HAARLÄNDER

Your expert for special products

flexible, fast and customer-driven

Tradition and forward-looking approach

Haarländer is your expert for a multitude of special products ranging from copper braids and strands to copper-based alloys and special materials, which may be bare or coated.





Compliance & Quality

RoHS & REACh

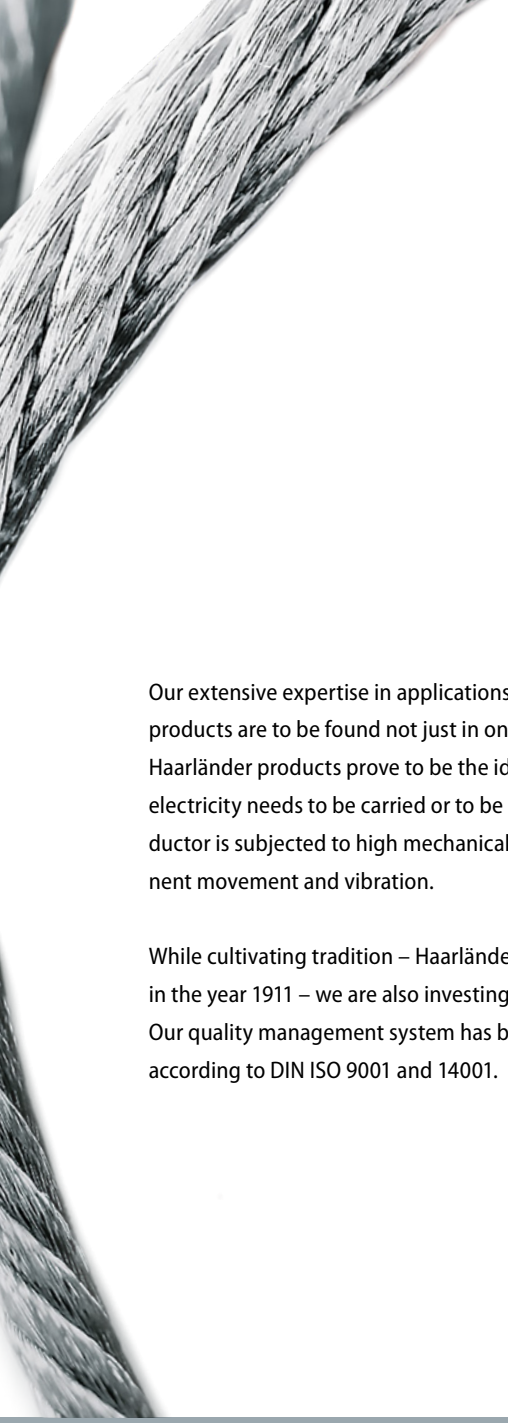
Detailed information about RoHS & REACh is available on our website at www.haarlaender-gmbh.com, where you will find standard letters of confirmation for download as well.

https://www.haarlaender-gmbh.com/en/about-us/material-compliance

Dodd-Frank-Act

In response to inquiries made, we can confirm that our products do not contain any minerals that originate from regions of conflict. They are in full accordance with the American Dodd-Frank-Act. For detailed information please contact our sales-department directly by telephone: +49 9171 9618-0.

https://www.haarlaender-gmbh.com/en/about-us/material-compliance



Our extensive expertise in applications means that our products are to be found not just in one specific sector. Haarländer products prove to be the ideal solution wherever electricity needs to be carried or to be grounded and the conductor is subjected to high mechanical stresses due to permanent movement and vibration.

While cultivating tradition – Haarländer was founded in the year 1911 – we are also investing in the future. Our quality management system has been certified according to DIN ISO 9001 and 14001.

Certificates

Haarländer is certified according to ISO 9001 and ISO 14001. You will find the certificates for download on our website.

https://www.haarlaender-gmbh.com/en/about-us/certificates/

Social compliance

As a member of the LEONI Group we fully endorse its corporate culture. You will find detailed information on our website www.haarlaender-gmbh.com.

https://www.haarlaender-gmbh.com/en/about-us/social-compliance

AWG – American Wire Gauge

Wire sizes and strand sizes (for non-ferrous metals) can be indicated in two ways on the international level: in mm or as AWG. Further information about AWG as well as conversion tables for single wires and strands can be found on our website www.haarlaender-gmbh.com.

https://www.haarlaender-gmbh.com/en/competence-customer-service/customer-service/awg-american-wire-gauge

Resistance welded strands

Compacted material terminals based on clearly defined parameters.

Nominal cross-section ranging from 1 mm² to 16 mm² (depending on welding area).

