

High current technology • Flexible connectors •
Solderless cable connection technology • Electroplating equipment

druseidt

Elektrotechnik



Catalogue No. 2

Highly flexible air- and water-cooled connectors
and cables for hi-tech-applications in industrial
and high current equipment



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The dimensions and technical data listed in this catalogue have been determined with the greatest possible care and the illustrations correspond to the status at the time of printing. However, we reserve the right to make technical changes as well as changes in dimensions, shape and colour.

Our specifications, in particular the values for possible current loads, are non-binding guide values. The assignment of conductor cross-sections, of current carrying capacities by national or international standards or regulations is neither restricted nor cancelled by this. Only the details and commitments in our order confirmations are binding for us.

The use of photos, drawings, catalogue pages etc. for own advertising campaigns or other uses requires or formerly written acceptance.

Extensive production possibilities

For decades, our company has been involved in the design and manufacture of both highly flexible and flexible power transmission components as well as power distribution components made out of solid materials. From the smallest earth and ground strap to high current cables with 6000 mm² cross-section or ready to install busbar or current transmission systems, almost all conceivable applications are covered. Whether in air-cooled or water-cooled design, we offer you suitable components and solutions.

Our various production technologies and our extensive range of machines with varying degrees of automation enable fast, cost-effective production of individual parts and small batches as well as series production of larger quantities. As we manufacture almost all of the flexible and highly flexible stranded and braided wires and cables required for the production of our high current connectors in our company, we can ensure consistent and reproducible quality, from raw material to finished products. This inhouse production area also increases our flexibility both in terms of delivery times and the production of customized solutions.

In this catalogue, we offer a wide range of standardized flexible connections, parts and components. In addition, we manufacture several thousand customized or plant-specific components, often supplemented with busbars or individually designed components made of solid materials. Information about the production of solid components can be found in our additional catalogue No. 4 "Busbars, non-ferrous metal working and accessories" or on our web-page under www.druseidt.de.

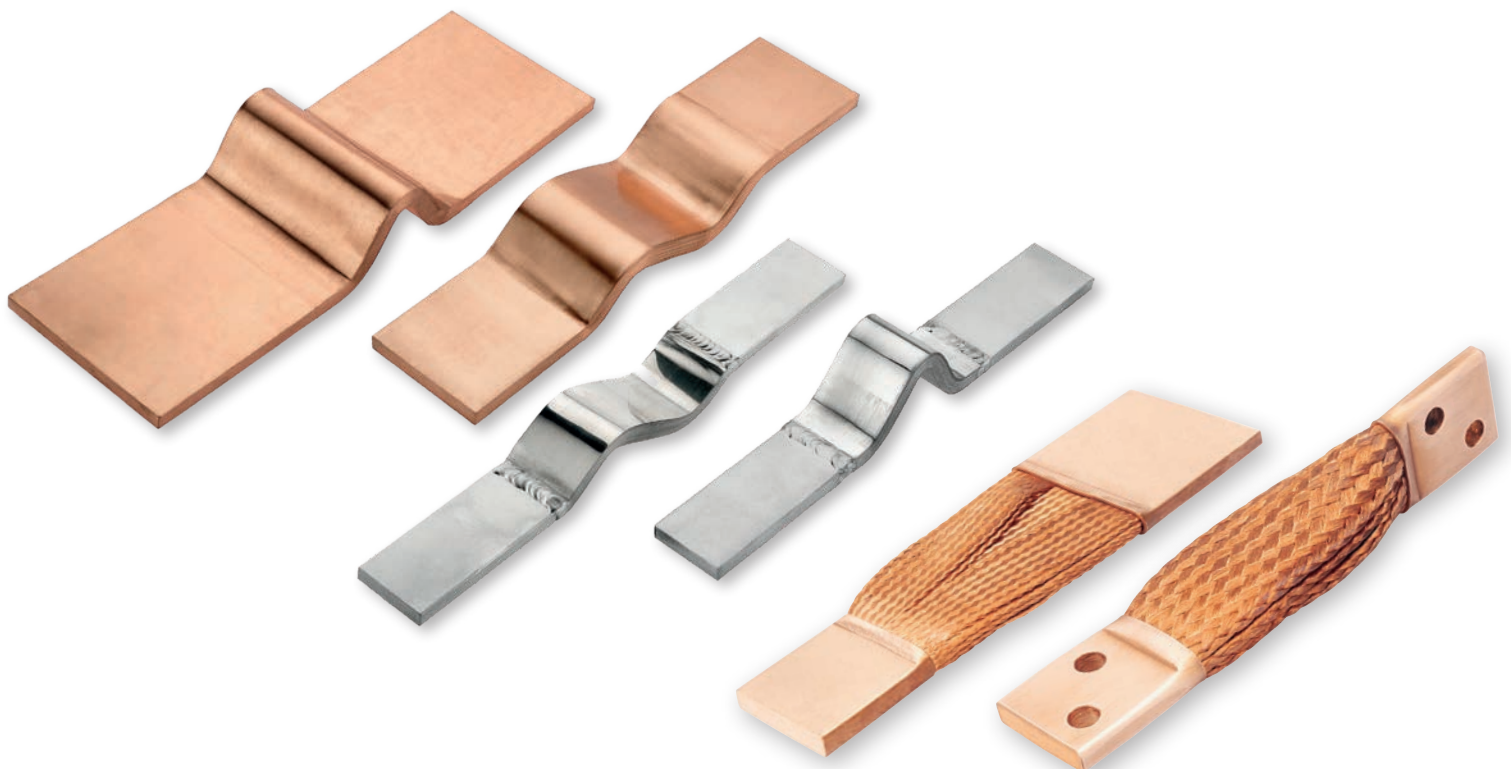
Our range of services

- Stranding and braiding of highly flexible and flexible flat and round strands as well as shielding braids
- Solderless crimping and welding of earth, ground and high current connectors
- Soldering and resistance welding of flexible connections
- Pressure-/diffusion welding of copper connectors made out of foils or strips
- Fusion-, inert gas- and electron beam welding of current transmission elements
- Press- riveting of flexible connections
- Extrusion of flexible/highly flexible special cables and supple bars

The afore mentioned areas are supplemented and supported by our

- Modern metal cutting production (turning, milling, drilling, grinding)
- Forming production (bending and edging of busbars, sheets and tubes)
- Welding department (welding of non-ferrous materials)
- Construction department (development of customized solutions)

We are happy to advise you on your specific applications.



We have a comprehensive information and a certified quality management system

Quality and customer satisfaction have a high priority in our company. In order to meet these requirements on a permanent basis we maintain a comprehensive information- and quality management system. The existing system and the organizational measures are continuously refined and further developed.

In this way, taking into account the changing markets and requirements, it should also be ensured in the future that the necessary quality assurance measures are carried out and documented economically in accordance with defined guide-lines, especially in the areas of design, production, sales and procurement. Extensive testing possibilities are therefore the basis and prerequisite for our high quality standard.

For example, we have these testing facilities in our company:

- Geometrical measurements on components also with 3D- or optoelectronic measuring devices
- Determination of compositions using x-ray fluorescence analyzers
- Hardness tests
- Tensile tests
- Preparation of micrographs
- Microscopy, micrograph analysis and microstructure testing
- Measurement of electrical conductance
- Measurement of electrical resistances
- Pressure tests for water-cooled components
- Tests and inspections according to customer specifications, if desired also in cooperation with specified test centres or laboratories



Checking the dimensions by means of a 3D-measuring arm



Opto-electronic measurement of the dimensions

Careful inspection and control

Reproducible processes and procedures are essential prerequisites for maintaining a high quality standard. Our extensive and modern measuring and testing facilities

are therefore important components of our quality management system and support both our production departments and the development/further development of our products.



Conductivity test/flexible braided connectors



Determination of material compositions



Conductivity test/flexible foil-connectors



Hardness test

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Insulated and non-insulated braids, ropes and cables

We manufacture and deliver highly flexible and flexible braids, ropes and cables by the metre in both insulated and non-insulated design.

- Non-insulated braided copper tapes
- Insulated braided copper tapes
- Braided aluminium tapes
- Braided stainless steel tapes
- Tubular braids for covering and shielding
- Non-insulated stranded copper cables
- Round stranded cables with overall copper braid
- Plait braided cables
- Highly flexible PVC-insulated cables
- Welding cables H01N2-D
- Insulated ropes ESY/ESUY
- Extruded silicone cables, single and double insulated
- TPE-U insulated cables

Twisting, stranding and braiding of highly flexible or flexible flat and plait braids as well as round stranded ropes and shielding braids

We offer an extensive range of highly flexible and flexible stranded braids, wires and cables in both non-insulated and insulated design. All designs and dimensions are available as yard goods in coils, wound on spools or wooden drums, both in small and large quantities, usually from stock. Customized designs are also possible by arrangement. All types offered by the metre also serve as basic material for our comprehensive range of ready-made power tapes and cable sets.

Our own material production enables us to ensure both the necessary flexibility in terms of delivery times also for larger quantities and the delivery of a consistently reproducible quality from the stranded braid or cable to the finished conductor/cable set.

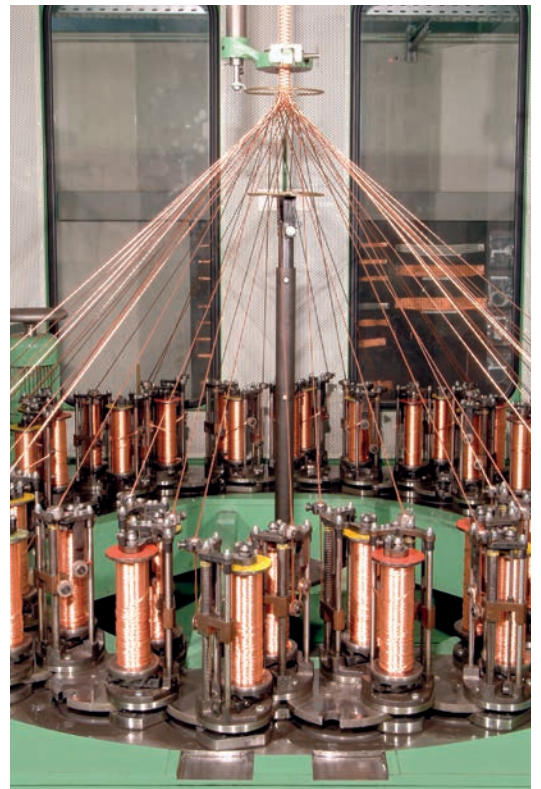
We manufacture flexible current transmission elements from the stranded cable or braid to the ready assembled solderless pressed high current connector.



Manufacturing of round- and plait braided cables



Twisting and stranding of highly flexible conductors



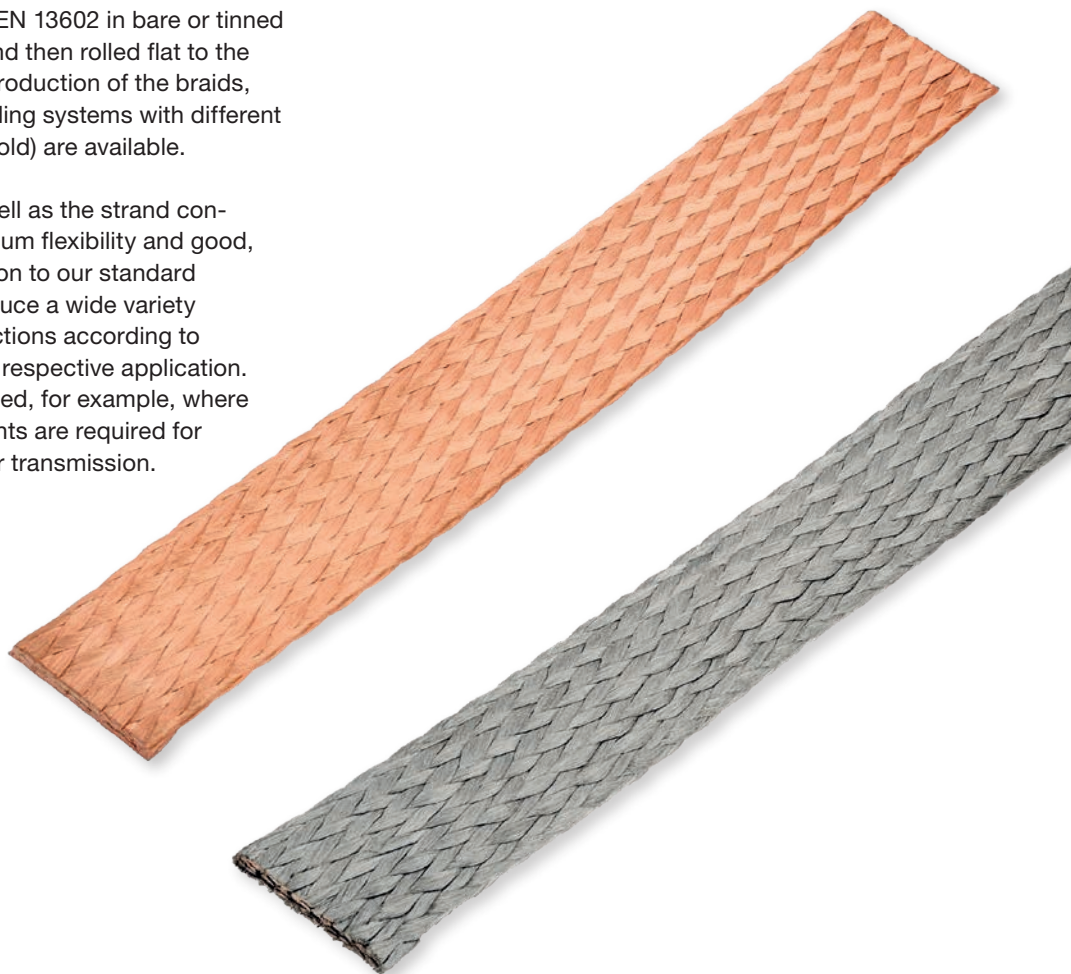
Braiding of wires

Highly flexible braided copper tapes

Construction and application

Our highly braided copper tapes are made of soft annealed copper-ETP1 wires according to DIN EN 13602 in bare or tinned version. They are braided as a tube and then rolled flat to the specified width dimensions. For the production of the braids, modern stranding machines and braiding systems with different numbers of brackets (16/24/36 or 48 fold) are available.

