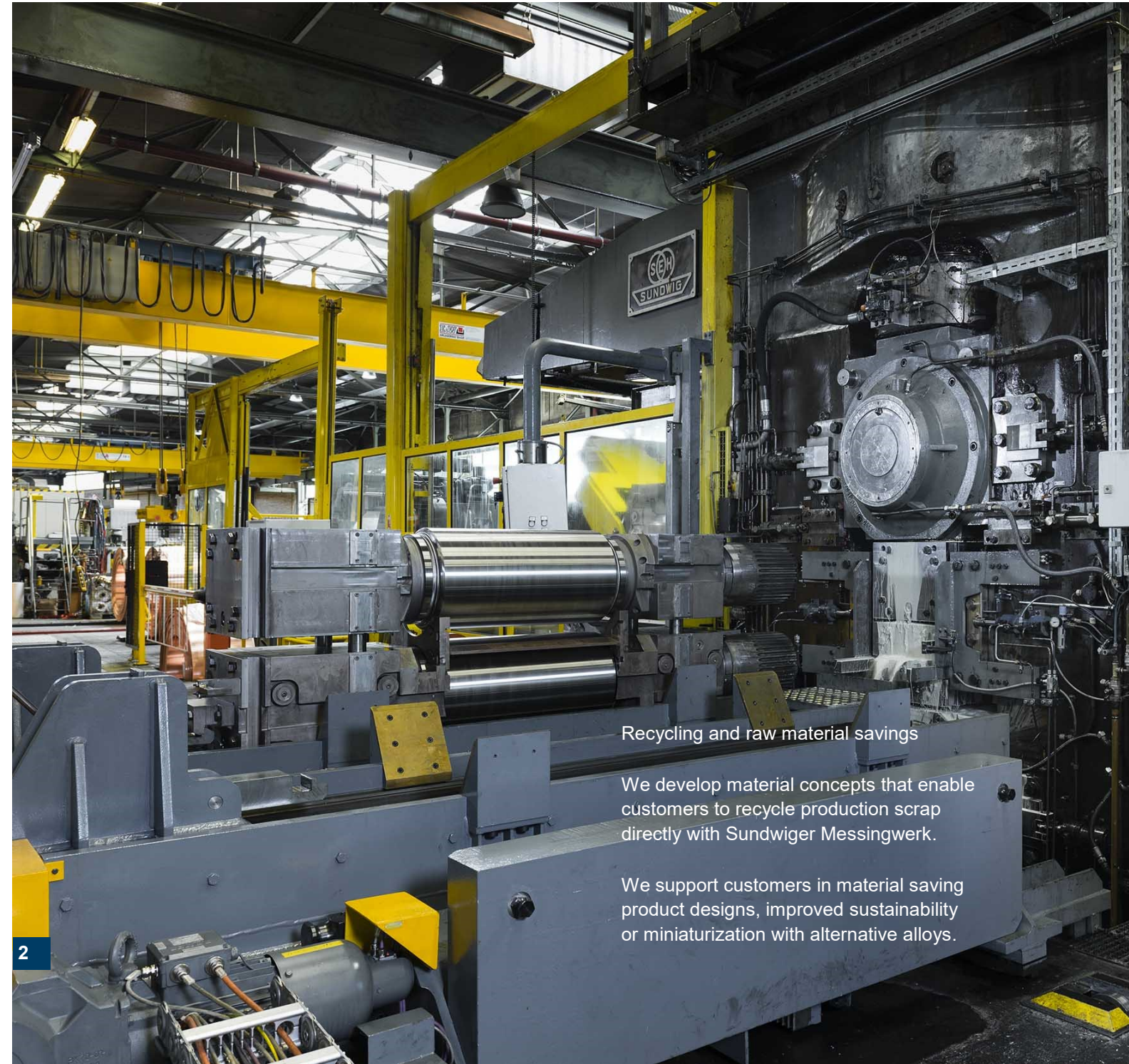




# STRIP & WIRE PRODUCTS

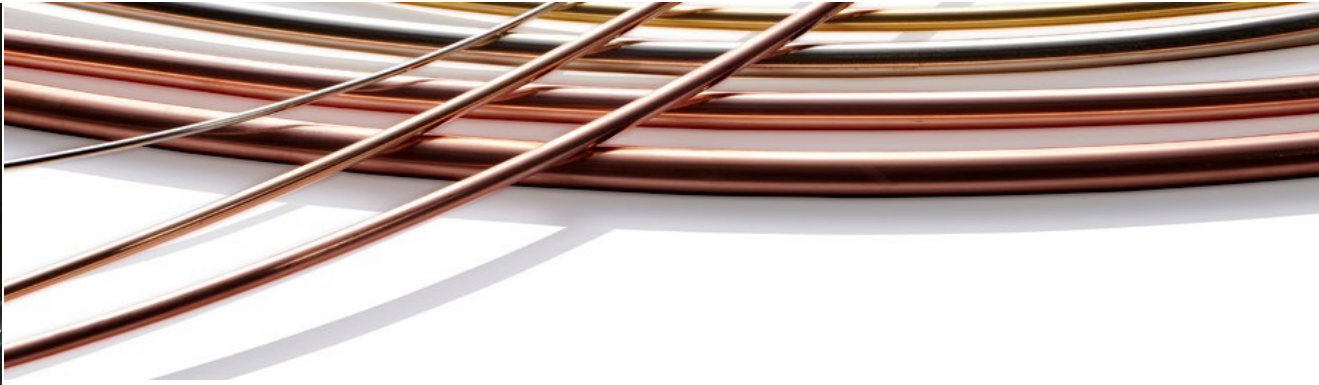
**SUNDWIGER**  
Messingwerk



Recycling and raw material savings

We develop material concepts that enable customers to recycle production scrap directly with Sundwiger Messingwerk.

We support customers in material saving product designs, improved sustainability or miniaturization with alternative alloys.



The two sites Sundwiger Messingwerk (Hemer, Germany) and Sundwiger Metal Shenzhen (China) manufacture and distribute copper alloy strip and wire to the international customer base.

Our portfolio ranges from bronze, low-alloyed copper to pre-cipitation-hardening special alloys, nickel silver and brass. Pure copper is available in wire. According to customer requirements and product applications, our products are available with various plating surfaces and packaging forms.

Hallmark state-of-the-art 20-high rolling technology and stretch bend leveling integrated into the process flow result in excellent thickness precision, narrow tolerances, minimum residual stresses and long strip lengths. We reduce our customers' set-up times and optimize the entire process chain from casting to the finished part.



# STRIP PRODUCTS

Next to standardized products we offer customer specific solutions adjusted optimized to the individual requirement