Particular benefits for our customers

- Compact welded terminals
- Automated processing is possible
- Production of individual parts as well as large-scale production
- Customised assembling

Applications

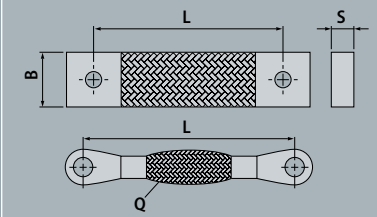
- Switch contacts
- Special applications

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	●	●	○	○	
Cu OF	●	●			
LEONI Histral®	○		○		
Stainless steel					
Aluminium					

● Standard ○ Upon request

Selection of terminals



L Inside micrometer (mm)
B Width (mm)
S Thickness (mm)
Q Cross-section (mm²)

Starting product:
- Flat copper conductors
- Round copper braids
- Round copper strands

Coating:
- Bare
- Tin-plated
- Nickel-plated
- Silver-plated

Basic material:
- Copper
- Stainless steel
- Aluminium on request

Flexible copper connectors

Earthing straps MB, current leads SB and connectors VB with different constructions regarding customer specification.

Particular benefits for our customers

- Very good flexibility
- Individual parts and large-scale production
- Modifyable for all customerspecific applications
- Short development time and fast response

Applications

- Power transmission
- Potential equalisation / grounding

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	●	●	○	○	
Cu OF	●	●			
LEONI Histral®	●		○		
Stainless steel	○				
Aluminium	○				

● Standard ○ Upon request

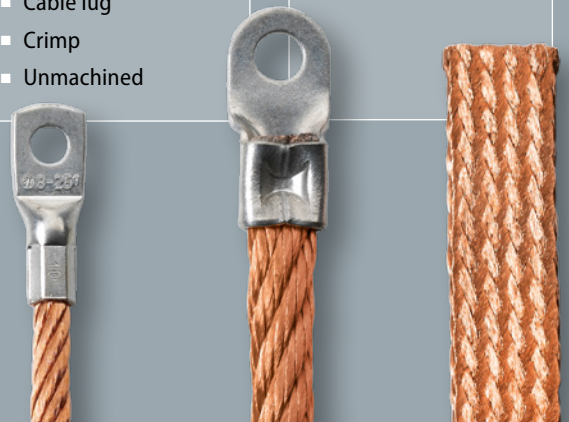
Learn more about materials on page 20

Terminals:

- Hot dip tinned (with or without radius)
- Fitted with a terminal (with or without radius)
- Cable lug
- Crimp
- Unmachined

Cover:

- Insulating sleeve
- Heat-shrinkable tube
- Special materials



You may combine any materials and endings for your assemblies.
Please select your customised construction in our request form at:
https://www.haarlaender-gmbh.com/en/products/flexible-copper-connectors

We will be pleased to advice you personally:
+49 9171 9618-0

Flat copper conductors KFL

Braided, flat rolled copper strip
according to DIN 46444 and 72333.

The flexibility of our fabric tapes is determined by their design. The higher the number and the smaller the diameter of the individual wires, the more flexible the finished product will be.

- Single wire diameter ranging from Ø 0.05 mm to Ø 0.16 mm
- Nominal cross-section ranging from 0.09 mm² to 240 mm²
- Nominal cross-section from 1.5 mm² to 70 mm² with single wire Ø 0.05 mm upon request
- Variable parameters upon request

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	●	●	●	●	
Cu OF	●	●		○	
LEONI Histral®	○				
Stainless steel	○				
Aluminium	○				

● Standard ○ Upon request

Particular benefits for our customers

- Very good flexibility depending on construction
- Adjustable degree of compaction, with cross-section remaining unchanged
- Delivered by the meter or in fixed lengths (copper cutting parts)

Applications

- Earthing straps
- Busbars
- Connectors

Flat copper conductor | woven

Woven flat copper conductor
for special applications.