The lay lengths and braid angles as well as the strand constructions are chosen to ensure optimum flexibility and good, further processing. However, in addition to our standard dimensions, it is also possible to produce a wide variety of cross-sections and strand constructions according to customer's wishes and tailored to the respective application. Such flat braided copper tapes are used, for example, where even highly flexible connecting elements are required for earthing, lightning protection or power transmission.



Technical data

Material:

- soft annealed copper-ETP 1 wires acc. to DIN EN 13602
- wire-Ø 0,05 (1 mm²)
- wire-Ø 0,07 (1,5 - 10 mm²)
- wire-Ø 0,10 (16 - 168 mm²)

Surface:

- optionally uncoated or tinned

Delivery:

- optionally in rings, on one way or plastic spools or wooden drums

Part-No.		Technical data				
		cross-section mm ²	conductor structure	dimensions ca. mm		weight kg/%m
uncoated	tinned			width	thickness	
02790	02815	1	16 x 32 x 0,05	3,2	0,7	1,50
02791	02816	1,5	16 x 25 x 0,07	4	1	1,70
02792	02817	2	16 x 33 x 0,07	5	0,8	2,20
02793	02818	2,5	24 x 27 x 0,07	5,8	1	2,70
02794	02819	4	24 x 43 x 0,07	8,2	1	4,25
02795	02820	6	24 x 66 x 0,07	10	1	6,00
02796	02821	8	24 x 88 x 0,07	12	1,1	8,00
02797	02822	10	24 x 109 x 0,07	13,8	1,3	10,00
02799	02824	16	24 x 85 x 0,10	18	2	16,00
02801	02826	25	24 x 135 x 0,10	20	2,4	25,00
02802	02827	35	36 x 124 x 0,10	29	2,2	35,00
02803	02828	50	48 x 133 x 0,10	33	2,8	50,00
02804	02829	70	48 x 186 x 0,10	38	3	70,00
02812	02834	95	48 x 256 x 0,10	45	4,5	95,00
02805	02830	120	48 x 320 x 0,10	50	4,5	120,00
02806	02831	140	48 x 373 x 0,10	55	5,3	140,00
02807	02832	168	48 x 446 x 0,10	70	4,5	168,00

Flexible braided copper tapes 14-70 mm²

similar to DIN 72333 part 3

Construction and application

Flexible braided copper tapes are made from thicker single wires with a diameter of 0,16 mm or 0,20 mm. They can be used wherever connections are not subject to special flexibility requirements.

In accordance with DIN 72333 part 3, they are intended for use as earth straps or earth connectors in the area of starter batteries (see also ready-made earth and ground straps according to pages 28/29 of this catalogue).

Other cross-sections than indicated in the table from single wires 0,16 mm or 0,20 mm on request.



Part-No.		Technical data					weight kg/% m
uncoated	tinned	cross-section mm ²	dimensions ca. mm				
			conductor structure	width	thickness		
02798	02823	14	24 x 29 x 0,16	18	1,5	14,00	
02600	02620	16	24 x 34 x 0,16	20	1,6	16,00	
02800	02825	21	24 x 44 x 0,16	22	2	21,00	
02601	02621	25	24 x 52 x 0,16	22	2,5	25,00	
02602	02622	35	36 x 48 x 0,16	25	3	35,00	
02603	02623	50	36 x 69 x 0,16	33	3,2	50,00	
02604	02624	70	48 x 72 x 0,16	35	4,5	70,00	
02605	02625	14	36 x 13 x 0,20	18	1,5	14,00	
02606	02626	16	36 x 15 x 0,20	20	1,6	16,00	
02607	02627	21	36 x 19 x 0,20	22	2	21,00	
02608	02628	25	36 x 22 x 0,20	22	2,5	25,00	
02609	02629	35	36 x 31 x 0,20	25	3	35,00	
02610	02630	50	48 x 33 x 0,20	33	3,2	50,00	
02611	02631	70	48 x 47 x 0,20	35	4,5	70,00	

Technical data

Material:

- soft annealed copper-ETP 1 wires acc. to DIN EN 13602
- single wire Ø optional 0,16/0,20 mm

Surface:

- optionally uncoated or tinned

Delivery:

- optionally in rings, on one way or plastic spools or wooden drums

Standard delivery on plastic spools K160/K355



Our plastic spools K160/K355 have proven themselves to be easy to handle and uncomplicated to transport. We supply standard cross-sections up to approx. 14 mm² on K160 with a filling volume of 4-6 kg from 16 mm² on K355 with a filling volume of approx. 30-35 kg. For buyers of larger quantities, delivery can, of course, also be made on wooden drums with different diameters and weights up to a few hundred kg.

Flexible, dimensionally stable copper braids 10-140 mm²

Construction and application

Our flexible dimensionally stable copper flat braids are braided as tubing and then rolled flat to the specified width dimensions. With the special rolling process used here, tighter tolerances can be maintained compared with the conventional standard-produced designs. This creates a relatively dimensionally stable design with pronounced edges. These flat braids are better suited for automated processing e.g. for welded connections. They therefore serve as base material for our connectors with welded contact areas described on pages 33 and 36/37 in this catalogue.



Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm			Gewicht kg/% m
conductor structure		width	thickness		
02650	10	24 x 22 x 0,16	12	1,3	10,00
02651	16	36 x 15 x 0,20	15	1,6	16,00
02652	25	36 x 22 x 0,20	20	1,6	25,00
02653	25	36 x 22 x 0,20	25	1,3	25,00
02654	35	36 x 31 x 0,20	20	2,3	35,00
02655	35	36 x 31 x 0,20	25	2,1	35,00
02656	50	48 x 33 x 0,20	25	2,6	50,00
02657	50	48 x 33 x 0,20	30	2,4	50,00
02658	70	48 x 47 x 0,20	25	3,5	70,00
02659	70	48 x 47 x 0,20	30	3,3	70,00
02660	70	48 x 47 x 0,20	35	2,8	70,00
02661	100	48 x 68 x 0,20	40	3,5	100,00
02662	120	48 x 81 x 0,20	40	4,1	120,00
02663	140	48 x 95 x 0,20	40	4,8	140,00

Technical data

Material:

- soft annealed copper-ETP 1 wires acc. to DIN EN 13602
- single wire-Ø 0,15/0,16/0,20 mm

Surface:

- uncoated

Delivery:

- optionally in rings, on one way- or plastic spools or wooden drums

Dimensionally stable flexible copper braids 25-240 mm² compact design

Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm			weight kg/% m
conductor structure		width	thickness		
60140	25	24 x 60 x 0,15	12	4	25,00
60142	50	24 x 119 x 0,15	20	5	50,00
60144	70	24 x 166 x 0,15	20	7	70,00
60146	70	24 x 166 x 0,15	24	5,5	70,00
60148	100	24 x 237 x 0,15	24	7,5	100,00
60150	120	24 x 285 x 0,15	32	8	120,00
60152	185	2 x 24 x 219 x 0,15	32	12	185,00
60154	240	2 x 24 x 285 x 0,15	32	15	240,00



Braided aluminium tapes

Construction and application

For applications requiring the use of flexible braided aluminium tapes, we supply such material braided from wires with a single wire of 0,30 mm diameter. In addition to the supply of yard goods, we also manufacture ready-made connections, e.g. for the connection of heating elements etc. acc. to the pages 38 and 39 of this catalogue.



Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm			weight kg/% m
conductor structure		width	thickness		
30790	6	24 x 4 x 0,30	9	1	2,00
30791	10	24 x 6 x 0,30	10	1,5	3,30
30792	20	36 x 8 x 0,30	20	2	6,70
30793	25	32 x 12 x 0,30	25	2	8,30
30794	30	36 x 12 x 0,30	25	2,4	10,00
30795	40	36 x 16 x 0,30	30	3	13,30
30796	50	36 x 20 x 0,30	30	3,5	16,70
30797	80	32 x 35 x 0,30	32	5	26,70
30798	110	32 x 48 x 0,30	40	5	36,70
30799	150	32 x 66 x 0,30	40	7	50,00

Technical data

Material:

- soft annealed AL 99,5 wires
- single wire-Ø 0,30 mm

Surface:

- uncoated

Delivery:

- optionally in rings,
on one way or plastic spools

Highly flexible braided stainless-steel tapes

Construction and application

Highly flexible braided stainless-steel tapes are used wherever copper materials do not offer sufficient resistance (e.g. chemical and ship-building industries). Ready-made connections e.g. analogue to various VG-regulations on request or according to page 40 of this catalogue.



Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm			weight kg/% m
conductor structure		width	thickness		
30031	3	36 x 10 x 0,10	10	0,5	2,00
30032	16	36 x 57 x 0,10	20	1,4	13,00
30033	25	36 x 90 x 0,10	30	1,5	21,00
30034	35	36 x 124 x 0,10	30	2,0	30,00
30035	50	48 x 133 x 0,10	35	2,0	42,00

Technical data

Material:

- soft annealed stainless-steel wires
material-no. 1.4401
- single wire-Ø 0,10

Surface:

- uncoated

Delivery:

- optionally in rings,
on one way or plastic spools

Tubular braids for covering and shielding

Construction and application

In order to achieve EMC safe shielding for the purpose of improving electromagnetic compatibility or protecting cables, lines and components from the interfering influence of electrical and magnetic fields, we supply copper shielding braids in various diameters. Installation is carried out by expanding and pushing together and sliding onto the cables or components to be protected. Special designs in other diameter ranges or other constructions are possible on request.

Part-No.		Technical data				
uncoated	tinned	cross-section mm ²	conductor structure	dimensions ca. mm		weight kg/% m
				Ø normal/max.		
15100	15120	0,25	16 x 2 x 0,10	0,7	- 3	0,25
15101	15121	0,38	16 x 3 x 0,10	0,8	- 3	0,36
15102	15122	0,50	16 x 4 x 0,10	1,0	- 4	0,50
15103	15123	0,88	16 x 7 x 0,10	1,5	- 6	0,90
15104	15124	1,32	24 x 7 x 0,10	2,8	- 8	1,22
15105	15125	1,98	36 x 7 x 0,10	4,0	- 12	1,85
15110	15126	3,10	36 x 11 x 0,10	6,0	- 14	2,85
15111	15127	5,30	24 x 7 x 0,20	5,0	- 10	5,30
15112	15128	6,80	24 x 9 x 0,20	6,5	- 14	6,80
15113	15129	7,90	36 x 7 x 0,20	8,5	- 25	7,40
15114	15130	10,20	36 x 9 x 0,20	10,0	- 27	8,70
15115	15131	12,45	36 x 11 x 0,20	12,0	- 29	11,30
-	15133	15,30	24 x 9 x 0,30	14,0	- 50	16,00
-	15135	35,80	36 x 14 x 0,30	25,0	- 70	36,00
-	15137	51,10	48 x 15 x 0,30	25,0	- 90	51,50

Technical data

Material:

- soft annealed copper-ETP 1 wires acc. to DIN EN 13602
- single wire-Ø 0,10 mm (0,25-3,10 mm²)
- single wire-Ø 0,20 mm (5,30-12,45 mm²)
- single wire-Ø 0,30 mm (15,30-51,10 mm²)

Surface:

- optionally uncoated or tinned

Delivery:

- optionally in rings, on one way or plastic spools



Shielding braids/applications

Current-carrying conductors generate electric, magnetic or electromagnetic fields/waves that can penetrate other electrical equipment significantly interfere with its function. In order to avoid unwanted sources of interference and to prevent electromagnetic waves from escaping, such components must be provided with suitable shielding. This shielding then realizes the electromagnetic compatibility (EMC) of the components/application.

Flexible PVC- extruded copper tapes 10-210 mm²

lead-free, black insulated as yard goods

Construction and application

PVC-extruded flat braids consist of bare, soft annealed copper-ETP1 wires and are over-moulded with a flexible self-extinguishing and lead-free PVC compound of high quality. The flexible braided copper tapes used as electrical conductors are braided as a tube and then rolled flat to the specified width dimensions.

The technical properties of the insulation, combined with good flexibility, enable extensive application possibilities within switch gear or power plant applications. Other insulation colours or halogen-free versions with extruded thermoplastic (temperature range - 25 °C up to + 105 °C) are also available for corresponding order quantities.

Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm			
		braided tapes		with insulation	
		width	thickness	width	thickness
16280	10	10	2	12	4
16281	16	16	2	18	4
16282	25	25	2	27	4
16283	35	25	3	27	5
16284	50	25	4	27,4	6,4
16285	50	30	3,3	32,4	5,7
16286	70	25	5,6	27,4	8
16287	70	35	4,3	37,4	6,4
16288	100	35	5,7	38,2	8,9
16289	120	40	6	43,2	9,2
16290	140	40	7	43,6	10,6
16291	210	40	10	46	14

Technical data

Electrical conductor:

- braid out of copper-ETP 1 wires acc. to DIN 13602 wires uncoated, soft annealed
- single wire Ø 0,15 mm (10/16 mm²)
- single wire Ø 0,20 mm (25-210 mm²)

Insulation:

- special PVC-compound
- lead-free, black coloured
- self-extinguishing acc. to UL 94 VO
- elasticity/stretch 365 %
- dielectric strength 20 kV/mm
- operating voltage 1 kV AC / 1,5 kV DC
- operating temperature - 20 °C up to + 105 °C

Delivery:

- Optionally in rings, on one way or plastic spools or on wooden drum



Silicone-extruded copper tapes 10-140 mm²

free of halogen, black coloured as yard goods

Construction and application

Highly flexible heat and cold resistant insulated flat braids. The electrical conductors consist out of soft annealed copper-ETP1 wires which are extruded by a high quality halogen free silicone compound. The used silicone material is extremely flexible and enables, e.g. in conjunction with our welded connecting areas (see ready assembled products acc. catalogue page 35) the production of extremely flexible and universally applicable electrical connections. They are well suited within switchgear and power plant constructions as well as for applications where high cold stability (up to - 50° C) is required. In addition to the black coloured standard insulation, on request and acceptance of relatively small minimum quantities, other colours such as green/yellow, red, orange or blue are deliverable too.

Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm			
		braided tapes		with insulation	
		width	thickness	width	thickness
16300	10	12	1,3	16	5,3
16301	16	15	1,6	19	5,6
16302	25	20	1,6	24	5,6
16303	25	25	1,3	29	5,3
16304	35	20	2,3	24	6,3
16305	35	25	2,1	29	6,1
16306	50	25	2,6	29	6,6
16307	50	30	2,4	34	6,4
16308	70	25	3,5	31	7,5
16309	70	30	3,3	36	7,3
16310	70	35	2,8	41	6,8
16311	100	40	3,5	46	7,5
16312	120	40	4,1	46	8,1
16313	140	40	4,8	46	8,8

Technical data

Electrical conductor:

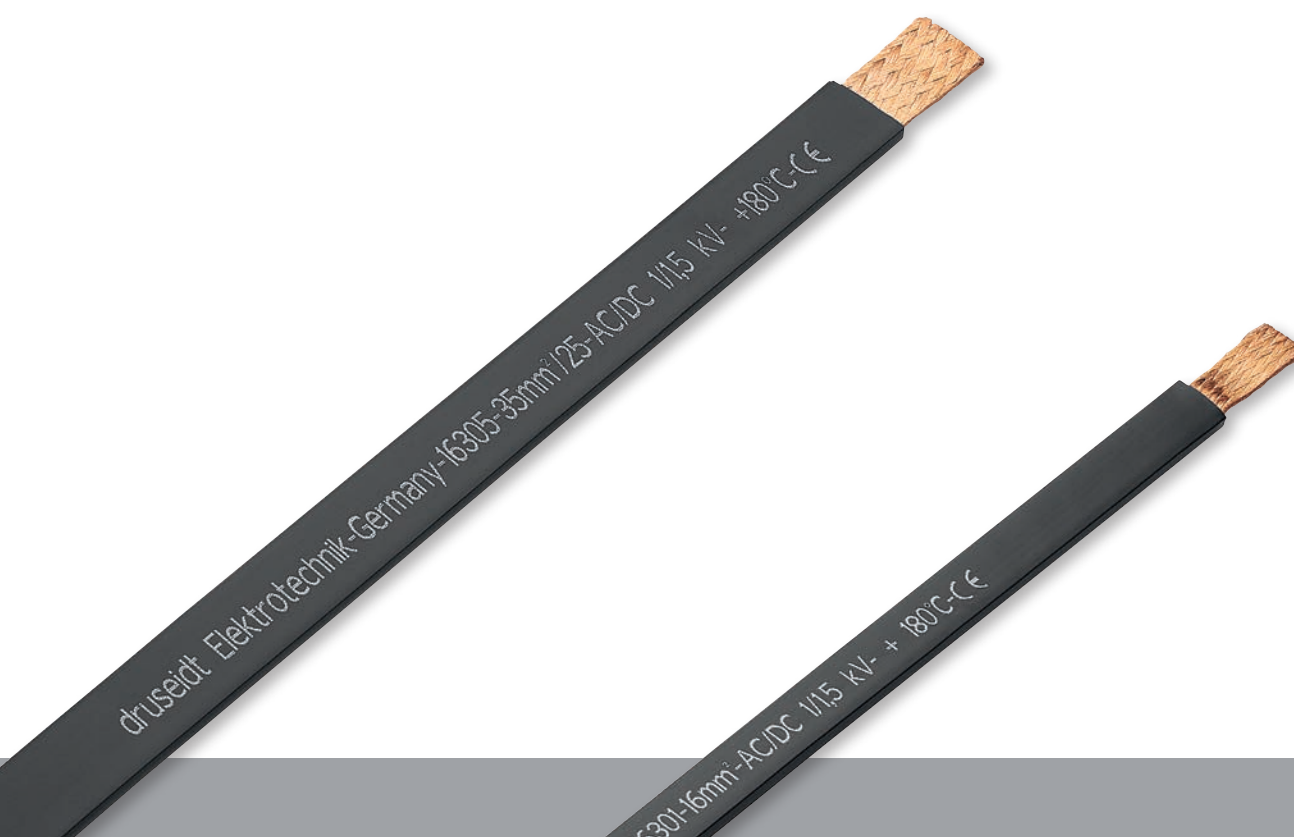
- Braid out of copper-ETP 1 wires acc. to DIN 13602
- Wires uncoated, soft annealed
- single wire Ø 0,16 mm (10 mm²)
- single wire Ø 0,20 mm (16-140 mm²)

Insulation:

- Silicone rubber circa 60 Shore A
- black coloured
- free of halogen, chloring content < 4 ppm
- hardly inflammable and self-extinguishing
- operating voltage 1 kV AC / 1,5 kV DC
- testing voltage 9 kV AC (Spark test)
- dielectric strength 20 kV/mm
- operating temperature - 50° bis + 180° C

Delivery:

- Optionally in rings, on one way or plastic spools or on wooden drums



Highly flexible round stranded copper cables

Construction and application

Our highly flexible round stranded copper cables are made of very thin single wires in diameter of 0,05/0,07 or 0,10 mm and are characterized by excellent flexibility. This material can also be used to manufacture components with larger cross-sections that can transmit higher currents in extremely confined spaces. Another advantage here is the very large surface area of the conductors available for current transmission. The standard rope construction for the cross-sections 1-300 mm² is 6 + 1 = 7 fold resp. from 400 mm² 11 + 5 = 16 fold resp. 1 + 6 + 12 = 19 fold. The lay lengths and rope constructions are selected to ensure good workability of the material. Special rope constructions according to customer requirements are possible on request.

Technical data

Material:

- soft annealed copper ETP 1 wires acc. to DIN EN 13602
- single wire-Ø 0,05 mm (1 mm²)
- single wire-Ø 0,07 mm (1,5-16 mm²)
- single wire-Ø 0,10 mm (25-1000 mm²)

Surface:

- optionally uncoated or tinned

Delivery:

- optionally in rings, on one way or plastic spools or on wooden drums

Part-No.		Technical data			
uncoated	tinned	cross-section mm ²	dimensions ca. mm		weight kg/% m
			conductor structure	outer-Ø	
02855	02875	1	512 x 0,05	1,5	1,00
02856	02876	1,5	392 x 0,07	1,9	2,00
02857	02877	2,5	651 x 0,07	2,4	3,00
02858	02878	4	1036 x 0,07	2,6	4,00
02859	02879	6	1561 x 0,07	3,6	6,00
02860	02880	8	2100 x 0,07	4,2	8,00
02861	02881	10	2604 x 0,07	4,5	10,00
02862	02882	16	4200 x 0,07	5,8	16,00
02863	02883	25	3192 x 0,10	7,5	25,00
02864	02884	35	4480 x 0,10	8,5	35,00
02865	02885	50	6383 x 0,10	10,7	50,00
02866	02886	70	8918 x 0,10	13	70,00
02867	02887	95	12100 x 0,10	15	105,00
02868	02888	120	15300 x 0,10	16,2	132,00
02869	02889	150	19152 x 0,10	19	162,00
02870	02890	185	23580 x 0,10	21	196,00
02871	02891	240	30870 x 0,10	23,5	250,00
02872	02892	300	38200 x 0,10	27,5	315,00
15000	-	400	50960 x 0,10	33	412,00
15001	-	500	64288 x 0,10	38	509,00
15002	-	600	76832 x 0,10	43	600,00
15003	-	750	95648 x 0,10	46	750,00
15004	-	850	108976 x 0,10	48	850,00
15005	-	1000	128676 x 0,10	54	1018,00



Tubular cable lugs for fine stranded cables standard design



Tubular cable lugs for fine stranded cables with smaller flange

Electrical connection technology

For the electrical connection of our highly flexible round stranded copper cables, we also supply the correspondingly dimensioned cable lugs and processing tools. For detailed information, please refer to our catalogue 1 "Professional installation- and electrical connection technique for craft, industry and high current application" which we will be happy to send you free of charge on request.

Flexible round stranded copper cables

Construction and application

Our flexible round stranded copper cables are made of single wires in diameter 0,3 mm. They can be used wherever there are no special requirements for extreme flexibility. They are therefore very well suited for power connections that have to be made over longer distances. The rope constructions we have chosen allow good bending and movement behavior, so that they can be used for a wide range of applications. For a TPE-U insulated version with these cables as inner conductor, see catalogue page 26. Designs with even stronger individual wires are also possible on request.

Part-No.	Technical data			
	cross-section mm ²	dimensions ca. mm		weight kg/% m
uncoated		conductor structure	outer-Ø	
15050	120	1698 x 0,30	15,5	132,00
15051	150	2166 x 0,30	17,3	162,00
15052	185	2622 x 0,30	19,0	196,00
15053	240	3400 x 0,30	22,5	250,00
15054	300	4275 x 0,30	25,5	315,00
15055	400	5660 x 0,30	29,0	412,00
15056	500	7076 x 0,30	33,5	509,00

Technical data

Material:

- soft annealed copper ETP1 wires acc. to DIN EN 13602
- single wire-Ø 0,3 mm

Surface:

- uncoated

Delivery:

- Optionally in rings, on one way or plastic spools or on wooden drum



Round stranded cables with overall copper braids

Construction and application

This material consists of a highly flexible round stranded copper cable which are additionally braided with a copper braid. So the effective cross-section is therefore higher than their specified nominal cross-section. The additional braiding prevents the strand from untwisting during movement and keeps it compactly together. The braid thus serves as an additional support braid so that the strands can also be used for applications with increased demands on mechanical stability. On request and by ordering minimum quantities it is possible to deliver tin coated designs too.

Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm/construction		weight kg/% m	
uncoated		round stranded cable	copper braid		outer-Ø
15060	1	266 x 0,05	64 x 0,10	1,5	1,00
15061	1,5	525 x 0,05	64 x 0,10	2	1,60
15062	2,5	651 x 0,05	64 x 0,10	2,9	2,90
15063	4	1036 x 0,07	64 x 0,10	3,6	4,60
15064	6	1575 x 0,07	96 x 0,10	4,5	7,00
15065	8	2058 x 0,07	96 x 0,10	5	9,40
15066	10	2562 x 0,07	128 x 0,10	5,5	12,00
15067	16	4116 x 0,07	192 x 0,10	7	19,50
15068	25	3234 x 0,10	192 x 0,10	8,9	28,00
15069	35	4508 x 0,10	240 x 0,10	10,5	41,50
15070	50	6468 x 0,10	360 x 0,10	12,5	58,50
15071	70	8967 x 0,10	360 x 0,10	14,7	82,00
15072	95	12201 x 0,10	360 x 0,10	16,5	109,00
15073	120	15435 x 0,10	360 x 0,10	19	136,00

Technical data

Material:

- soft annealed copper ETP 1 wires acc. to DIN EN 13602
- 1-2,5 mm² 0,05 mm Ø
- 4-16 mm² 0,07 mm Ø
- 25-120 mm 0,10 mm Ø
- copper braid single wire Ø 0,10 mm

Surface:

- uncoated

Delivery:

- optionally in rings or on one way or plastic spools



Highly flexible plait braided copper cables

Construction and application

Our plait braided copper cables are made of copper wires in a single wire diameter 0,07/0,10 mm (highly flexible design) or 0,20 mm (flexible design). The production process is twist-free and untwisting of the ropes, as is possible with normal round strands, e.g. acc. to catalogue pages 16/17, is prevented. They are therefore ideally suited for switch-constructions, relay production, carbon brushes or slip ring applications as well as applications in the railway or aviation industry.