| Sundwiger Messingwerk          | DIN EN Symbol          | DIN EN Nr. | UNS              | JIS   | Electrical Conductivity [MS/m] | Thermal Conductivity [W/(m*K)] | Density [g/cm³] | Applications  |
|--------------------------------|------------------------|------------|------------------|-------|--------------------------------|--------------------------------|-----------------|---|
| <b>Bronze</b>                  |                        |            |                  |       |                                |                                |                 |   |
| BB15                           | CuSn1,5                | -          | C50500           | -     | 24,9                           | -                              | 8,9             |   |
| BB20                           | CuSn2Fe0,1P            | -          | C50715           | -     | 20                             | 200                            | 8,9             |   |
| BB21                           | CuSn2Zn2Fe             | -          | C50725           | -     | 19                             | 150                            | -               |   |
| BB40                           | CuSn4                  | CW450K     | C51100           | C5111 | 11,6                           | 86                             | 8,9             | Connectors for electrical engineering, electronics and automotive technology, stamped-bent parts, contact springs, relay springs, slide bearings, slideways   |
| BB40 Plus                      | CuSn4+                 | CW450K     | C51100           | C5111 | 11,6                           | 86                             | 8,9             |   |
| BB50                           | CuSn5                  | CW451K     | C51000           | C5102 | 9,9                            | 78                             | 8,9             |   |
| BB60                           | CuSn6                  | CW452K     | C51900           | C5191 | 8,1                            | 66                             | 8,8             |   |
| BB60 Plus                      | CuSn6+                 | CW452K     | C51900           | C5191 | 8,1                            | 66                             | 8,8             |   |
| BB80                           | CuSn8                  | CW453K     | C52100           | C5212 | 7,5                            | 54                             | 8,8             |   |
| BB80 Plus                      | CuSn8+                 | CW453K     | C52100           | C5212 | 7,5                            | 54                             | 8,8             |   |
| BB95                           | CuSn10                 | -          | C52400           | -     | 6                              | 50                             | 8,8             |   |
| <b>Fine alloys</b>             |                        |            |                  |       |                                |                                |                 |   |
| BB01                           | CuSn0,15               | CW117C     | C14410<br>C14415 | C1441 | 48                             | 360                            | 8,9             | Connectors and contacts for electronics, automotive and leadframe applications  |
| SB01                           | CuFe0,1P               | -          | C19210           | C1921 | 49                             | 430                            | 8,9             |   |
| SB02                           | CuFe2P                 | CW107C     | C19400           | C1940 | 36,5                           | 260                            | 8,9             |   |
| <b>High performance alloys</b> |                        |            |                  |       |                                |                                |                 |   |
| SB20                           | CuNi1,5Zn0,4Sn0,2Si0,3 | -          | C19005           | -     | 33,5                           | 250                            | 8,9             | Precipitation-hardening alloys for connectors and leadframes for power transistors and semiconductor devices, relay springs, stamped-bent parts, semiconductor carriers, connector pins, automotive electric systems, contact springs |
| SB21                           | CuNi1,5Si              | -          | C19010           | -     | 33,5                           | 260                            | 8,9             |   |
| SB22                           | CuNi2Si                | CW111C     | C70260<br>C64700 | -     | 32                             | 250                            | 8,8             |   |
| SB28                           | CuNi3SiMg              | -          | C70250           | -     | 25                             | 190                            | 8,8             |   |
| SB92                           | CuNi9Sn2               | CW351H     | C72500           | C7250 | 6                              | 120                            | 8,9             |   |
| SB35                           | CuSn2Zn9               | CW454K     | C42500           | -     | 16                             | 130                            | 8,8             |   |



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|----------------------|---------------|------------|--------|-------|--------------------------------|--------------------------------|-----------------|---|
| <b>Nickel Silver</b> |               |            |        |       |                                |                                |                 |   |
| NB12                 | CuNi12Zn24    | CW403J     | C75700 | -     | 4                              | 33                             | 8,7             | Coins, electromagnetic shieldings, deep-drawn parts, security keys, contact springs, connectors, relay springs, electrical contacts |
| NB16                 | CuNi18Zn17    | -          | C75200 | C7521 | 3                              | -                              | 8,7             |   |
| NB17 / ES17          | CuNi18Zn27    | CW410J     | C77000 | C7701 | 3                              | 27                             | 8,8             |   |
| NB18 / ES18          | CuNi18Zn20    | CW409J     | -      | C7521 | 3                              | 27                             | 8,7             |   |
| NX13                 | CuNi13Zn24Pb1 | CW404J     | C79200 | -     | 4                              | -                              | 8,7             |   |
| <b>Coin alloys</b>   |               |            |        |       |                                |                                |                 |   |
| NM05                 | CuNi5Zn20     | -          | C73100 | -     | 7,5                            | -                              | 8,7             | Coins and medals  |
| NM06                 | CuNi5,5Zn24   | -          | -      | -     | -                              | -                              | -               |   |
| <b>Brass</b>         |               |            |        |       |                                |                                |                 |   |
| MB30                 | CuZn30        | CW505L     | C26000 | C2600 | 15,7                           | 124                            | 8,5             | semiconductor carriers, deep-drawn parts, stamped-bent parts, connectors  |
| MB36                 | CuZn36        | CW507L     | C27000 | C2700 | 14,5                           | 120                            | 8,4             |   |
| MB37                 | CuZn37        | CW508L     | C73100 | C2720 | 14,5                           | 120                            | 8,4             |   |

Other coin alloys are available upon request.