Dimensions and materials upon request may be found.
info@haarlaender-gmbh.com

Construction according to DIN 46444

Flat copper conductors KFL

Learn more about the table of current loads and cross-sections on page 22

Nominal cross-section (mm²)	Dimensions width x thickness ± 5 % – 25 % (mm)	Construction	Net. weight approx. ± 12 % (kg/km)
Wire Ø 0.05 mm ± 0.002			
0.09	1.0 x 0.2	16 x 3	0.9
0.16	1.2 x 0.2	16 x 5	1.6
0.25	1.6 x 0.2	16 x 8	2.5
0.50	2.5 x 0.4	16 x 16	5.0
0.75	2.7 x 0.5	16 x 24	7.5
1.00	3.2 x 0.7	16 x 32	10.0
Wire Ø 0.07 mm ± 0.002			
1.5	4.0 x 0.8	16 x 25	15
2.0	5.0 x 0.8	16 x 33	20
2.5	5.8 x 0.8	24 x 27	25
3	7.5 x 0.9	24 x 33	30
4	8.2 x 1.0	24 x 43	40
6	10.0 x 1.3	24 x 66	60
8	12.3 x 1.5	24 x 88	80
10	14.0 x 1.5	24 x 109	100
Wire Ø 0.10 mm ± 0.003			
16	17.5 x 2.0	24 x 85	160
25	22.0 x 2.5	24 x 135	250
35	30.0 x 2.5	36 x 124	350
50	33.0 x 3.2	48 x 133	500
70	45.0 x 3.5	48 x 186	700
95	50.0 x 4.0	48 x 253	950
120	60.0 x 4.0	48 x 319	1,200
150	65.0 x 5.0	48 x 399	1,500
185	75.0 x 5.0	48 x 491	1,850
240	80.0 x 6.5	48 x 637	2,400

Construction according to DIN 72333

Flat copper conductors KFL

Nominal cross-section (mm²)	Dimensions width x thickness ± 5 % – 25 % (mm)	Construction	Net. weight approx. ± 12 % (kg/km)
Draht-Ø 0.16 mm ± 0.006			
6	9 x 1.0	24 x 12	60
10	14 x 1.5	24 x 21	100
16	20 x 1.6	36 x 22/23	160
25	22 x 2.5	36 x 34/35	250
35	25 x 3.0	36 x 48/49	350
50	33 x 3.2	48 x 52	500
70	40 x 3.5	48 x 73	700
120	55 x 4.5	48 x 125	1,200

Further dimensions upon request.

Shielding braids KAG

Shielding braids consist of bobbin wires, located parallel, which have been braided into a tube.

- Single wire diameter ranging from Ø 0.10 mm to Ø 0.40 mm
- Nominal cross-section ranging from 0.25 mm² to 108 mm²

Particular benefits for our customers

- Smoothly expandable
- Very good shielding effect

Applications

- Electrical and mechanical shielding
- Shielding of wires and cables
- Shielding of cable bundles and cable harnesses

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	○	●	○	○	
Cu OF	○				
LEONI Histral®	○				
Stainless steel	○				
Aluminium					

● Standard ○ Upon request

Learn more about materials on page 20

Contract manufacture

You need special braids for your product?

We can offer you braids for cables as well as special braids using textiles, aramide or stainless steel.

Each order is unique and each material has got its own characteristics. We take great pleasure in giving you individual advice!
info@haarlaender-gmbh.com

Construction

Shielding braids KAG

Nominal cross-section	Construction No. of wires	Inner Ø max. expandable to	Net. weight approx.
(mm²)		(mm)	± 12 % (kg/km)
Wire Ø 0.1 mm ± 0.003			
0.25	16 x 2	3.0	3.3
0.38	16 x 3	3.5	3.5
0.50	16 x 4	4.0	4.6
0.88	16 x 7	5.0	8.1
0.94	24 x 5	6.0	8.6
1.32	24 x 7	8.0	12.1
1.70	24 x 9	10	15.6
1.98	36 x 7	15	18.1
Wire Ø 0.2 mm ± 0.003			
5.3	24 x 7	16	48.4
6.8	24 x 9	20	62.2
7.9	36 x 7	25	74.0
10.2	36 x 9	30	95.1
12.4	36 x 12	40	127
Wire Ø 0.3 mm ± 0.004*			
23.8	48 x 7	50	222
30.5	48 x 9	60	285
33.9	48 x 10	70	317
40.7	48 x 12	80	380
Wire Ø 0.4 mm ± 0.004*			
60.3	48 x 10	90	574
66.4	48 x 11	100	632
78.4	48 x 13	120	747
90.5	48 x 15	140	862
108.6	48 x 18	160	1,034

* Upon request

Round copper braids KZG

Compact braided round copper flexibles.

- Optimised cutting quality and aramide inlay upon request
- Single wire diameter ranging from Ø 0.05 mm to Ø 0.10 mm
- Nominal cross-section ranging from 0.35 mm² to 25 mm²

Particular benefits for our customers

- Absolute free from twist
- Compact cutting surface
- Very high degree of dimensional accuracy
- Fully automatic further processing
- Very high Flex life
- Delivered by the meter or in fixed lengths (copper cutting parts KST)

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	●	●	○	○	
Cu OF	●	●			
LEONI Histral®	○				
Stainless steel	○				
Aluminium					

● Standard ○ Upon request

Learn more about materials on page 20

Applications

- Carbon brushes
- Connectors
- Switches with high switching cycles
- Prematerial for resistance welded strands (see also page 4)

