

COMPENDIUM Flat Wire

Precise. Innovative. Fit for use.



BRUKER-SPALECK

SPECIALTY WIRES

Expertise & Innovation

The end-product does not have a very spectacular appearance, but flat wire is a demanding product, the quality and reliance of which profit from our extensive experience.

In this compendium you will learn how we,

- › *manufacture the product*
- › *inspect the quality*
- › *and recommend the handling and storage*

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- 1.0** – The materials
 - 2.0** – Manufacturing process from round to flat wire
 - 3.0** – Quality Assurance process according to Semi Standard
 - 4.0** – Type of packaging according to customer request
 - 5.0** – Handling and storage of flat wire
 - 6.0** – What we also manufacture



Bruker-Spaleck has been specialist in the production of customer-specified flat wires for decades. Our customers' trust is based on our high-precision fabrication, our innovative procedures and operator optimised products.

Our special flat wires are deployed where dependence on high-precision is demanded, e. g. in photovoltaic, automobile, springs,

medical, cable and textile industries. At both our sites, Schramberg and Bochholt we produce primarily on equipment from our own machine construction.

This is the basis for the high and consistent quality of our flat wires. As a company of the KERN-LIEBERS Group we are supported by a world-wide expertise network.

OUR DISTINCTIVE COMPETENCES ARE:

Forming of round wires to flat wires:

■ pulling ■ rolling ■ annealing and tempering ■ winding

Copper Material

e.g. Cu-ETP1, OfCu

Outstanding electrical conductivity and very good malleability make copper an ideal material for the manufacturing of flat wires for flexible cables.

Characteristics of copper:

Tightness: 8.93 g/cm³

Element symbol: Cu

Melting point: 1.083°C

Very good formability and solderability

Very good electric conductivity
IACS >100 %

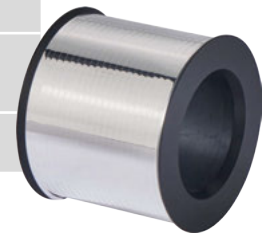
Round copper wire according to
DIN EN 13602:2013

Copper alloy examples:

- Low-alloy copper
CuMg03; CuMg05; CuBe2
- Copper nickel zinc alloys (nickel silver)
CuNi18Zn24
- Copper tin alloys (bronze)
CuSn4; CuSn6; CuSn8
- Copper zinc alloys (brass)
CuZn15; CuZn30; CuZn37
- According to DIN EN 12166:2011

Coatings:

- | | |
|----------|----|
| ■ Tin | Sn |
| ■ Silver | Ag |
| ■ Nickel | Ni |
| ■ Gold | Au |



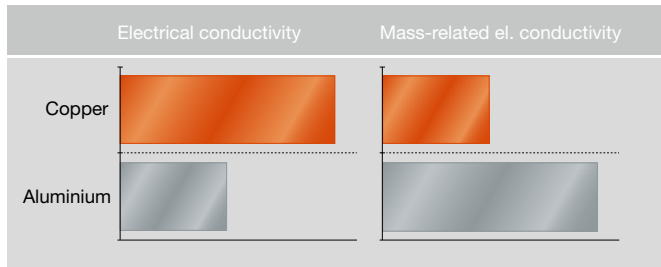
Aluminium material and special profiles

e.g. ENAW-AL99.5

Aluminium has a level of conductivity that is twice as high as copper relative to weight.

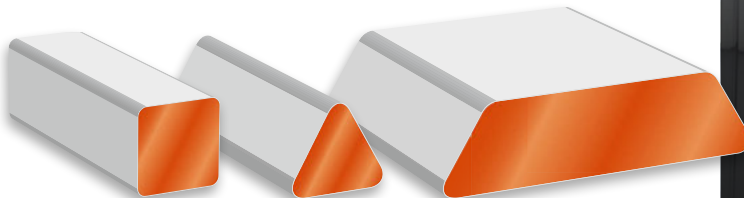
Characteristics of aluminium

- | | |
|---|------------------------|
| ■ Tightness | 2.70 g/cm ³ |
| ■ Element symbol | Al |
| ■ Melting point | 660°C |
| ■ Good formability | |
| ■ Good electric conductivity | |
| IACS 35 MS/m corresponds to approx. 60 % IACS | |
| ■ According to DIN EN 573-3:2009 | |



SPECIAL PROFILES FOR ALL MATERIALS

Bruker-Spaleck can supply you with the special profiles that you want as a square, triangle or trapezoid.