# DELIVERY FORMS

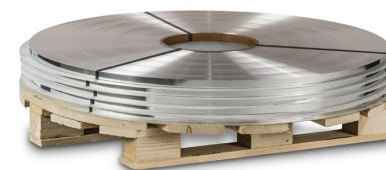
## Available dimensions

Bare pre-rolled strip 1,0–5,0 mm  
 Precision strip thicknesses 0,05–1,2 mm  
 Strip widths 3,0–600 mm, but at least 10 times strip thickness

## Available surfaces

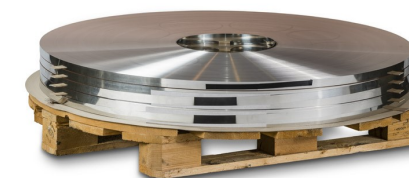
Bare strip with passivation  
 Hot-dip tinned strip  
 Milled strip  
 Electroplated strip

## Delivery forms



### Strip/ Coil

Thickness: 0,05–5,0 mm  
 Width: 3,0–600 mm  
 Diameter: bis 1.200 mm



### Multiple Pancake

Thickness: 0,20–0,80 mm  
 Width: 15,0–50,0 mm  
 Weight: bis 2.500 kg



### Traverse Wound

Thickness: 0,15–1,00 mm  
 Width: 3,5–50,0 mm  
 Weight: bis 1.500 kg

# TOLERANCES

## Thickness tolerances

| Strip thickness in mm |        | EN 1652/1654 Rev.1998 |          |                          |
|-----------------------|--------|-----------------------|----------|--------------------------|
| from                  | to (<) | Class A               | Class B  | Sundwiger Fine Tolerance |
| 0,05                  | 0,1    | -                     | -        | +/-0,003                 |
| 0,1                   | 0,2    | +/-0,010              | +/-0,007 | +/-0,005                 |
| 0,2                   | 0,3    | +/-0,015              | +/-0,010 | +/-0,006                 |
| 0,3                   | 0,4    | +/-0,018              | +/-0,012 | +/-0,007                 |
| 0,4                   | 0,5    | +/-0,020              | +/-0,015 | +/-0,010                 |
| 0,5                   | 0,8    | +/-0,025              | +/-0,018 | +/-0,012                 |
| 0,8                   | 1,0    | +/-0,030              | +/-0,022 | +/-0,015                 |
| 1,0                   | 1,5    | -                     | -        | +/-0,020                 |
| 1,5                   | 5,0    | -                     | -        | +/-0,030                 |

## Width tolerances

| Strip thickness in mm | 3 to 50 mm | 50 to 100 mm | 100 to 200 mm |
|-----------------------|------------|--------------|---------------|
| 0,05-0,5              | +0,10/-0   | +0,20/-0     | +0,30/-0      |
| 0,5-1,0               | +0,20/-0   | +0,30/-0     | +0,40/-0      |
| 1,0-1,5               | +0,40/-0   | +0,50/-0     | +0,60/-0      |
| 1,5-2,5               | +0,50/-0   | +0,60/-0     | +0,70/-0      |
| 2,5-5,0               | +1,50/-0   | +1,70/-0     | +1,90/-0      |



### Surface finish / roughness

The standard surface roughness of strip products is between 0.10 and 0.20 µm (Ra). Contact rolls in various grades are available to meet individual surface roughness requirements of our customers.



### Surface protection

All uncoated strip products undergo a passivation process. This increases the oxidation resistance of the material.



### Milled strip / profiled strip\*

Profiled strip refers to strip that has several zones with different material thickness. The advantage is reduced or no blanking is required to achieved different dimensions in the final product. Since the profiled strip is not plastically deformed during the milling process, residual stresses are avoided and similar physical parameters can be met at different thicknesses in the part .