Examples of use

1. Resistance welded strands
2. Assemblies, e.g. connectors
3. Low-voltage applications
4. Carbon brushes

We will be pleased to advice you.
info@haarlaender-gmbh.com

Construction

Round copper braids KZG

Nominal cross-section (mm²)	Construction ± 2 % (No. of wires)	Overall Ø (approx. mm)	Net. weight approx. ± 12 % (kg/km)
Wire Ø 0.05 mm ± 0.002			
0.35	8 x 23	0.95	3.50
0.50	8 x 32	1.10	5.00
0.75	8 x 48	1.35	7.50
1.00	8 x 64	1.55	10.0
1.5	8 x 96	1.90	15.0
Wire Ø 0.07 mm ± 0.002			
0.50	8 x 16	1.10	5.0
0.83	8 x 27	1.40	8.3
1.00	8 x 32	1.55	10.0
1.25	8 x 40	1.70	12.5
Wire Ø 0.07 mm ± 0.002			
1.5	8 x 49	1.88	15
2.5	8 x 81	2.42	25
1.5	12 x 33	1.90	15
2.0	12 x 44	2.20	20
2.5	12 x 54	2.40	25
3	12 x 65	2.70	30
4	12 x 86	3.10	40
5	12 x 108	3.50	50
6	12 x 130	3.80	60
8	12 x 174	4.40	80
10	12 x 217	4.90	100
12	12 x 260	5.40	120
Wire Ø 0.10 mm ± 0.003			
16	12 x 170	6.10	160
20	12 x 213	6.90	200
25	12 x 266	7.70	250

Further dimensions upon request.

Ropes KRL

High-flexible round strands and ropes. Apart from their extraordinary flexibility, these product types are characterized by a long flex life.

- Single wire diameter ranging from Ø 0.05 mm to Ø 0.10 mm
- Cross-section ranging from 0.02 mm² to 150 mm²

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	●	●	○	○	
Cu OF	●	○			
LEONI Histral®	○				
Stainless steel	○				
Aluminium					

● Standard ○ Upon request

Learn more about assemblies and connectors on page 5

Basic material for assemblies and connectors

Dimensions and materials upon request may be found.
info@haarlaender-gmbh.com

To be used for products like earthing straps MB, current leads SB and connectors VB with different constructions regarding customer specification.

Construction

Ropes KRL

Nominal cross-section (mm²)	Construction ± 2 % (No. of wires)	Outer-diameter (approx. mm)	Net. weight approx. ± 12 % (kg/km)
Wire Ø 0.05 mm ± 0.002			
0.06	30	0.30	0.6
0.10	51	0.40	1.0
0.14	72	0.50	1.4
0.20	105	0.60	2.0
0.25	130	0.70	2.5
0.35	180	0.85	3.5
0.50	266	1.00	1.0
0.75	392	1.25	7.5
1.00	525	1.50	10.0
Wire Ø 0.07 mm ± 0.002			
1.50	385	1.75	15
2.00	525	2.10	20
2.50	651	2.40	25
3.00	798	2.60	30
4.00	1,036	3.00	40
6.00	1,575	3.70	60
8.00	2,058	4.30	80
10.00	2,562	4.80	100
12.00	3,108	5.30	120
16.00	4,116	6.10	160
Wire Ø 0.10 mm ± 0.003			
25	3,234	7.8	250
35	4,508	9.2	350
50	6,468	11.0	500
70	8,967	13.0	700
95	12,201	16.0	950
120	15,435	18.0	1,200
150	19,110	20.0	1,500

Learn more about the table of current loads and cross-sections on page 22

Further dimensions upon request.

Ropes with overall braid

High-flexible copper-based ropes, enclosed by an additional braid

Consistent elongation and close tolerances of the individual wires. Suitable for connectors and strands. Available in Cu ETP and Cu OF bare, tin-plated or nickel-plated.

- Single wire diameter ranging from Ø 0.05 mm to Ø 0.10 mm
- Cross-section ranging from 0.35 mm² to 120 mm²

