-1 |                                                |
| FLUX SN1  | ✓       | ✓      | F - SW12 | 3.1.1.A/C  | General purpose                                |
| FLUX SN2  | -       | ✓      | F - SW11 | 3.2.2.A    | For Stainless Steel                            |
| FLUX SN6  | -       | ✓      | F - SW24 | 2.1.3.A    | For Electromechanics                           |
| FLUX SN35 | -       | ✓      | -        | 2.1.2.A    | For aluminium and low-alloyed aluminium alloys |



OTHER PACKAGES AVAILABLE UPON REQUEST

|         |                                                                                       |
|---------|---------------------------------------------------------------------------------------|
| Powder: | Packages of: 0,1 - 0,25 - 0,5 - 1 - 10 - 20 kg                                        |
| Paste:  | Packages of: 0,1 - 0,25 - 0,5 - 1 - 1,5 - 10 - 20 kg                                  |
| Liquid: | Packages of: 0,25 - 0,5 - 1 - 5 - 10 - 25 lt • Drums of 60 - 200 lt (LI1 - LI2 - LI3) |

## INFILTRATION BINDERS

Copper based alloys to be used as infiltration binders for the production of mining and exploration tools, drill heads, diamond bits.

These alloys are melted and infiltrated onto a matrix of hard materials in powder form, creating an hard, abrasive, and wear resistant component.

These materials are available as cubes, slugs and grains.



| CODE      | COMPOSITION % |    |      |     |    |
|-----------|---------------|----|------|-----|----|
|           | Cu            | Zn | Ni   | Mn  | Sn |
| IB-CuMn24 | Bal.          | 8  | 15   | 24  | -  |
| IB-CuMn20 | Bal.          | -  | 10   | 20  | -  |
| IB-CuSn19 | Bal.          | -  | 1,5  | 0,3 | 19 |
| IB-CuNi10 | Bal.          | -  | 10,1 | 5,7 | 6  |

OTHER ALLOYS AVAILABLE UPON REQUEST

## CONTACT MATERIALS

| CODE                                                 | COMPOSITION %<br>(Ag is balance) | MELTING POINT | DENSITY           | ELECTRICAL CONDUCTIVITY | MECHANICAL PROPERTIES<br>(RECRYSTALLIZED STATE) |            |                   |
|------------------------------------------------------|----------------------------------|---------------|-------------------|-------------------------|-------------------------------------------------|------------|-------------------|
|                                                      |                                  | °C            | g/cm <sup>3</sup> | MS/m                    | Rm<br>[ MPa ]                                   | A<br>[ % ] | HV <sub>0,2</sub> |
| Ag99,9                                               | Ag 99,9 min.                     | 960           | 10,5              | 60                      | 155-215                                         | 40         | 30                |
| AgNi0,15                                             | Ni 0,10—0,20                     | 960           | 10,5              | 57                      | 185-255                                         | 30         | 40                |
| AgNi10                                               | Ni 10,0                          | 960           | 10,4              | 48                      | 200-250                                         | 20         | 50                |
| AgNi20                                               | Ni 20,0                          | 960           | 10,3              | 46                      | 270-300                                         | 15         | 60                |
| AgCu8                                                | Cu 7,4—8,4                       | 900-940       | 10,3              | 50                      | 225-325                                         | 25         | 60                |
| AgCd8                                                | Cd 7,0—9,0                       | 890-910       | 10,4              | 25                      | 195-295                                         | 35         | 35                |
| AgCd13                                               | Cd 12,0—14,0                     | 830-850       | 10,3              | 20                      | 215-315                                         | 35         | 40                |
| AgCuO10                                              | CuO 10,0                         | 960           | 10,2              | 45                      | 225-325                                         | 15         | 60                |
| AgCdO10                                              | CdO 10,0                         | 960           | 10,3              | 49                      | 225-325                                         | 15         | 60                |
| AgCdO15                                              | CdO 15,0                         | 960           | 10,2              | 45                      | 225-325                                         | 15         | 80                |
| AgSnO <sub>2</sub> (Bi <sub>2</sub> O <sub>3</sub> ) | SnO <sub>2</sub> 10,0            | 960           | 9,8               | 45                      | 270                                             | 10         | 100               |

Wires

Strips

Solid and bimetallic contact rivets

Solid and bimetallic contact discs



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