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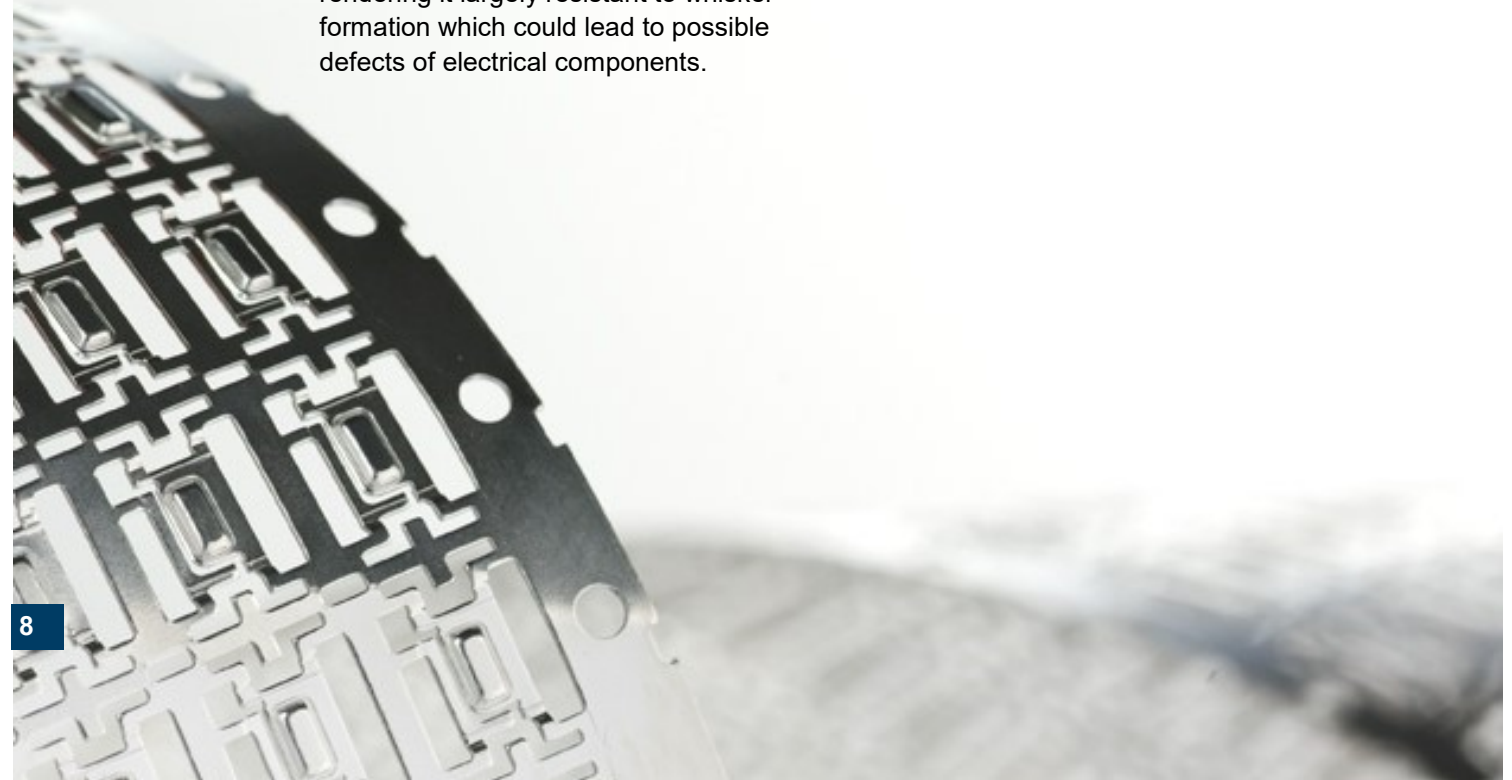
\*Starting dimensions: Width 3,0-190 mm / Thicknesses 0,20-3,0 mm

# HOT-DIP TINNING

In many technical applications where metals are used, surface plating is of fundamental importance. This is particularly true for plating of copper-based materials with tin. Besides corrosion protection, tin plating ensures reliable connector contacts and improved solderability.