Other diameters and materials upon request may be found.
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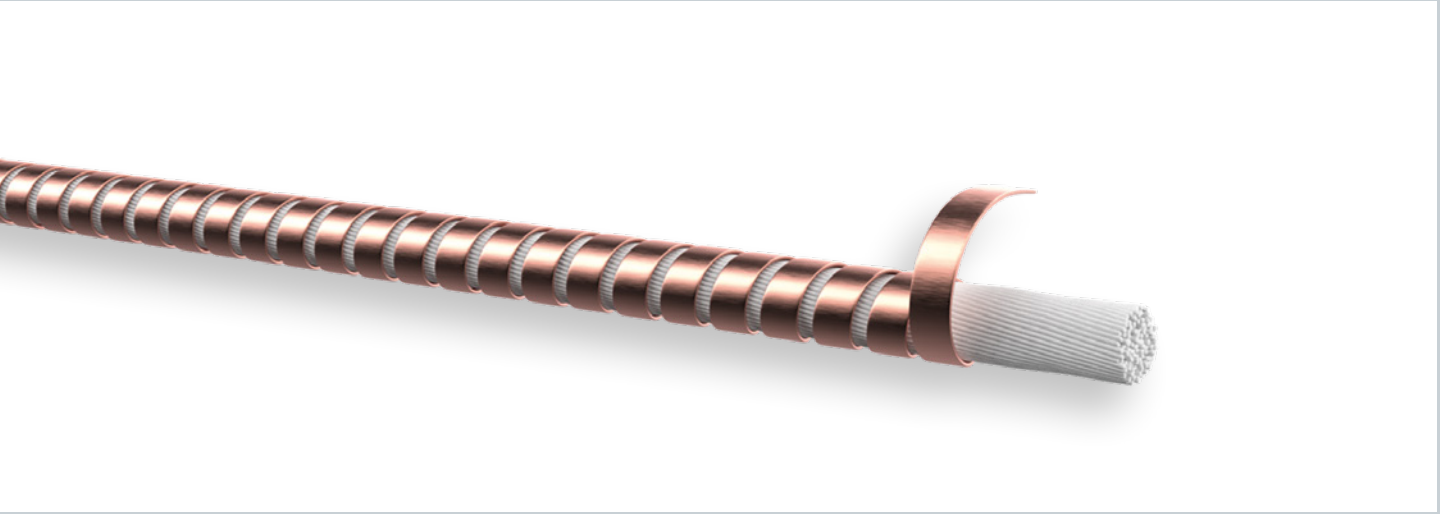


Tinsel conductors KGL

One or two layers of flat copper wire are spun around a carrier-thread (aramide, polyester or similar). Round single wire diameter ranging from Ø 0.05 mm to Ø 0.10 mm.

Particular benefits for our customers

- Very good flexibility
- Good Flex life
- Very good tensile strength (aramide carrier thread)

Applications

- Healthcare
- Extrusion (jamming protection)
- Heating application
- Coil-cords for loudspeakers

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	●	●	○		
Cu OF	●	○			
LEONI Histral®	○				
Stainless steel					
Aluminium					

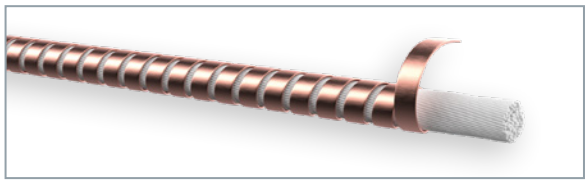
● Standard ○ Upon request

Learn more about materials on page 20

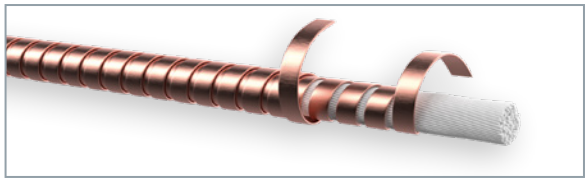
Further constructions upon request.

Construction

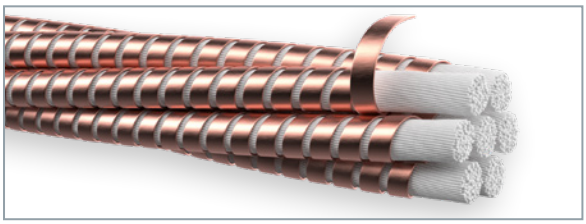
- **Tinsel conductor**
  Single covered (design „E“)



- **Tinsel conductor**
  Double covered (design „D“)



- **Tinsel copper strand**
  Available in different constructions
  (from three-fold to eight-fold)



- **Tinsel copper braids**
  Available in different constructions
  (six-fold, eight-fold and twelve-fold)

Ribbons & tapes

Woven ribbons KLB

Applications

- Transformers
- Instrument transformers
- Current transformers

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	●				○
Cu OF					
LEONI Histral®					
Stainless steel					
Aluminium					

● Standard ○ Upon request

Construction

Width (mm)	Construction (No. of wires)	Copper content (kg / 100 m)
10	22	0.16
15	32	0.24
20	42	0.32
25	54	0.40
30	62	0.48
40	84	0.64

Further dimensions upon request.