Manufacturing process

FROM ROUND TO FLAT WIRE

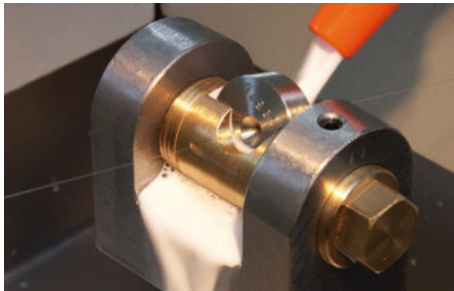
GOODS INWARD

A goods inward control is carried out on the raw material, to ensure that specified values are kept to.



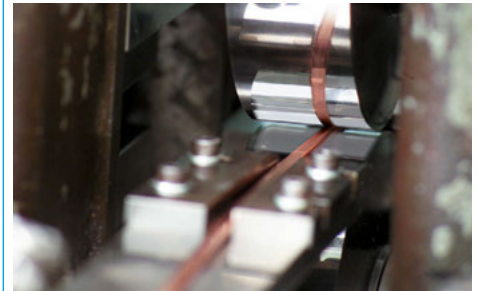
DRAWING

During the drawing process the diameter of the wire is made ready for the rolling procedure.



ROLLING

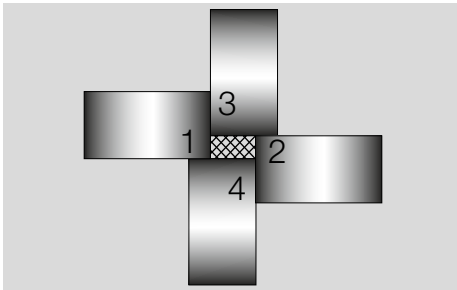
The required thickness and width are produced in the rolling process.



2.0

PROFILE ROLLING

In profile rolling, square, trapezoidal or triangular profiles as well as profiled surfaces can be produced.



HEAT TREATMENT

In the heat treatment process, the mechanical values of the flat wires are specifically controlled.



WINDING ONTO SPOOLS

In the winding process, attention is paid to the absolutely precise mirror finish installation.



Quality assurance process

ACCORDING TO SEMI STANDARD

PULLING CHECK

On the pulling check we measure technical parameters, for example the elongation limits, elongation and strength of the flat conductor.



COATING THICKNESS

For coated flat wires, we inspect the specified condition in the next step.



DIMENSION TEST

Additionally we can check the thickness and width of the wire with special digital precision instruments.





Our QA-system is certified in accordance with the new automotive demands of ISO / TS 16949



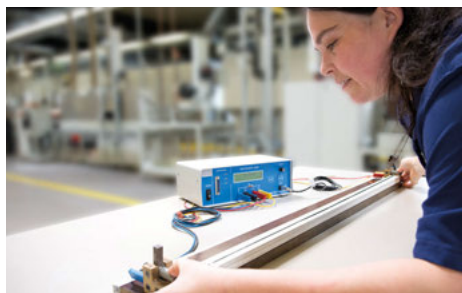
Certified energy management system in accordance with DIN EN ISO 50001:2011

Certified environmental management system in accordance with DIN EN ISO 14001:2004, AC:2009

3.0

ELECTRICAL TEST

We can also check the electrical resistance, if the customer so wishes.



SURFACE AND COILING CHECK

By an optical test of the surface, the expert eye of our staff recognizes the flawless execution.



STRAIGHTNESS CHECK

To ensure that you can further process the product in your plants in an optimal manner, we check the flat wire for its straightness.