Hot-dip tinned surfaces form system-inherent intermetallic phases, thereby rendering it largely resistant to whisker formation which could lead to possible defects of electrical components.

By means of heat treatment, the thickness of the intermetallic phase can be precisely adjusted to downstream processing and the intended application of the tin-coated strip. This also has a positive effect on insertion and extraction forces, surface hardness and solderability.

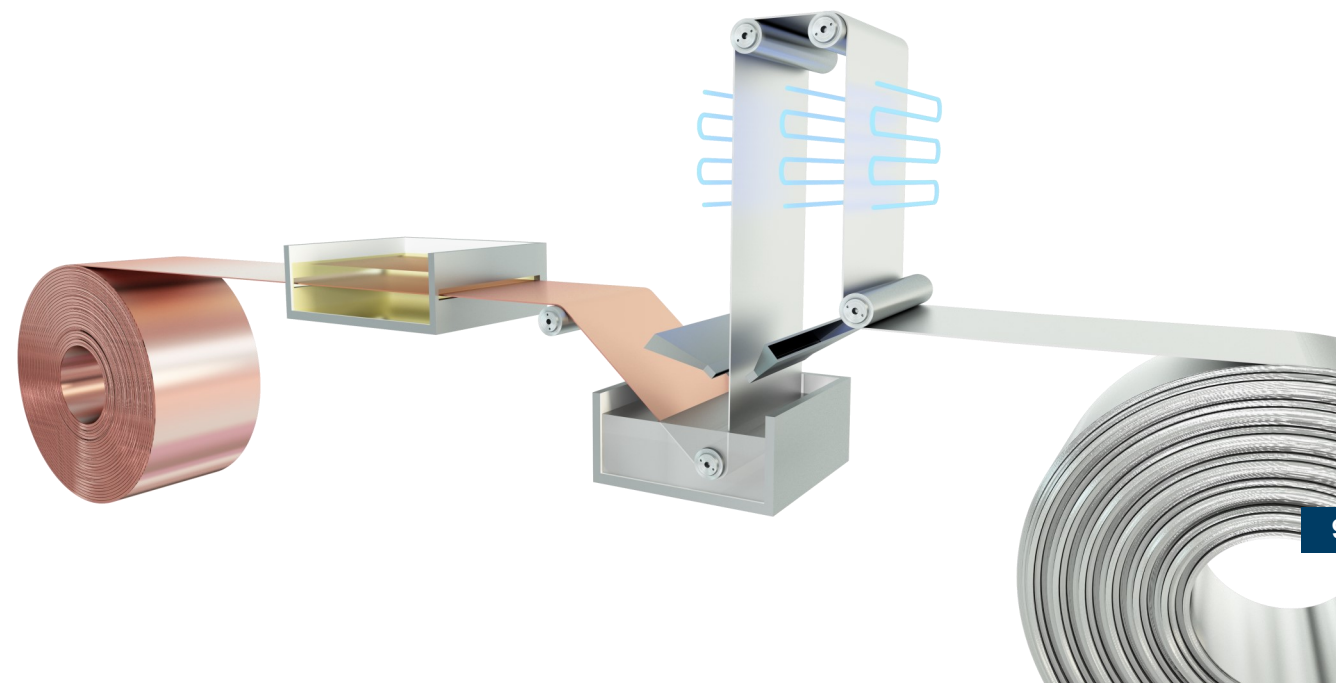


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## Tin plating spectrum

| Hot-Dip Tinning        |                |  |
|------------------------|----------------|--|
| Strip thickness        | 0,1-1,2 mm     | Coating thickness tolerance: +/-1,5 µm                                       |
| Strip Width            | 3,0-400 mm     | Others upon request  |
|                        | <b>Coating</b> | <b>Properties</b>  |
| <b>HDT</b>             | 0,8-4,0 µm     | Corrosion protection, low insertion and extraction forces                    |
|                        | 4-8 µm         | Good corrosion protection, good solderability                                |
|                        | 8-13 µm        | Very good solderability  |
| <b>SR</b>              | 2-13 µm        | Matte / even surface, low flaking during stamping, good laser weldability    |
| <b>HDT 10 /50 /100</b> | 2-13 µm        | High hardness, low insertion and extraction forces, good fretting resistance |