Connection technology

For the assembly of our braids, we also supply the necessary cable lugs and processing tools that are dimensionally matched to them.

For detailed information please refer to our catalogue no. 1 "Professional installation- and electrical connection technique for craft, industry and high current application" which we will be happy to send you free of charge on request.

Technical data

Material:

- soft annealed copper ETP1 wires acc. to DIN EN 13602
- single wire-Ø 0,07 mm Ø up to 10 mm²
- single wire-Ø 0,10 mm Ø (up to 25 mm²)
- single wire-Ø 0,20 mm Ø (from 10-240 mm²)

Surface:

- optionally uncoated or tinned

Delivery:

- optionally in rings, on one way or plastic spools or wooden drums

Part-No.		Technical data			
		cross-section mm ²	dimensions ca. mm		weight kg/% m
uncoated	tinned		conductor structure	outer-Ø	
Highly flexible design					
14900	14920	1,5	12 x 33 x 0,07	1,9	1,50
14901	14921	2,5	12 x 54 x 0,07	2,4	2,50
14902	14922	4	12 x 86 x 0,07	3,1	4,00
14903	14923	6	12 x 130 x 0,07	3,8	6,00
14904	14924	10	12 x 217 x 0,07	4,8	10,00
14905	14925	16	12 x 170 x 0,10	6,2	16,00
14906	14926	25	12 x 266 x 0,10	7,0	25,00
Flexible design					
60100	60250	10	12 x 27 x 0,20	4,8	10,00
60102	60252	16	12 x 43 x 0,20	6,0	16,00
60104	60254	25	12 x 69 x 0,20	7,0	25,00
60106	60256	35	12 x 96 x 0,20	9,2	35,00
60108	60258	50	12 x 121 x 0,20	11,0	50,00
60110	60260	70	12 x 185 x 0,20	13,0	70,00
60112	60262	95	12 x 249 x 0,20	15,0	95,00
60114	60264	120	12 x 319 x 0,20	18,5	120,00
60116	60266	150	12 x 398 x 0,20	21,0	150,00
60118	60268	185	12 x 491 x 0,20	22,5	185,00
60120	60270	240	12 x 640 x 0,20	26,0	240,00
Remark: Since not all dimensions can be kept in stock minimum quantities may be required by some cross-sections. We therefore ask for your inquiries. Other cross-sections than indicated in the tables are also possible on request.					



Insulated plait braided copper cables

On request, we can also supply our plait braided copper cables in an insulated version. A halogen free design overmoulded with a thermoplastic compound is also available on request. These versions are suitable for operating voltages 1 kV AC/1,5 kV DC and temperature ranges of - 20 °C up to + 105 °C. Colours and minimum purchase quantities (depending on the cross-section) on request.



Highly flexible plait braided stainless steel cables

Construction and application

Our plait braided stainless steel cables are made of very thin stainless steel wires with a single wire-Ø of 0,10 mm. As with our plait braided copper cables, the production process is also twist-free, so that untwisting of the ropes is prevented. Highly flexible plait braided stainless steel cables are used wherever copper materials do not offer sufficient resistance. Due to their relatively high flexibility, they can also be mounted well in confined installation conditions. In addition to the plait braided stainless steel cables by the metre, we also supply ready assembled components (see catalogue page 44) or, for in-house assembly, the corresponding cable lugs and processing tools as described below.

Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm		weight kg/% m	
conductor structure		outer-Ø			
60160	2,5	12 x 28 x 0,10	3,0		2,10
60162	6	12 x 64 x 0,10	4,0		4,80
60164	10	12 x 112 x 0,10	5,4		8,50
60166	16	12 x 176 x 0,10	6,3		13,50
60168	25	12 x 272 x 0,10	8,5		21,00
60170	35	12 x 384 x 0,10	9,5		30,00
60172	50	18 x 360 x 0,10	13,5		42,00

Stainless steel ropes with stronger single wires

Construction and application

These stainless steel ropes are stranded as a round rope in 7 x 19 conductor construction, that means one inner conductor stranded with 6 outer conductors. Each of these 7 conductors now consists of 19 individual wires of larger diameter. The focus of these round ropes is not on flexibility but on breaking strength and outer diameter of the round strands. Here too, in addition to the supply of yard goods, we can offer ready-made connections (see catalogue page 44) as well as suitable stainless steel cable lugs and suitable processing tools for in-house assembly.

Part-No.	Technical data		
	Minimum breaking force 1570 N/mm ² / 160 kp/mm ²		
	nominal-Ø mm	kN	kp
30161	3,0	4,68	477
30162	4,0	8,33	849
30163	5,0	13,02	1326
30164	6,0	18,75	1910
30165	8,0	33,30	3400
30166	10,0	52,10	5310

Remark: Conversion of units for strengths and breaking forces acc. to DIN 1301, i.e. 1 kp = 9,80665 N, 1 kN = 1000 N, 1 kp/mm² = 9,08665 N/mm².

Technical data

Material:

- soft annealed stainless steel wires
Material-no. 1.4401
- single wire Ø 0,10 mm

Surface:

- uncoated

Delivery:

- optionally in rings, on one way
or plastic spools
or wooden drums



Technical data

Material:

- Stainless steel wires
Material-no. 1.4401

Surface:

- uncoated

Delivery:

- optionally in rings or on one way
or plastic spools



Connection technology

For the assembly of our plait braided stainless steel cables and ropes, we also supply matching stainless steel tubular cable lugs made out of V4A material 1.4571, temperature resistant up to approx. + 400 °C, as well as suitable crimping tools with dimensionally matched crimping dies. For detailed information, please refer to our catalogue no 1 "Professional installation- and electrical connection technique for craft, industry and high current application" which we will be happy to send you free of charge on request.

Extremely flexible silicone extruded cables 2,5-300 mm²

Our highly flexible silicone extruded cables are excellently suitable for high current connections inside of switchboards, switch-gears and other high current applications. Since more and more systems and devices with high performance but even smaller dimensions are being launched on the market, our cables offer an optimal solution for power connections in tight spaces. A wide temperature range from - 50 °C up to + 180 °C expands the application possibilities.

Both single insulated cables in the voltage range 1,8/3 kV and double insulated designs 1,8/3 kV and 3,6/6 kV are available. **All 1,8/3 kV designs are tested and meet the fire protection requirements acc. to DIN EN 45545 required for use in the railway industry and similar applications.** The single insulated version also has an UL-style, which also applies to most of the articles we produce from it.



Extremely flexible



Standard natural coloured

Coloured designs
e.g. black, red, orange, blue or yellow green on request

Silicone insulated copper cables 4-300 mm² 1,8/3 kV, single insulated

Highly flexible, free of halogen, self-extinguishing, with UL-style

Electrical connection technology

For the electrical connection of our highly flexible silicone insulated cables we also supply the correspondingly dimensioned cable lugs and processing tools. For detailed information, please refer to our catalogue no. 1 "Professional installation- and electrical connection technique for craft, industry and high current application" which we will be happy to send you free of charge on request.

Technical data

Electrical conductor:

- Round stranded copper cable out of copper ETP 1 wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,07 mm (4-16 mm²)
Single wire-Ø 0,10 mm (25 - 300 mm²)

Insulation:

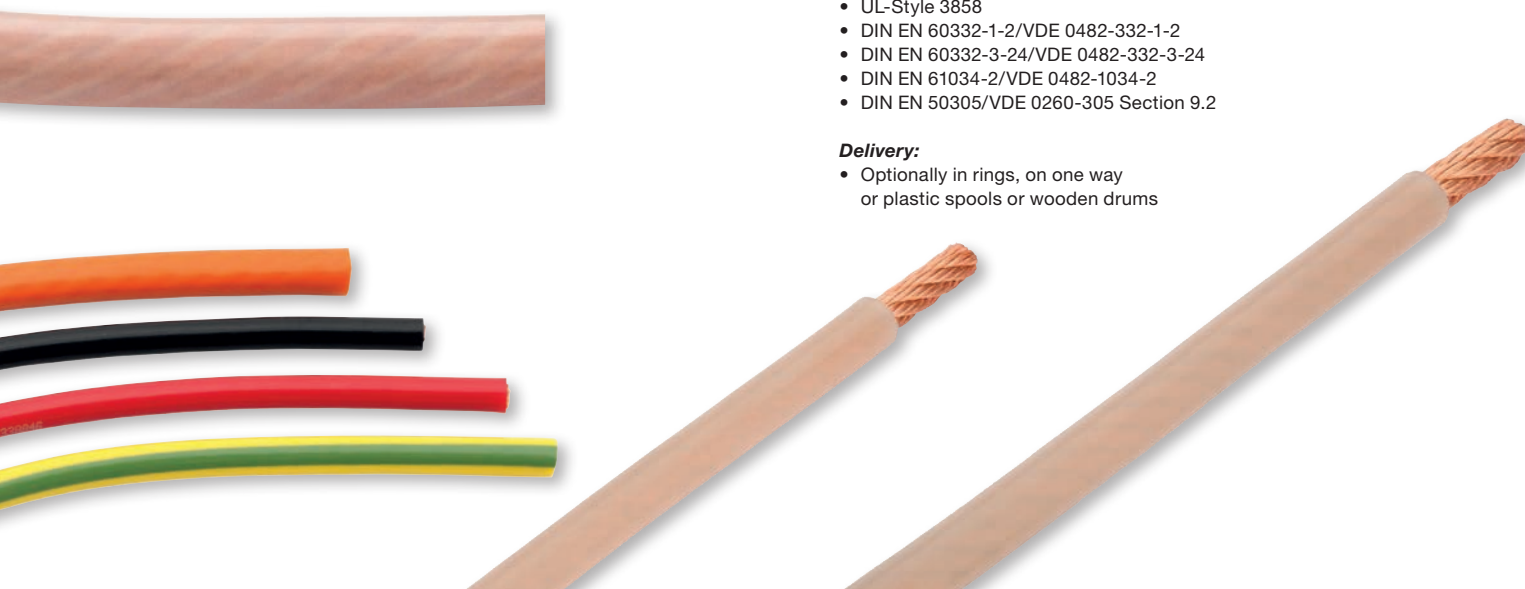
- Silicone rubber ca. 60 Shore A
- Natural-coloured
- Free of halogen, Chlorine content < 4 ppm
- Hardly inflammable, self-extinguishing
- Operating voltage 1,8/3 kV
- Testing voltage 10 kV AC (Sparktest)
- Dielectric strength 20 kV/mm
- Operating temperature - 50 °C up to 180 °C
shortly + 250 °C up to + 300 °C (soldering iron contact)
- Short circuit resistance SiR + 350 °C

Approvals an fire tests:

- UL-Style 3858
- DIN EN 60332-1-2/VDE 0482-332-1-2
- DIN EN 60332-3-24/VDE 0482-332-3-24
- DIN EN 61034-2/VDE 0482-1034-2
- DIN EN 50305/VDE 0260-305 Section 9.2

Delivery:

- Optionally in rings, on one way or plastic spools or wooden drums



Part-No.	Technical data								
	cross-section mm ²	dimensions ca. mm			current load in dependence of the conductor heat in °C				
		conductor structure	outer-Ø	insulation thick- ness approx.	45 °C	80 °C	90 °C	100 °C	130 °C
15014	4,0	1036 x 0,07	4,8	1,1	30 A	50 A	55 A	60 A	70 A
15016	6,0	1568 x 0,07	5,6	1,1	40 A	65 A	70 A	78 A	90 A
15020	10,0	2562 x 0,07	8,5	2,0	50 A	90 A	98 A	107 A	120 A
15022	16,0	4116 x 0,07	10,0	2,0	70 A	125 A	132 A	143 A	160 A
15024	25,0	3234 x 0,10	12,0	2,3	95 A	160 A	176 A	187 A	215 A
15026	35,0	4508 x 0,10	13,8	2,5	115 A	200 A	218 A	230 A	260 A
15028	50,0	6468 x 0,10	15,5	2,5	145 A	245 A	276 A	287 A	325 A
15030	70,0	8967 x 0,10	18,0	2,5	175 A	305 A	347 A	352 A	400 A
15032	95,0	12201 x 0,10	20,0	2,5	215 A	370 A	416 A	425 A	485 A
15034	120,0	15435 x 0,10	21,5	2,5	245 A	425 A	488 A	495 A	560 A
15036	150,0	19404 x 0,10	23,5	2,5	285 A	490 A	566 A	575 A	640 A
15038	185,0	23580 x 0,10	26,0	2,5	320 A	555 A	644 A	655 A	730 A
15040	240,0	30600 x 0,10	28,5	2,5	380 A	650 A	775 A	790 A	855 A
15042	300,0	38200 x 0,10	32,5	2,5	435 A	750 A	898 A	915 A	985 A

Remark: All information about current load are approximate values in consideration of the cables, heat for single laying of air cooled cables and ambient temperature + 30 °C. The values of conductor heat of + 90 °C are in accordance with VDE 0298 part 4 table 15. By changing the ambient temperature or the kind of laying reducing factors are to be considered. Nature colour is standard but on request it is also possible to manufacture cables with colours like black, red, blue yellow/green etc. or with reduced insulation thickness and other operating voltages. Minimum quantity on request. The outside diameter of our highly flexible copper conductors are manufactured in consideration with cable lugs acc. to DIN 46234/DIN 46341 and druseidt tubular cable lugs for fine stranded cables.