Fabric tapes KGB

Applications

- Electrical shielding
- Heat dissipation

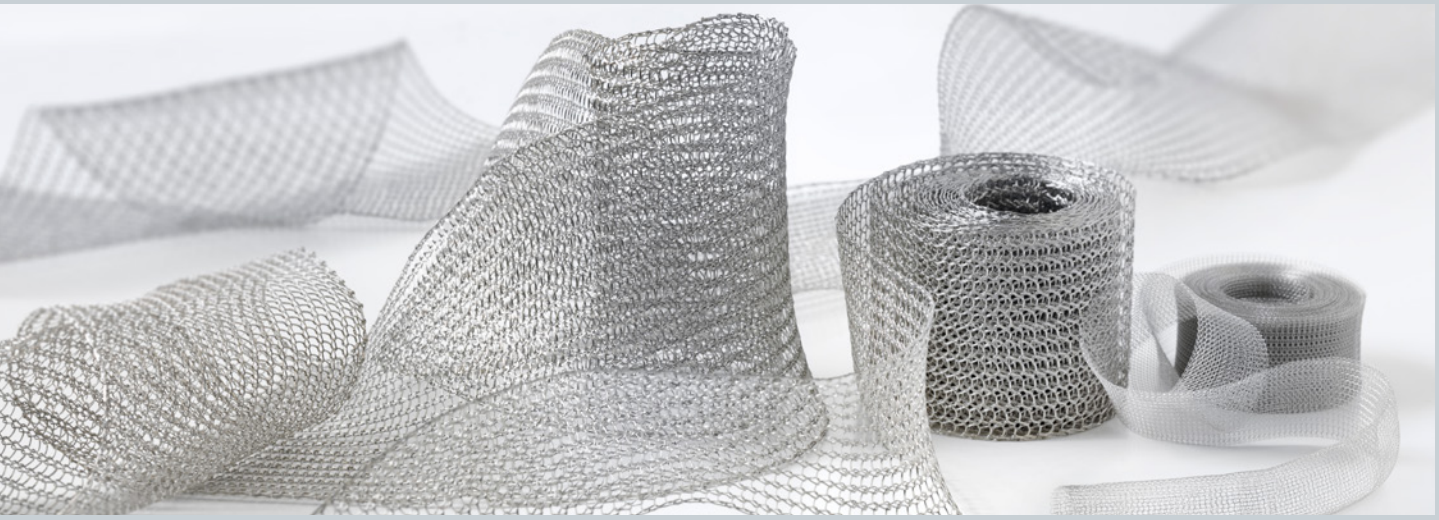
Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	●				
Cu OF					
LEONI Histral®					
Stainless steel					
Aluminium					

● Standard ○ Upon request

Construction

Width (mm)	Wire Ø (mm)	Copper content (kg / 100 m)
25	55 x 0.15	1.10



Knitted fabrics

Particular benefits for our customers

- Very good flexibility
- Customised packaging (rolled goods)

Applications

- Electrical shielding

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	○	●			
Cu OF					
LEONI Histral®	○				
Stainless steel					
Aluminium					