Type of packaging

TYPE OF SPOOL WITH MAXIMUM POSSIBLE FULL WEIGHT

Spool	Spool measurements		Spool measurements in cm ³	Material	Tara-weight in g	Max. net full weight in kg
	Outer diameter in mm	Length in mm				
HKV 100	100	100	390	ABS	130	1.2 kg
HKV 125	125	125	767	ABS	160	2.5 kg
HKV 160	160	160	1675	ABS	315	approx. 7.2 kg
HKV 200	200	200	3271	ABS	575	approx. 13.0 kg
HKV 250	250	250	6469	ABS	975	25 kg
Type 4	127	107	557	POM-C	420	3.3 kg
HK 80	80	100	220	ABS	75	0.5 kg
US P4	152	110	1073	ABS	315	approx. 5.2 kg
K 160	160	160	1568	ABS or PS	350	approx. 6.0 kg
K 200	200	200	3063	ABS or PS	600	16 kg
SD 300 K	300	103	3220	ABS or PS	630	approx. 18.0 kg

4.0



HKV-Spool

TYPE OF SPOOL



HK 80



Type 4



USP4



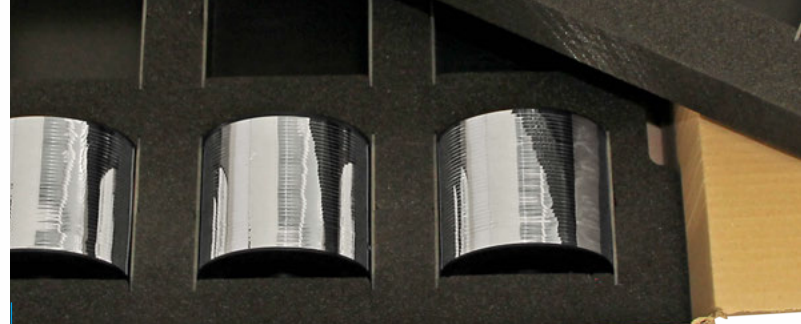
*HKV 100
HKV 125
HKV 160
HKV 200
HKV 250*



*K 160
K 200*



SD 300 K



PACKAGES TYPE

We organise our packages individually in accordance with the desires of the customer. Customers have a choice of either cardboard or wood. Packages either on wooden or plastic pallets. For the flawless delivery of highly-sensitive products, we recommend our specially developed inlays made of black foam material, which are further packaged with standard cartons.



W 51-Box



Carton W 51

Handling and storage of the flat wire

WHAT IS MARKED ON OUR SPOOL LABEL?

■ Manufacturer

■ Raw material and, where applicable, coating material

■ Internal BS order number

■ Batch number

■ Material net weight in kg

■ Length/spool in m

■ Material strength in N/mm²

■ Customer item number

■ Internal BS part number

BRUKER-SPALECK GmbH

Cu-ETP1 | 0,035 x 0,750

Order-no. 11861469 / 2 | Sp.No. 3/5

Los.no. 20137372 | Resist: 634,4 mΩ/m

Netto: 3,870 kg | Date: 20.10.2016

Length: 15000 m

Tensile Str: 478,5 N/mm²

Cust.SKU: 1100000045500-46600

Mat.SAP-No: 20112366

Dimension

Consecutive,
clear spool numbers

Electrical resistance

Date of manufacture

5.0

Bruker-Spaleck flat wire is delivered to the customer by a forwarding agent. (1)

The transport packaging is constructed in such a way as to ensure that the fork-lift can only grasp at a right-angle to the spool axis.

Consequently the winded flat wire will not be damaged by jolts during transport. (2/3)

Stacking and tilting of the packages can also result in damage to the contents.

On the package is a pouch containing the Delivery Note and Quality Certificate, as well as the forwarder's label with the delivery address. (4)

Specific markings according to customers' wishes are possible after prior agreement.