Silicone insulated copper cables 2,5-300 mm² 1,8/3 kV, double insulated

Highly flexible, free of halogen and self-extinguishing



Technical data

Electrical conductor:

- Round stranded copper cable out of copper ETP 1 wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,07 mm (2,5 - 16 mm²)
- Single wire-Ø 0,10 mm (25 - 300 mm²)

Insulation:

- Silicone rubber ca. 60 Shore A
- Natural-coloured
- Free of halogen, Chlorine content < 4 ppm
- Hardly inflammable, self-extinguishing
- Operating voltage 1,8/3 kV
- Testing voltage 10 kV AC (Sparktest)
- Dielectric strength 20 kV/mm
- Operating temperature - 50 °C up to 180 °C shortly + 250 °C up to + 300 °C (soldering iron contact)
- Short circuit resistance SiR + 350 °C

Approvals and fire tests:

- DIN EN 60332-1-2/VDE 0482-332 1-2
- DIN EN 60332-3-24/VDE 0482-332-3-24
- DIN EN 61034-2/VDE 0482-1034-2
- DIN EN 50305/VDE 0260-305 section 9.2

Delivery:

- Optionally in rings, on one way or plastic spools or wooden drums

Electrical connection technology

For the electrical connection of our highly flexible silicone insulated cables we also supply the correspondingly dimensioned cable lugs and processing tools.

For detailed information, please refer to our catalogue no. 1 "Professional installation- and electrical connection technique for craft, industry and high current application" which we will be happy to send you free of charge on request.

Part-No.	Technical data				
	cross-section mm ²	current load	conductor structure	outer-Ø	insulation thickness
15170	2,5	41 A	651 x 0,07	6,2	1,1 + 1,0
15172	4,0	55 A	1036 x 0,07	7,0	1,2 + 1,0
15174	6,0	70 A	1568 x 0,07	8,1	1,2 + 1,2
15176	10,0	98 A	2562 x 0,07	9,4	1,3 + 1,2
15178	16,0	132 A	4116 x 0,07	10,7	1,3 + 1,2
15180	25,0	176 A	3234 x 0,10	12,8	1,6 + 1,2
15182	35,0	218 A	4508 x 0,10	14,7	1,6 + 1,5
15184	50,0	276 A	6468 x 0,10	16,7	1,6 + 1,5
15186	70,0	347 A	8967 x 0,10	19,3	1,6 + 1,8
15188	95,0	416 A	12201 x 0,10	21,9	1,9 + 1,8
15190	120,0	488 A	15432 x 0,10	24,4	2,0 + 2,1
15192	150,0	566 A	19404 x 0,10	26,6	2,1 + 2,1
15194	185,0	644 A	23580 x 0,10	30,6	2,4 + 2,4
15196	240,0	775 A	30600 x 0,10	33,1	2,4 + 2,4
15198	300,0	898 A	38200 x 0,10	37,5	2,4 + 2,4

Remark: All information about current load are approximate values acc. to VDE 0298 part 4 table 15 for single laying of air cooled cables by an ambient temperature + 30 °C and allowed conductor heat of + 90 °C. By changing the ambient temperature or the kind of laying reducing factors are to be considered.

Silicone insulated copper cables with additional shielding

On request, we can also supply all our silicone overmoulded highly flexible copper cables with additional shielding. Colours and operating voltage as desired. Minimum purchase quantities depending on the cross-section on request.



Silicone insulated copper cables 2,5-300 mm² 3,6/6 kV, double insulated

Highly flexible, free of halogen and self-extinguishing



Electrical connection technology

For the electrical connection of our highly flexible silicone insulated cables we also supply the correspondingly dimensioned cable lugs and processing tools.

For detailed information, please refer to our catalogue no. 1 "Professional installation- and electrical connection technique for craft, industry and high current application" which we will be happy to send you free of charge on request.

Technical data

Electrical conductor:

- Round stranded copper cable out of copper ETP 1 wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,07 mm (2,5 - 16 mm²)
- Single wire-Ø 0,10 mm (25 - 300 mm²)

Delivery:

- Optionally in rings, on one way or plastic spools or wooden drums

Insulation:

- Silicone rubber ca. 60 Shore A
- Natural-coloured
- Free of halogen, Chlorine content < 4 ppm
- Hardly inflammable, self-extinguishing
- Operating voltage 3,6/6 kV
- Testing voltage 10 kV AC (Sparktest)
- Dielectric strength 20 kV/mm
- Operating temperature - 50 °C up to 180 °C shortly + 250 °C up to + 300 °C (soldering iron contact)
- Short circuit resistance SiR + 350 °C

Part-No.	Technical data				
	cross-section mm ²	current load	conductor structure	outer-Ø	insulation thickness
15138	2,5	43 A	651 x 0,07	8,4	2,0 + 1,2
15140	4,0	56 A	1036 x 0,07	9,0	2,0 + 1,2
15142	6,0	71 A	1568 x 0,07	9,7	2,0 + 1,2
15144	10,0	99 A	2562 x 0,07	11,2	2,2 + 1,2
15146	16,0	133 A	4116 x 0,07	12,5	2,2 + 1,2
15148	25,0	174 A	3234 x 0,10	15,2	2,5 + 1,5
15150	35,0	215 A	4508 x 0,10	16,5	2,5 + 1,5
15152	50,0	270 A	6468 x 0,10	19,1	2,5 + 1,8
15154	70,0	338 A	8967 x 0,10	21,1	2,5 + 1,8
15156	95,0	403 A	12201 x 0,10	24,3	2,8 + 2,1
15158	120,0	473 A	15432 x 0,10	26,0	2,8 + 2,1
15160	150,0	546 A	19404 x 0,10	28,4	3,0 + 2,1
15162	185,0	622 A	23580 x 0,10	32,2	3,2 + 2,4
15164	240,0	750 A	30600 x 0,10	34,7	3,2 + 2,4
15166	300,0	850 A	38200 x 0,10	38,3	3,2 + 2,4

Remark: All information about current load are approximate values acc. to VDE 0298 part 4 table 15 for single laying of air cooled cables by an ambient temperature + 30 °C and allowed conductor heat of + 90 °C. By changing the ambient temperature or the kind of laying reducing factors are to be considered.

Flexible heat-resistant PFA-insulated cables

On request we can also supply heat-resistant PFA-insulated cables with very good acid and chemical resistance. Cross-sections and minimum quantities on request.

Technical data

Electrical conductor:

- copper ETP1 wires acc. to DIN EN 13602
- soft annealed
- Wire-Ø in dependence of the cross-section 0,07 or 0,10 mm

Surface:

- Optionally uncoated or tinned

Insulation material:

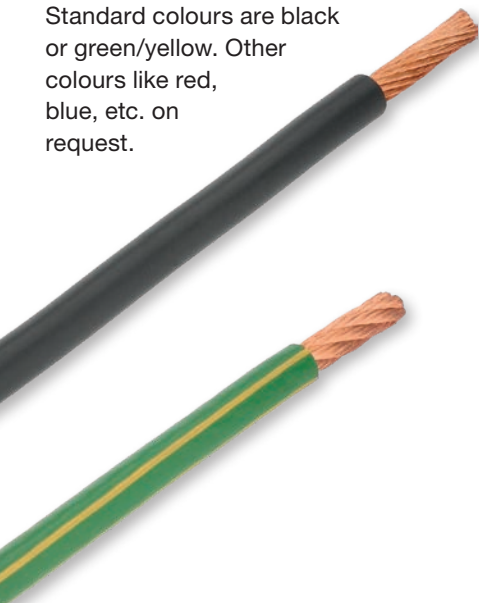
- PFA white colour, thickness approx. 0,8 mm
- Operating voltage: max. 1 kV
- Dielectric strength: 25 kV/mm
- Temperature range:
Continuously - 40 °C up to + 195 °C
Shortly up to + 260 °C



Highly flexible PVC-insulated cables LifY

Construction and application

PVC-insulated cables manufactured out of highly flexible uncoated copper ETP1 wires. Well suited as electrical connections inside of switchgears or switchboards as well as inside of vehicles. Additional applications as earthing connections are possible too. Standard colours are black or green/yellow. Other colours like red, blue, etc. on request.



Technical data

Electrical conductor:

- Round stranded copper cable out of soft annealed ETP1 wires acc. to DIN EN 13602
- Surface uncoated
- Wire-Ø 0,07 mm (0,5-2,5 mm²)
- Wire-Ø 0,10 mm (4,0-16 mm²)
- Wire-Ø 0,15 mm (25-120 mm²)

Insulation material:

- PVC
- Colour black or green/yellow
- Operating voltage up to 1 kV
- Operating temperature
 - fixed - 20 °C up to + 70 °C
 - moved - 5 °C up to + 70 °C

Delivery:

- Optionally in rings, on one way or plastic spools or wooden drums

Part-No.		Technical data				
black	green/yellow	cross-section mm ²	current load	dimensions ca. mm		weight kg/% m
				conductor structure	outer-Ø	
15223	15255	0,5	9 A	132 x 0,07	2,2	0,80
15225	15256	0,75	15 A	195 x 0,07	2,5	1,20
15227	15257	1	19 A	260 x 0,07	2,6	1,80
15229	15258	1,5	24 A	392 x 0,07	3,3	2,20
15230	15291	2,5	32 A	691 x 0,07	3,8	3,70
15231	15292	4	42 A	512 x 0,10	4,9	5,60
15232	15293	6	54 A	768 x 0,10	6,2	7,90
15233	15294	10	73 A	1280 x 0,10	7,3	13,40
15234	15295	16	98 A	2048 x 0,10	8,8	20,00
15235	15296	25	129 A	1400 x 0,15	10,5	30,90
15236	15297	35	158 A	1960 x 0,15	12,5	38,00
15237	15298	50	198 A	2800 x 0,15	14,4	53,00
15238	15299	70	245 A	3920 x 0,15	16,2	78,00
15239	-	95	292 A	5320 x 0,15	19,0	110,00
15254	-	120	344 A	6720 x 0,15	21,5	138,00

Remark: All information about current-load are approximate values acc. to DIN VDE 0298 part 4 table 10 and 11 for single laying of air cooled cables by an ambient temperature of + 30° and allowed conductor heat of + 70 °C. By changing the ambient temperature or the kind of laying reducing factors are to be considered.

Welding cables H01N2-D

Construction and application

Flexible rubber insulated cables for connecting welding machines with welding guns and similar applications. The stabilized insulation and the flexibility offer multifarious possibilities for electrical connections in different kinds of applications.



Technical data

Electrical conductor:

- Round stranded copper cable out of soft annealed ETP1 wires acc. to DIN EN 13602
- Surface uncoated
- Wire-Ø 0,21 mm (16-95 mm²)
- Wire-Ø 0,31 mm (120 mm²)

Insulation material:

- Neoprene rubber
- Operating voltage max. 100 V
- Operating temperature
 - fixed - 40 °C up to + 80 °C
 - moved - 25 °C up to + 80 °C
- Allowed conductor temperature max. + 85 °C

Part-No.		Technical data				
		cross-section mm ²	current load	dimensions ca. mm		weight kg/% m
				conductor structure	outer-Ø	
02899		16	130 A	500 x 0,21	10,5	22,00
02900		25	173 A	760 x 0,21	11,5	31,00
02901		35	216 A	1080 x 0,21	12,0	41,50
02902		50	274 A	1580 x 0,21	15,0	57,00
02903		70	341 A	2160 x 0,21	17,0	79,00
02904		95	413 A	2930 x 0,21	19,0	105,00
02905		120	480 A	1660 x 0,31	23,5	133,00

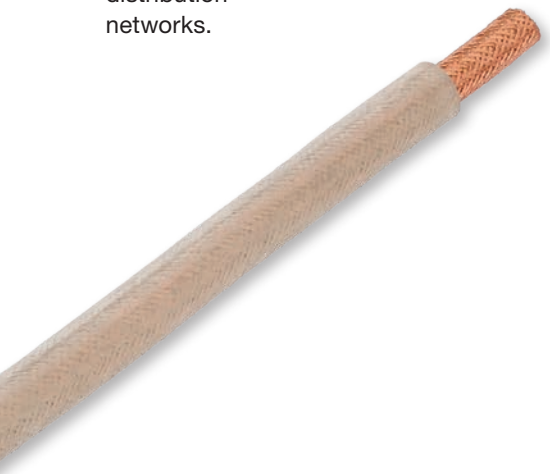
Remark: The fixed values about current load are for welding application acc. to DIN VDE 0298 part 4 table 16 by an ambient temperature of + 30 °C, permanent load (100 %) an allowed conductor heat of + 85 °C. Values for other current cycles and reducing factors acc. to VDE 0298 part 4.

Copper cables ESUY

highly flexible, with overall copper braid

Construction and application

PVC insulated copper strands consisting of a highly flexible inner conductor, which is additionally braided with a highly flexible support mesh. As a result, an increased stress resistance is given, for example, within power installations or distribution networks.



Electrical connection technology

For the electrical connection of our ESUY/ESY lines we also supply the correspondingly dimensioned cable lugs and processing tools. For detailed information, please refer to our catalogue no. 1 "Professional installation- and electrical connection technique for craft, industry and high current application" which we will be happy to send you free of charge on request.