| Electroplating       |             |  |
|----------------------|-------------|--|
| Strip thickness      | 0,05-2,5 mm | Tolerance dependent on coating thickness |
| Strip width          | 3,0-200 mm  | Others upon request                      |
| <b>Sn, Reflow Sn</b> | Max. 4 µm   | Others upon request                      |



# WIRE PRODUCTS

Due to our fully integrated production process (melting, rolling, shaving and drawing) at one location, we are able to offer a broad spectrum of products with specially adapted properties for the intended application. With our wire casting near the final dimension, state-of-the-art inert gas bell annealers as well as inductive annealing systems, constant material properties are guaranteed over the entire wire length.



| Sundwiger Messinwerk          | DIN EN Symbol | DIN EN Nr. | UNS    | JIS   | Electrical Conductivity [MS/m] | Thermal Conductivity [W/(m*K)] | Density [g/cm³] | Applications   |
|-------------------------------|---------------|------------|--------|-------|--------------------------------|--------------------------------|-----------------|--|
| <b>Bronze</b>                 |               |            |        |       |                                |                                |                 |  |
| BD15                          | CuSn1,5       |            |        |       |                                |                                |                 | Connector pins, flat wire, screws, springs, rivets, pressed parts, power and connection wire, stranded wire, brushes & weaving wire, welding pins, resistance wire for heating elements, contact parts for lighting elements, wire mesh (construction), reinforcement (construction), spectacle frames |
| BD20                          | CuSn2         | -          | C50700 | -     | ≥15                            | 140                            | 8,9             |  |
| BD40                          | CuSn4         | CW450K     | C51100 | C5111 | ≥11                            | 86                             | 8,9             |  |
| BD50                          | CuSn5         | CW451K     | C51000 | C5102 | ≥9,5                           | 78                             | 8,9             |  |
| BD60                          |               |            |        |       |                                |                                |                 |  |
| BD61                          | CuSn6         | CW452K     | C51900 | C5191 | ≥7,5                           | 66                             | 8,8             |  |
| BD65                          |               |            |        |       |                                |                                |                 |  |
| BD80                          | CuSn8         | CW453K     | C52100 | C5212 | ≥6                             | 54                             | 8,8             |  |
| BD95                          | CuSn10        | CW480K     | C52400 | C5191 | ≥6                             | 50                             | 8,8             |  |
| <b>Multi-Component Bronze</b> |               |            |        |       |                                |                                |                 |  |
| BY44                          | CuSn4Zn4Pb4   | CW456K     | C54400 | C5441 | ≥11                            | 80                             | 8,8             | Turned contact elements, connector pins  |
| BY51                          | CuSn5Pb1      | CW458K     | C53400 | C5341 | ≥9,8                           | 80                             | 8,8             |  |
| <b>Copper-Magnesium</b>       |               |            |        |       |                                |                                |                 |  |
| SD01                          | (CuMg0,1)     | CW127C     | C18661 | -     | ≥46,4                          | 310                            | 8,9             | Power and connection wire, wire harnesses, connector pins, on-board electric systems, telecommunication cables, support cables for catenary wire, catenary wire for high-speed trains  |
| SD02                          | CuMg0,2       | CW127C     | C18661 | -     | ≥44,6                          | 310                            | 8,9             |  |
| SF02                          | CuMg0,2       | CW127C     | C18661 | -     | ≥45,2                          | 310                            | 8,9             |  |
| SD03                          | (CuMg0,3)     | CW127C     | C18661 | -     | ≥41,7                          | 290                            | 8,9             |  |
| SD04                          | (CuMg0,4)     | CW128C     | C18661 | -     | ≥37,1                          | 250                            | 8,9             |  |
| SD05                          | CuMg0,5       | CW128C     | C18661 | -     | ≥37,1                          | 250                            | 8,9             |  |