● Standard ○ Upon request

Construction

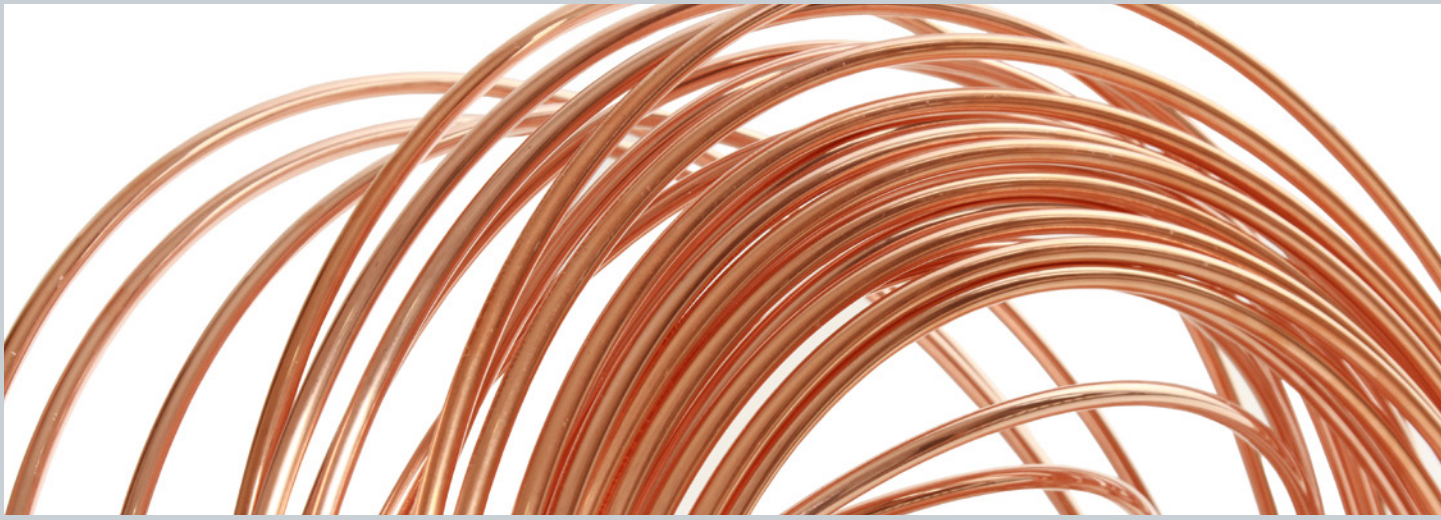
- **Flat-knitted copper tape KFG**

Width (mm)	Construction (No. of wires)	Copper content (kg / 100 m)
Wire Ø 0.10 mm		
20	4 x 0.10	0.60
	8 x 0.10	1.20
30	4 x 0.10	0.85
	8 x 0.10	1.70
60	4 x 0.10	1.50
	8 x 0.10	3.00
100	8 x 0.10	5.00

- **Tubular-knitted copper KSG**

Width (mm)	Construction (No. of wires)	
Wire Ø 0.10 mm		
25	1 x 0.10	tin-plated
	2 x 0.10	tin-plated

Further dimensions upon request.



Single wires

Round copper wires as per international regulations and individual customer requirements with a single wire diameter ranging from Ø 0.10 mm to Ø 1.8 mm.

Particular benefits for our customers

- Wide range of types
- Customised packaging (reels, rings)

Applications

- Different industries
- Crafts

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	●	●	○	○	
Cu OF	○				
LEONI Histral®	○				
Stainless steel	○				
Aluminium					

● Standard ○ Upon request

Learn more about materials on page 20

Further dimensions upon request.

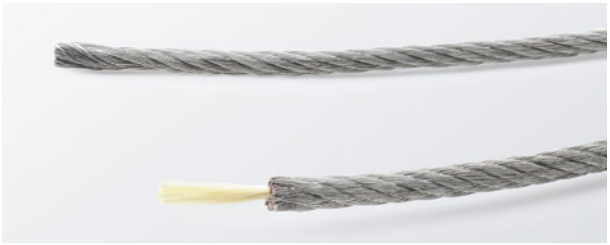
Conductors for low-voltage lighting

Particular benefits for our customers

- Cut resistant terminals
- Available with strain relief (i.e. aramide): combination of a small cross section with a high tensile strength is possible.

Upon request all kind of low-voltage cables are available with braidings made of textile, stainless steel, nickel-plated copper wire or light gold copper wire.

Round copper conductors KRL



- Cross-section ranging from 4 mm² to 6 mm²
- Further dimensions upon request

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	○	●	○		
Cu OF					
LEONI Histral®					
Stainless steel					
Aluminium					

● Standard ○ Upon request

Round copper braids KZG

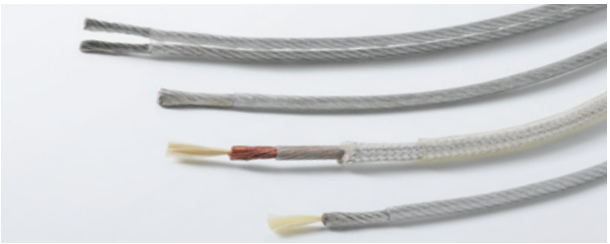
- Cross-section ranging from 0.35 mm² to 2.5 mm²
- Further dimensions upon request

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	○	●	○	○	○
Cu OF					
LEONI Histral®					
Stainless steel	○				
Aluminium					

● Standard ○ Upon request

Insulated cords and cables LTG



- Cross-section ranging from 0.25 mm² to 6 mm²
- Available as twin cables
- Thin-walled insulation: good electrical contacting
- Insulation materials: FEP, silicone, PVC
- Insulation of core or sheath upon request
- Special products as like triangle cable upon request

Coaxial cables | Insulated core, braided

- Additional braiding using stainless steel upon request
- Cross-section: ranging from 2 x 0.25 mm² to 2 x 1.5 mm²
- Insulation materials for core or sheath insulation: FEP, silicone, PVC

Learn more about materials on page 20

Materials

	bare	tin-plated	silver-plated	nickel-plated	light gold
Cu ETP	○	●	○	○	○
Cu OF					
LEONI Histral®					
Stainless steel	○				
Aluminium					

● Standard ○ Upon request

Operating temperature

FEP	briefly up to 150 °C
Silicone	briefly up to 180 °C
PVC	briefly up to 80 °C

Further constructions and insulation materials upon request.