Technical data

Electrical conductor:

- Round stranded copper cable with overall copper braid made out of soft annealed copper ETP1 wires acc. to DIN EN 13602
- Wire-Ø 0,07 resp. 0,10 mm
- Surface uncoated

Insulation material:

- PVC, colour transparent
- Operating temperature fixed - 20 °C up to + 70 °C moved - 5 °C up to + 70 °C

Delivery:

- Optionally in rings, on one way or plastic spools or wooden drums

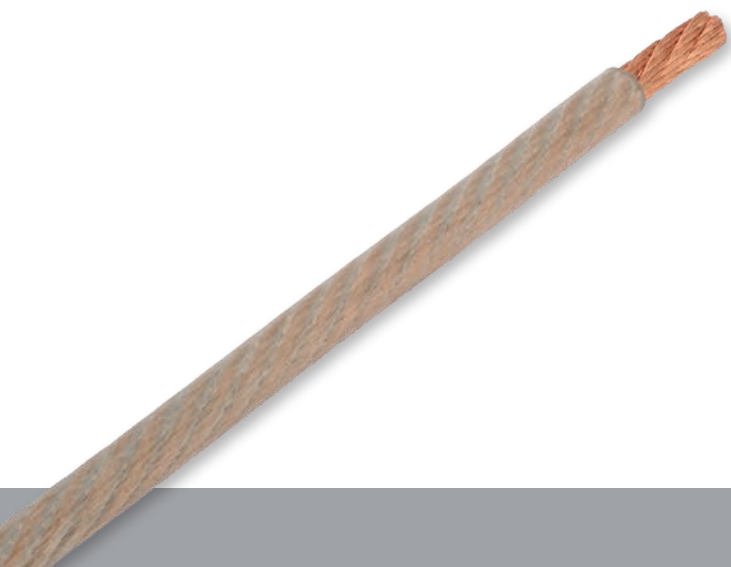
Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm			weight kg/% m
round stranded cable		copper braid	outer-Ø		
02910	16	4200 x 0,07	192 x 0,10	9,1	23,00
02911	25	3192 x 0,10	240 x 0,10	10,4	34,00
02912	35	4480 x 0,10	240 x 0,10	13,1	48,00
02913	50	6383 x 0,10	360 x 0,10	14,6	67,00
02914	70	8918 x 0,10	360 x 0,10	17,4	94,00
02915	95	12100 x 0,10	360 x 0,10	20,8	127,00

Insulated earthing ropes ESY

flexible, without overall copper braid

Construction and application

Insulated grounding cable consisting of a flexible copper conductor with wire diameter of 0,2 mm. Suitable as a grounding cable within portable earthing and short-circuiting devices as well as grounding for repair work in electrical power systems, railway systems and traction power systems as well as distribution networks.



Further applications and demands are contained in the regulations of the EN 61230 respectively VDE 0683 part 100 „Live working – portable equipment for earthing or earthing and short-circuiting“.

Technical data

Electrical conductor:

- Round stranded copper cables made out of soft annealed copper ETP1 wires acc. to DIN EN 13602
- Wire-Ø 0,20 mm
- Surface uncoated

Insulation material:

- PVC, colour transparent
- Operating temperature fixed - 20 °C up to + 70 °C moved - 5 °C up to + 70 °C

Delivery:

- Optionally in rings, on one way or plastic spools or wooden drums

Part-No.	Technical data			
	cross-section mm ²	dimensions ca. mm		weight kg/% m
conductor structure		outer-Ø		
02920	16	525 x 0,20	8,4	18,20
02921	25	800 x 0,20	9,8	26,50
02922	35	1120 x 0,20	11,4	36,50
02923	50	1615 x 0,20	13,8	53,70
02924	70	2250 x 0,20	15,8	74,70
02925	95	3085 x 0,20	18,2	99,60
02926	120	3820 x 0,20	20,1	122,00
02927	150	4800 x 0,20	22,0	152,00

TPE-U insulated high current cables 300/500 V resp. 450/750 V

Construction and application

For high current applications and to connect electrical devices we offer our TPE-U insulated cables for a voltage range 300/500 V or 450/750 V. The electrical conductor consists out of a round stranded copper cable with a wire-Ø of 0,3 mm which is insulated with a special TPE-U compound. The insulating material is free of halogen. It enables a flexible and simple installation also of longer cables distances in a short time. The use of ready assembled cables, manufactured in druseidt crimp-technology, in length and with contact areas in coordination with the application offer a further possibility to reduce the installation time to a minimum.

The cables are well suited to connect transformers, generators or rectifiers inside of industrial plants as well as electroplating equipments. Caused by the big conductor cross-sections up to 500 mm² they offer an alternative to busbar systems. Additionally to the cable we offer suitable cable lugs, crimping- and cutting-tools. So it is possible to buy a complete mounting system by our company. Standard colour for the 300/500 V design is orange and for the 450/750 V design green. Other colours like black, red, blue etc. and minimum quantities are available on request.

Technical data

Electrical conductor

- Round stranded copper cable made out of soft annealed copper ETP1 wires acc. to DIN EN 13602
- Surface uncoated
- Wire-Ø 0,3 mm

Insulation material

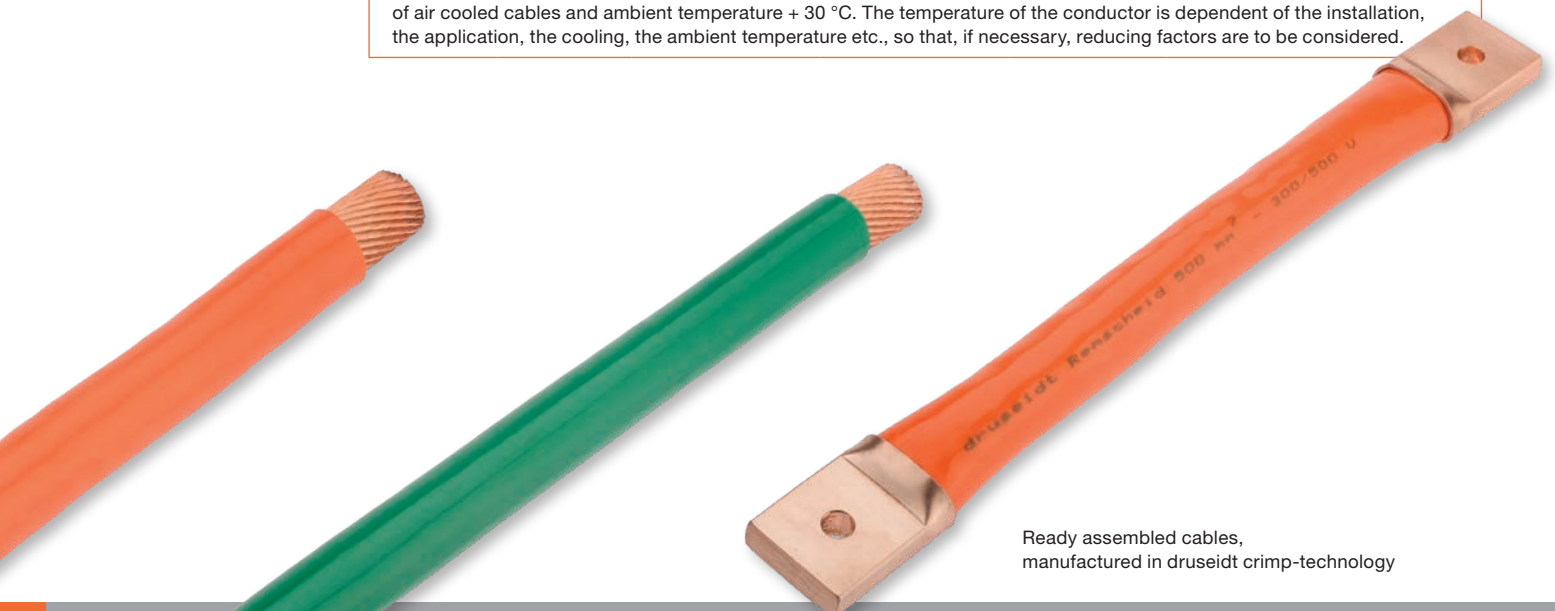
- TPE-U, free of halogen
- Orange colour Part-No. 15202-15214
Green colour Part-No. 15216-15228
- Operating voltage U_0/U
Part-No. 15202-15214 300/500 V
Part-No. 15216-15228 450/750 V
- Testing voltage
Part-No. 15202-15214 3,4 kV
Part-No. 15216-15228 4,0 kV
- Operating temperature
fixed - 50 °C up to + 90 °C
moved - 40 °C up to + 70 °C

Delivery

- Optionally in rings or on wooden drums

	Part-No.	Technical data					
		cross-section mm ²	conductor structure	dimensions ca. mm		current load in dependence of the conductor heat	
				outer-Ø	insulation thickness	70 °C	80 °C
300/500 V	15202	120	1698 x 0,30	18,7	1,6	380 A	420 A
	15204	150	2166 x 0,30	20,9	1,8	440 A	480 A
	15206	185	2622 x 0,30	23,0	2,0	500 A	550 A
	15208	240	3400 x 0,30	26,5	2,0	590 A	650 A
	15210	300	4275 x 0,30	29,5	2,0	675 A	740 A
	15212	400	5660 x 0,30	33,0	2,0	810 A	890 A
	15214	500	7076 x 0,30	37,5	2,0	925 A	1020 A
400/750 V	15216	120	1698 x 0,30	18,9	1,7	380 A	420 A
	15218	150	2166 x 0,30	21,1	1,9	440 A	480 A
	15220	185	2622 x 0,30	23,2	2,1	500 A	550 A
	15222	240	3400 x 0,30	27,5	2,5	590 A	650 A
	15224	300	4275 x 0,30	30,5	2,5	675 A	740 A
	15226	400	5660 x 0,30	34,0	2,5	810 A	890 A
	15228	500	7076 x 0,30	38,5	2,5	925 A	1020 A

Remark: All information about current load are approximate values in consideration of the cables heat for single laying of air cooled cables and ambient temperature + 30 °C. The temperature of the conductor is dependent of the installation, the application, the cooling, the ambient temperature etc., so that, if necessary, reducing factors are to be considered.



Ready assembled cables,
manufactured in druseidt crimp-technology

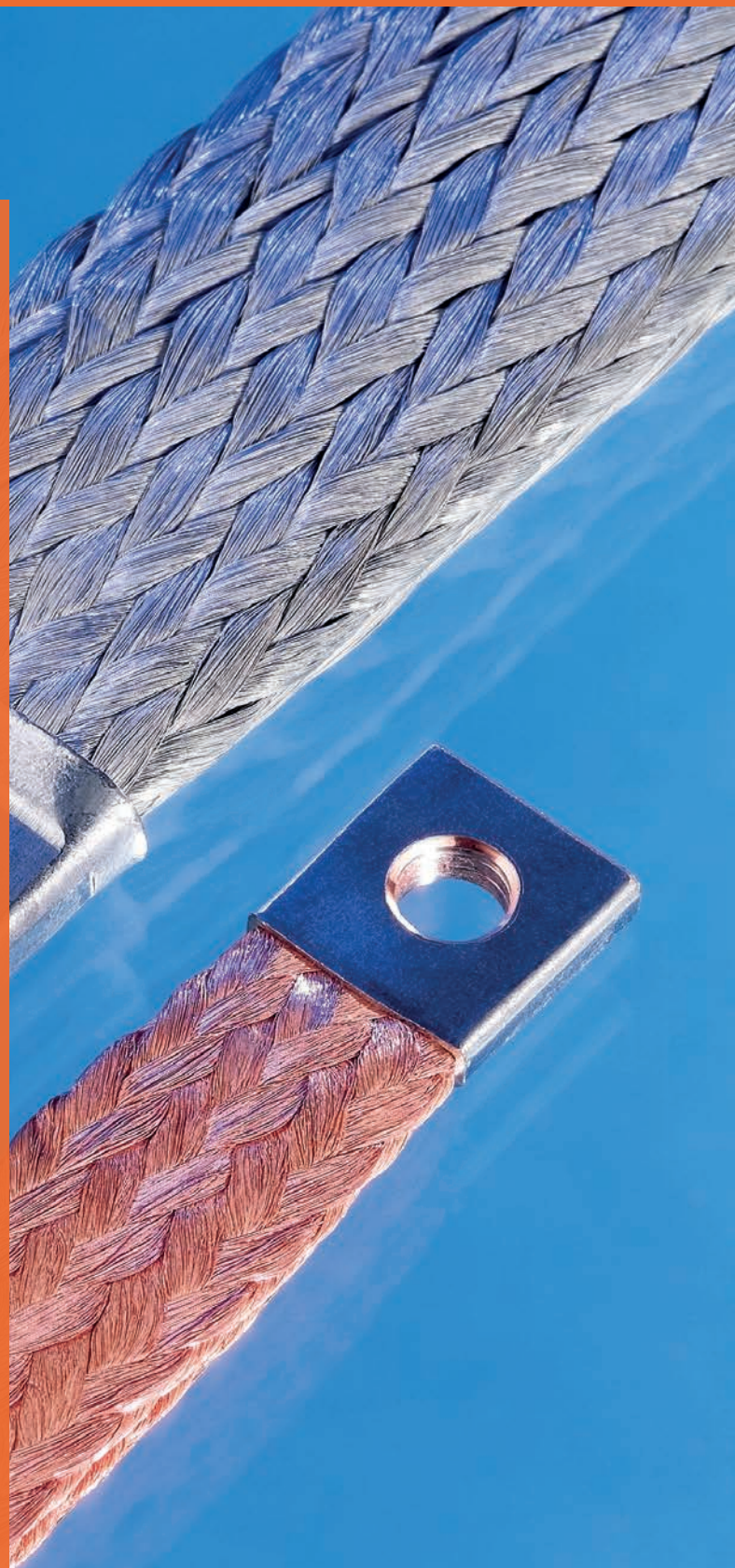
Grounding-, earthing-, EMC- and small braided connectors

We manufacture grounding, earthing and EMC tapes as well as small current leading connectors from flat braid in large as well as small series according to customers specifications from the following materials:

- Flat braided copper tapes, uncoated or tinned
- PVC-insulated flat braided copper tapes
- Silicone insulated flat braided copper tapes
- Flat braided stainless steel tapes
- Flat braided aluminium tapes

or from material according to your wishes.