Handling and storage of the flat wire

We recommend an immediate inspection of the transport packaging for external damage and completeness of the shipping documents. (1) A shock-sensor with unchanged white indicator means “everything OK”. (2)

A package which has not been handled correctly is noticeable by means of a red-coloured shock-sensor. However, a red-coloured indicator does not necessarily mean that the goods are damaged. In such a case please do not refuse acceptance. (4)

Note red-coloured indicators in the shipping documents and request the driver to confirm by signing this comment. Inspect the spools for damage of the winding, particularly of cracks on the edge of the spool. (3)



5.0

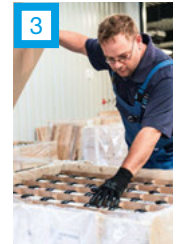
PREPARATION FOR GOODS INWARD CONTROL

Removal of protective wrapping (1)
Dismantling of cover and visual control of the spools.
Layer with recessed grip eases the removal of the individual spools. (2/3)

The spools are placed separately in cardboard compartments with the spool axis in right-angle to the transport direction. (4)
Each layer within the package is covered with a thick cardboard sheet (1)

The spools can be wrapped in film, if the customer so wishes.
The elongated stretch film ensures protection from outer influences and stabilises the wound flat wire.
Supplementary corrosion prevention with VCI-film. (4)

Removal of the spools (5) and subsequent horizontal storage. (6)



Handling and storage of the flat wire

Goods inward control of flat wire:

Whilst dismantling the flat wire for control purposes, ensure that the flat wire does not uncoil violently.

We recommend, to first place a spool on a mandril and then carefully remove the adhesive strip. Cut off the sample piece and then secure the wire taughtly on the edge again. (1 – 4)

Please observe the following points with regard to storage of our flat wire:

- Keep film pouch in wooden boxes closed until the material is needed.
- Room temperature 15 – 25°C
- Maximum 50% rel. humidity
- Store clear of atmospheric influence
- Do not store in the proximity of aggressive media such as industrial gases.
- The flat wire should have reached room temperature before disposition.

Bruker-Spaleck flat wire: „fit for use”

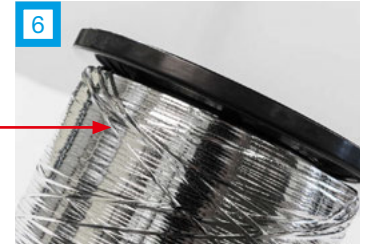
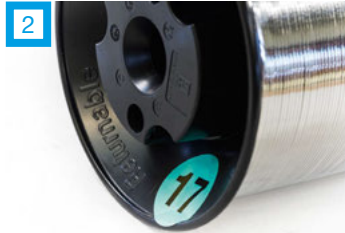


5.0

The spools should categorically only be stored and transported in a horizontal position. (1/3)

A vertical positioning of the spool, however short, can lead to an overlapping of the winding with the result that the material is of no use! (4/5/6)

Any kind of jolting or dropping of the spools must be avoided at all costs. In order to maintain the correct winding, the spools must be handled with extreme caution.



What we also manufacture

FLAT- AND FUSE-ELEMENTS – EXAMPLES OF USE



FFC – Flexible Flat Cable for Automotive



FFC – Flexible Flat Conductor for electronics



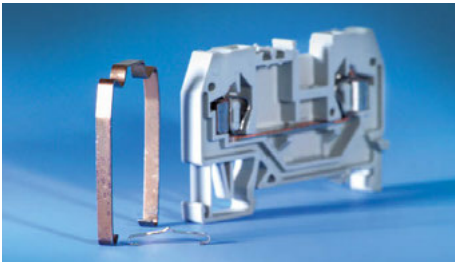
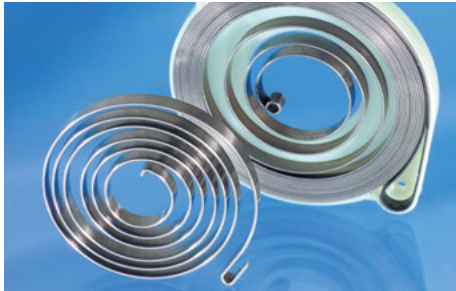
*Silver flat wire for
high-frequency cable*



Fuse-elements for cutout



SPRING FLAT WIRE – EXAMPLES OF USE



Springs and spring elements

SOLAR RIBBON – EXAMPLES OF USE



We look forward to hearing from you

BRUKER-SPALECK

SPECIALTY WIRES

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