Basic materials

Symbol	Material number	Composition in %-by-weight	Density kg/dm³	Melting point	% IACS [1] min.	
Cu-ETP1	CW003A [2]	Cu ≥ 99.9 % Oxygen ≤ 400 ppm	8.9	1083 °C	101	[3]
Cu-OF1	CW007A [2]	Cu ≥ 99.95 % Oxygen ≤ 10 ppm	8.9	1083 °C	101	

[1] International Annealed Copper Standard. Electrical conductivity of copper = min. 50 m/Ωmm² = 100 % IACS
[2] In accordance with DIN EN 13602
[3] https://www.haarlaender-gmbh.com/en/competence-customer-service/material/cu-etp-cu-of

LEONI Histral® Alloys	LEONI Histral® H – High strength alloys LEONI Histral® R – Resistance alloys		[1]
Stainless steel **Aluminium** **Pure nickel**			

[1] https://www.haarlaender-gmbh.com/en/competence-customer-service/material

Materials for electroplating

Material	Special properties	Further information	
Tin	■ Temperature resistance (up to 120 °C) ■ Effective protection against corrosion ■ Easy to solder	Requirements for tin coatings are regulated by DIN EN 13602	
Silver	■ Very good temperature resistance (up to 200 °C) ■ High conductivity ■ Easy to solder	Highly conductive silver coatings improves the properties of electrical conductors to be used in RF/HF Technology ("Skin effect")	[1]
Nickel	■ Very good temperature resistance (up to 260 °C) ■ High corrosion resistance ■ Diffusion barrier ■ Can only be soldered under certain conditions	Special type: 27 % nickel-plated copper for a very high corrosion resistance and for a very good temperature resistance from – 60 to + 750 °C.	

[1] https://www.haarlaender-gmbh.com/en/competence-customer-service/material

Table of current loads

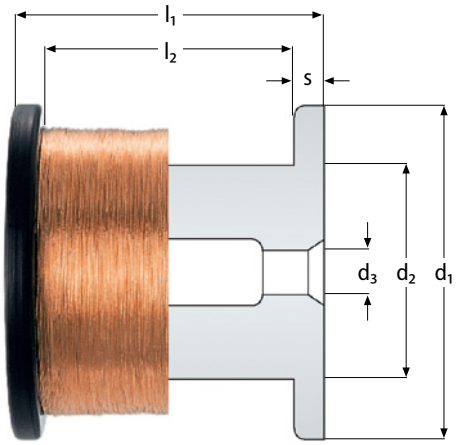
Overview over the appropriate cross-section as a function of the current load (determined at a room temperature of 35 °C and the maximum permitted conductor temperature of 70 °C).

Due to other factors usually playing a role as well, the values indicated besides are to be seen as a non-binding recommendation.

Nom. cross-section (mm²)	**Max. permitted current rating** (approx. A)
0.1	5
0.14	6
0.2	7
0.25	9
0.35	10
0.5	12.5
0.75	15
1	18
1.5	21
2.5	30
4	40
5.25	44
6	50
8	70
10	85
16	120
25	150
35	195
50	250
70	300
95	360
120	420
150	480
185	570
240	670
300	780
400	950
500	1,100
625	1,300
800	1,500
1,000	1,800

Packaging

The table shows an overview about the most common reel sizes. Special types are available upon request.



d_1 = flange diameter
d_2 = core diameter
d_3 = bore

l_1 = overall width
l_2 = laying width
s = flange thickness

Reel	Material	d_1 (mm)	d_2 (mm)	d_3 (mm)	l_1 (mm)	l_2 (mm)	s (mm)	Weight empty (kg)	Max. net filling weight (approx. kg)
Metal reels									
B400	Plate	400	200	35	220	200	10	7.0	50
Plastic reels									
K100	Plastic	100	63	16	100	80	10	0.13	2.0
K125	Plastic	125	80	16	125	100	12.5	0.20	4.0
K160	Plastic	160	100	22	160	128	16	0.35	6.0
K200	Plastic	200	125	22	200	160	20	0.45	12
K250	Plastic	250	160	22	200	160	20	1.35	20
K250	Plastic	250	160	22	200	160	20	1.05	20
K355	Plastic	355	224	36	200	160	20	1.85	35
K400	Plastic	400	250	32.7	243	203	20	4.40	70
K400	Plastic	400	230	127	280	240	20	5.00	70
K630	Plastic	630	320	55	430	380	25	11.0	350

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