Whether with dip-tinned or solderless pressed-on seamless contact sleeves, welded connection surfaces or with cable lugs of your choice, a wide variety of designs are possible.



Grounding-, earthing, EMC- and small braided connectors

Preferably for control cabinet/switchgear applications up to max. 1000 A current load

In this product range we manufacture both different versions earth or ground or EMC connection as well as smaller current connectors for control cabinet and switchgear applications with a current load of max. 1000 A.

Connections out of flat braided stainless steel or aluminium tapes are possible too.

We offer the following different designs and manufacturing processes as standard:

Earth connections with dip-tinned ends or solderless pressed-on brass sleeves

Such tapes are manufactured similar to DIN 72333 Part 3. It dates back to the seventies and actually no longer represents the state of today's production technology. Dip-tinned versions have a relatively high electrical resistance and the tin flows through the pressure of a screw connection. The electrical conductivity of brass sleeves is also lower than that of copper sleeves.

Current and earth connectors with seamless solderless pressed-on copper sleeves

Both simple low-cost versions and high-quality versions are offered as current straps for control cabinets and switchgear applications up to approx. 630/730 A.

Current and earth connectors with welded contact areas

The contact areas of such connections are welded here without the use of further materials, so that solid connection ends with extremely low electrical resistances are created.

Available as earth and ground straps as well as current straps for applications up to approx. 1000 A.

Flat stranded tapes with solderless pressed-on cable lugs

Technically possible in a wide variety of designs, but actually only recommended for conductor cross-sections up to 16 mm².

Flat strand connections out of stainless steel or aluminium wires

For applications where copper material is not sufficiently resistant or may not be used for other reasons, we also manufacture flexible connectors out of flat braided aluminium or stainless steel tapes. The contact areas are produced by solder-free pressing on of stainless steel or aluminium sleeves. The pressing process is carried out with high pressure so that a very well compacted connection surface is created.

Dip-tinned ends or equipped with tinned brass sleeves



Contact ends welded

Contact ends with pressed-on copper sleeves

Contact ends with crimped cable lugs

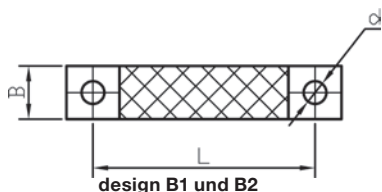
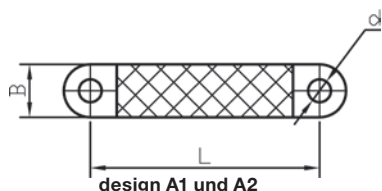
Earthing tapes

similar to DIN 72333 Part 3, design A and B

Designs

Manufactured out of uncoated as well as out of tinned copper braid. When placing an order please specify:

- Part-No.
- Length
- Diameter of the holes
- Braid uncoated or tinned



Deliverable designs

- design A1** contact areas dip-tinned
- design A2** contact areas with tinned brass sleeves
- design B1** contact areas dip-tinned
- design B2** contact areas with tinned brass sleeves

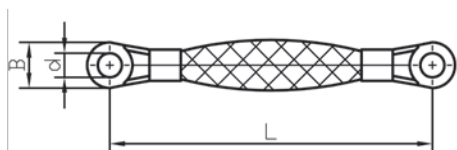
Part-No.		Technical data			
		cross-section mm ²	dimensions ca. mm		
			B	d	L
15280/A1	15280/A2	4	8		
15281/A1	15281/A2	6	10		
15282/A1	15282/A2	8	12		
15283/A1	15283/A2	10	14		
15284/A1	15284/A2	14	18		
15285/A1	15285/A2	16	20		
15286/A1	15286/A2	21	22		
15287/A1	15287/A2	25	22		
15288/A1	15288/A2	35	25		
15289/A1	15289/A2	50	33		
-	15290/A2	70	35		
15280/B1	15280/B2	4	8		
15281/B1	15281/B2	6	10		
15282/B1	15282/B2	8	12		
15283/B1	15283/B2	10	14		
15284/B1	15284/B2	14	18		
15285/B1	15285/B2	16	20		
15286/B1	15286/B2	21	22		
15287/B1	15287/B2	25	22		
15288/B1	15288/B2	35	25		
15289/B1	15289/B2	50	33		
-	15290/B2	70	35		

Highly flexible connectors

with solderless pressed terminals acc. to DIN 46234

Construction and application

Manufactured out of highly flexible braided copper tapes made out of annealed, tinned copper ETP1 wires, with solderless pressed terminals acc. to DIN 46234 at the ends. Everywhere applicable where connections with smaller cross-sections made out of braided copper tapes with solderless crimped cable lugs are recommended.



Technical data

Flat braid:

- Made out of soft annealed copper ETP1-wires acc. to DIN EN 13602
- Surface tinned
- Wire-Ø 0,07 mm (1,5-10 mm²)
- Wire-Ø 0,10 mm (16 mm²)

Contact areas:

- With solderless pressed terminals acc. to DIN 46234

Part-No.		Technical data		
		cross-section mm ²	dimensions ca. mm	
	B		d	L
13010	1,5	8	4,3	160
13011	4,0	10	5,3	160
13012	6,0	11	6,5	200
13013	10,0	11	6,5	200
13014	16,0	14	8,5	200

Remark: Length and drilling are changeable. Connectors with bigger cross-sections on request. When placing an order please specify the wished changes.

Earthing tapes 10-70 mm²

with solderless pressed-on copper sleeves

Construction and application

Manufactured out of highly flexible braids with solderless pressed contact areas made out of seamless copper ETP-tubes. The crimping process is realized without using additives like tin or soldering and welding additives.

We use exclusively materials of same analysis and same conductivity of approx. 57 S (braids and tubes). Suitable as earthing tapes as well as components for current transfer.

Everywhere applicable where components with high flexibility and an optimized contact resistance are needed.

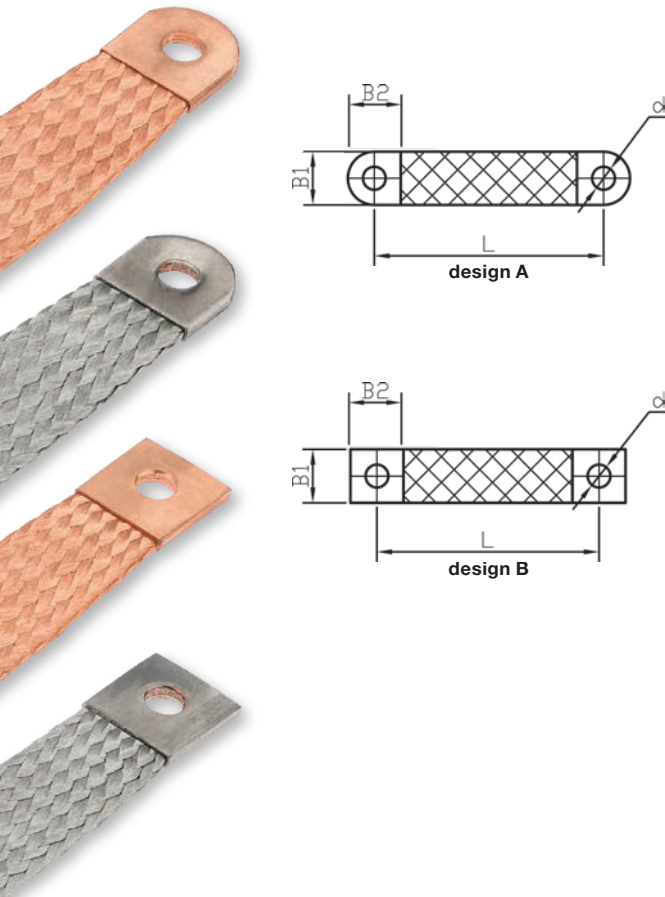
Technical data

Flat braid:

- Made out of soft annealed copper ETP 1-wires acc. to DIN EN 13602
- Surface optionally uncoated or tinned
- Wire-Ø 0,07 mm (10 mm²)
- Wire-Ø 0,16 mm (14 mm²)
- Wire-Ø 0,10 mm (16-70 mm²)

Contact sleeves:

- Seamless copper ETP-material
- Surface uncoated or tinned



Part.-No.		Technical data				
		cross-section mm ²	dimensions ca. mm			
uncoated	tinned		B ₁	B ₂	d	L
design A						
13015	13015 vz	10	15	15	6,5	According to customers wishes
13016	13016 vz	14	20	20	9	
13017	13017 vz	16	20	20	9	
13018	13018 vz	25	25	25	9	
13019	13019 vz	35	30	30	9	
13020	13020 vz	50	30	30	9	
13021	13021 vz	70	40	40	11	
design B						
13025	13025 vz	10	15	15	6,5	
13026	13026 vz	14	20	20	9	
13027	13027 vz	16	20	20	9	
13028	13028 vz	25	25	25	9	
13029	13029 vz	35	30	30	9	
13030	13030 vz	50	30	30	9	
13031	13031 vz	70	40	40	11	

Remark: Manufacturing in large as well as small quantities in lengths acc. to your wishes. On request also with changed drilling deliverable. When placing an order please specify the wished changes.



Special design with several connection points/contact areas

Flexible insulated earthing tapes and copper connectors 10-210 mm²

with solderless pressed-on contact sleeves

Construction and application

Manufactured by flexible PVC-extruded braided copper tapes with solderless pressed contact areas made out of seamless copper ETP-tubes.

The crimping process is realized without using additives like tin or soldering and welding additives. We use exclusively materials of same analysis and same conductivity of approx. 57 S (braids and tubes). So the hereby used druseidt-crimp technology guarantees an extreme compressing and an optimal resistance by compressing the wires so much. By using our connectors you can be sure to have a very well and optimized contact resistance.

Caused by the technical characteristics of the insulating material and the flexibility of the braids the connectors offer multifarious applications inside switchgears or control panel devices up to approx. 730 A as well as earthing connections.

Technical data

Electrical conductor:

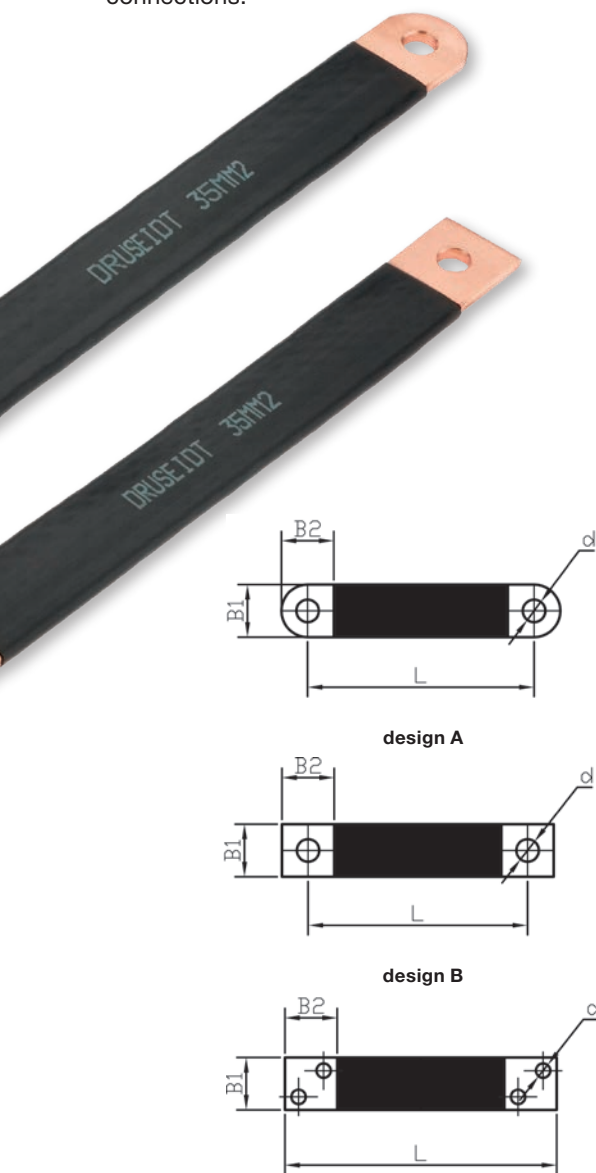
- Braided copper tapes made out of copper ETP1-wires acc. to DIN EN 13602
- Wires soft annealed, uncoated
- Wire-Ø 0,15 mm (10/16 mm²)
- Wire-Ø 0,20 mm (25-210 mm²)