#### Available dimensions

|                   | Rolled wire (square) | Finished wire | Starting material for railway applications |          |
|-------------------|----------------------|---------------|--|----------|
|                   |                      |               | Catenary wire                              | Ropes    |
| <b>Dimensions</b> | 5,1/7,4 mm □         | 0,5-6,2 mm Ø  | For crosssections 80-150 mm <sup>2</sup>   | 7,4 mm □ |

| Sundwiger Messingwerk          | DIN EN Symbol   | DIN EN Nr. | UNS    | JIS   | Electrical Conductivity [MS/m] | Thermal Conductivity [W/(m*K)] | Density [g/cm <sup>3</sup> ] | Applications   |
|--------------------------------|-----------------|------------|--------|-------|--------------------------------|--------------------------------|------------------------------|--|
| <b>High-Performance Alloys</b> |                 |            |        |       |                                |                                |                              |  |
| MT31                           | CuZn31Al5Ni3Ti1 | -          |        |       |                                |                                | 8,05                         | Wear protection  |
| <b>Nickel Silver</b>           |                 |            |        |       |                                |                                |                              |  |
| ND12                           | CuNi12Zn24      | CW403J     | C75700 | -     | ≥4                             | 35                             | 8,7                          | Fashion jewelry, clips for pens, spectacle frames, springs, zip fasteners, bridges for musical instruments, scouring sponges   |
| ND18                           | CuNi18Zn20      | CW409J     | C76400 | -     | >2,9                           | 25                             | 8,7                          |  |
| <b>Brass (lead-free)</b>       |                 |            |        |       |                                |                                |                              |  |
| MD15                           | CuZn15          | CW502L     | C23000 | C2300 | ≥21                            | 159                            | 8,8                          | Electronics, electrical engineering, rivets, extruded parts, contact and fastening elements, battery pins, zip fasteners, fashion jewelry, watchmaking industry, arts and crafts   |
| MD30                           | CuZn30          | CW505L     | C26000 | C2600 | ≥15                            | 126                            | 8,5                          |  |
| MD36                           | CuZn36/37       | CW507L     | C27400 | -     | ≥15                            | 122                            | 8,45                         |  |
| <b>Low-alloyed Copper</b>      |                 |            |        |       |                                |                                |                              |  |
| BD01                           | CuSn0,15        | CW117C     | C14410 | -     | ≥46,4                          | -                              | 8,9                          | Power & connection wire, stranded wire, connectors, connector pins, contact parts for lighting technology, contact elements, telecommunication cables, on-board electric systems, wire harnesses, flat wire, screws, pressed parts, rivets |
| BD02                           | (CuSn0,2)       | -          | -      | -     | ≥46,3                          | -                              | 8,9                          |  |
| BD03                           | (CuSn0,3)       | CW129C     | C18835 | -     | ≥39,4                          | 285                            | 8,9                          |  |
| BF03                           | (CuSn0,3)       | CW129C     | C18835 | -     | ≥42,9                          | 290                            | 8,9                          |  |
| BD06                           | CuSn0,6         | -          | C50100 | C5010 | ≥36,5                          | -                              | 8,9                          |  |
| SD94                           | CuFe2P          | CW107C     | C11000 | C1940 | ≥36,5                          | 260                            | 8,9                          |  |
| <b>Copper</b>                  |                 |            |        |       |                                |                                |                              |  |
| KD00                           | Cu-OF/OF1       | CW008A     | C10200 | C1020 | ≥58                            | 390                            | 8,93                         | Contact & fastening elements, screws & rivets for electronic applications  |
| KD58                           | E-Cu58 Cu-ETP   | CW004A     | C11000 | C1100 | ≥57                            | 390                            | 8,93                         |  |

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