Contact sleeves:

- Seamless copper ETP-material
- Surface standard uncoated, optionally tinned

Insulation:

- Special vinyl compound
- Black, free of lead
- Self-extinguishing acc. to UL 94 VO
- Elasticity 365 %
- Dielectric strength 20 kV/mm
- Operating voltage max. 1 kV AC/1,5 kV DC
- Operating temperature - 20 °C up to + 105 °C



Part-No. 15577

Part.-No.		Technical data						
		cross-section		dimensions ca. mm				
design A	design B	mm ²	current-load	B ₁	B ₂	S	d	L
15415	15560	10	70-105 A	12	12	3,0	5,5	According to customers wishes
15416	15561	16	100-150 A	15	15	3,3	6,5	
15417	15562	25	145-210 A	20	20	3,8	9	
15418	15563	25	145-210 A	25	25	3,5	9	
15419	15564	35	170-250 A	20	20	4,3	9	
15420	15565	35	170-250 A	25	25	3,6	9	
15421	15566	50	205-300 A	25	25	4,7	9	
15422	15567	50	205-300 A	30	30	4,3	11	
15423	15568	70	245-355 A	25	25	6,0	9	
15424	15569	70	245-355 A	30	30	5,0	11	
15425	15570	70	270-390 A	35	35	5,4	11	
15426	15571	70	270-390 A	40	40	5,2	14	
15427	15572	100	325-470 A	35	35	6,1	11	
15428	15573	100	325-470 A	40	40	7,2	14	
15429	15574	120	345-540 A	40	40	8,0	14	
-	15575	140	375-580 A	40	40	8,6	14	
-	15576	210	500-700 A	40	40	9,8	14	
-	15577	210	515-730 A	50	50	8,0	14	

Remark: Manufacturing acc. to the customers' wishes in large as well as small quantities.

Uncoated braid and uncoated contact areas are standard. But on request with tinned contact areas and bare braid or with changed drill holes deliverable. By ordering the design with tinned contact areas it is necessary to add the word tinned behind the part-no. (e.g. 15570 tinned). All information about current load are approximate values in consideration of the cables heat for single laying of air cooled cables and ambient temperature + 35 °C. Minimum value = conductor temperature approx. + 65 °C. Maximum value conductor temperature approx. + 90 °C. The temperature of the conductor is in dependent on the installation, the application, the cooling, the ambient temperature etc., so that if necessary reducing factors are to be considered. With pleasure our employees assist your company in finding optimal solutions.

Flexible current connectors and earthing tapes with welded contact areas

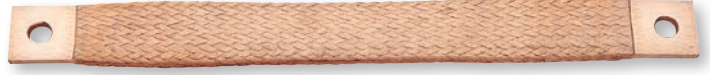
Flexible current connectors and earthing tapes made by druseidt electro technology are excellently suitable for the most diverse applications in the field of switchgear, switchbox and electrical control engineering. The welding process, used for the production process, allows a massive welding of contact areas, resulting in extremely flexible components with optimized electrical resistances and reduced power losses.

For switchgear applications up to approx. 1000 A we also manufacture multilayer tapes with welded connection areas as per page 37 or connectors with narrow connection areas for connecting compact switches up to 630 A as per page 36. The use of various insulation materials offers the user a wide range of connections with different flexibility in different temperature ranges.

Different insulating materials for different applications

- PVC-extruded braids - 20 °C up to + 105 °C
- Silicone-extruded braids - 50 °C up to + 180 °C
- Shrinking tube - 55 °C up to + 125 °C
- Silicone tube - 50 °C up to + 180 °C

In addition other special insulation materials are available on request, tailored exactly to your applications.



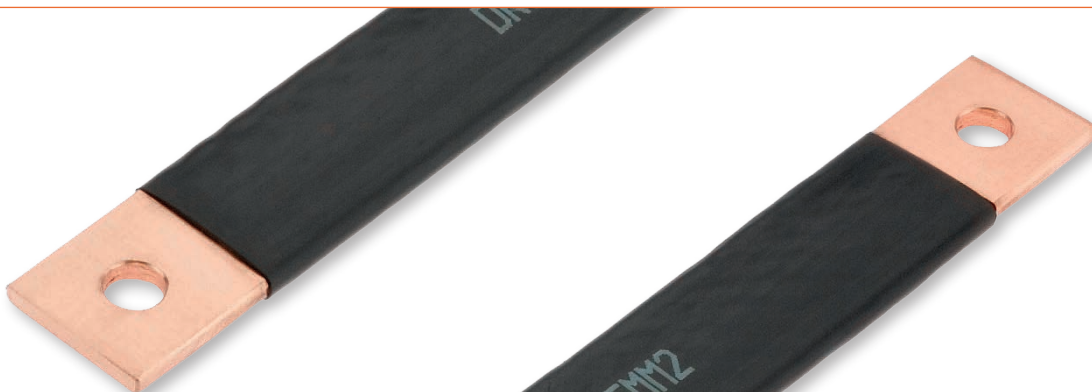
Main advantages:

High quality

- Massive, compact connection areas with lower electrical resistances as solderless crimped or dip-tinned designs
- Long-term stability with improved electrical aging behavior since no moisture can enter into the contact areas
- Extremely flexible to absorb vibrations, to compensate rail offset and shocks in all directions

Various applications

- As current- and earthing connectors
- As multilayer design for currents up to 1000 A
- As connections with particularly narrow contact areas for connecting compact-switches up to 630 A
- As extremely flexible designs with cold- as well as heat resistant insulation materials



Flexible grounding- and current connectors 10-140 mm² with welded contact areas

Our grounding- and current connectors are technically innovative flexible electrical connection elements, which can be used for a variety of applications. The massively welded contact surfaces result in components with extremely low electrical resistances and offer a good electrical aging behavior.

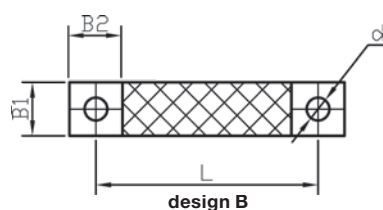
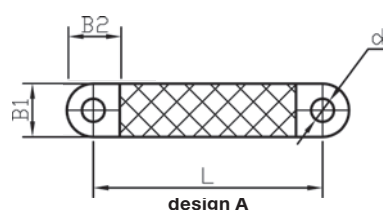
When used as earthing tapes braids have a much lower impedance than round stranded cables of the same cross-section. They are therefore also well suited for grounding applications in higher-frequency areas. We manufacture such connections in small and large series in lengths according to customers' requirements.

Technical Data

- Braided copper tapes made out of copper ETP1-wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single-wire-Ø 0,16 mm (0,10 mm²)
- Single-wire-Ø 0,20 mm (16-140 mm²)

Contact areas :

- welded



Part-No.		Technical Data						
design A	design B	cross-section mm ²	current-load	dimensions ca. mm				
				B ₁	B ₂	S	d	L
60300	60360	10	70-105 A	12	15	1,0	5,5	According to customers wishes
60302	60362	16	100-150 A	15	15	1,2	6,5	
60304	60364	25	145-210 A	20	20	1,2	9	
60306	60366	25	145-210 A	25	25	1,0	11	
60308	60368	35	170-250 A	20	20	1,7	9	
60310	60370	35	170-250 A	25	25	1,5	11	
60312	60372	50	205-300 A	25	25	1,9	11	
60314	60374	50	205-300 A	30	30	1,9	11	
60316	60376	70	245-355 A	25	25	3,0	11	
60318	60378	70	245-355 A	30	30	2,6	11	
60320	60380	70	270-390 A	35	35	2,2	14	
60322	60382	100	325-470 A	40	40	2,8	14	
60324	60384	120	345-540 A	40	40	3,2	14	
60326	60386	140	375-580 A	40	40	3,8	14	

Remark: Designs with other hole-Ø on request. All information about current load are approximate values in consideration of the connector heat for single laying of air cooled connectors and ambient Temperature + 35 °C. Minimum value = conductor temperature approx. + 65 °C. Maximum value conductor temperature = approx. + 90 °C. The temperature of the conductor is in dependent of the installation, the application, the cooling the ambient temperature and the heat removal option, so that, if necessary, reducing factors must be taken into account.



Flexible current- and grounding connectors 10-210 mm²

out of PVC-extruded braids
with welded contact areas

These types of current- and grounding connectors consist out of PVC-extruded flat braids whose connection surfaces are welded solid. The result is a flexible connection with extremely low electrical resistance and good electrical aging behavior. The isolation is extruded, so that, in contrast to hoses pushed on afterwards, it fits tightly against the braid. This is an advantage for the heat dissipation and also has a positive effect on the flexibility of the connections.

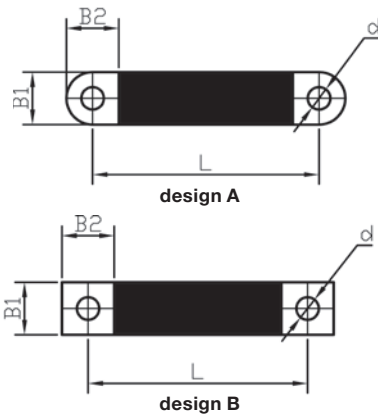
Technical data

Electrical conductor:

- Braided copper tapes made out of copper ETP1-wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,15 mm (10/16 mm²)
- Single wire-Ø 0,20 mm (25/210 mm²)

Insulation:

- Special vinyl compound
- Black, free of lead
- Self-extinguishing acc. to UL 94 VO
- Elasticity 365 %
- Dielectric strength 20 kV/mm
- Operating voltage max. 1 kV AC / 1,5 kV DC
- Operating temperature - 20 °C up to + 105 °C



Part.-No.		Technical data						
design A	design B	cross-section mm ²	current load	dimensions ca. mm				
				B ₁	B ₂	S	d	L
60400	60460	10	70-105 A	12	15	1,0	5,5	According to customers wishes
60402	60462	16	100-150 A	15	15	1,3	6,5	
60406	60466	25	145-210 A	25	25	1,5	11	
60410	60470	35	170-250 A	25	25	1,8	11	
60412	60472	50	205-300 A	25	25	2,3	11	
60414	60474	50	205-300 A	30	30	1,8	11	
60416	60476	70	245-355 A	25	25	2,9	11	
60418	60478	70	245-355 A	30	30	2,6	11	
60420	60480	70	270-390 A	35	35	2,4	14	
60422	60482	100	325-470 A	40	40	2,9	14	
60424	60484	120	345-540 A	40	40	3,5	14	According to customers wishes
60426	60486	140	375-580 A	40	40	4,0	14	
60428	60488	210	500-700 A	40	40	5,9	14	

Remark: Designs with other hole-Ø on request. All information about current-load are approximate values in consideration of the connector heat for single laying of air cooled connectors and ambient temperature + 35 °C. Minimum value = conductor temperature approx. + 65 °C. Maximum value conductor temperature approx. + 90 °C. The temperature of the conductor is in dependent of the installation, the application, the cooling, the ambient temperature and the heat removal option, so that, if necessary, reducing factors must be taken into account.

Highly flexible current- and grounding connectors 10-140 mm²

out of silicone extruded braids
with welded contact areas

The highly flexible connectors consist out of silicone extruded braids whose connection surfaces are welded solid. The result is an extremely flexible electrical connection, characterized by both cold- and heat resistant insulation (- 50 °C up to + 180 °C). Ideally suited for electrical connections in applications where only a small amount of space is available or the connection needs to move.

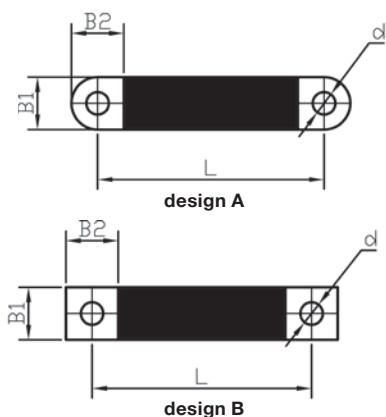
Technical data

Electrical conductor:

- Braided copper tapes made out of copper ETP1-wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,16 mm (10 mm²)
- Single wire-Ø 0,20 mm (16-140 mm²)

Insulation:

- Silicone approx. 60 Shore A
- Colour black
- Free of halogen, chlorine content < 4 ppm
- Hardly inflammable and self-extinguishing
- Operating voltage 1 kV AC / 1,5 kV DC
- Testing voltage 9 kV AC (Sparktest)
- Dielectric strength 20 kV/mm
- Operating temperature - 50 °C up to + 180 °C



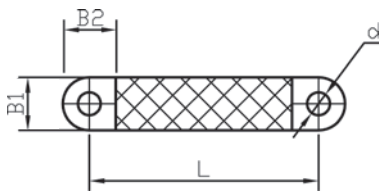
Part.-No.		Technical data						
design A	design B	cross-section mm ²	current load	dimensions ca. mm				
				B ₁	B ₂	S	d	L
60500	60560	10	70-105 A	12	15	1,0	5,5	According to customers wishes
60502	60562	16	100-150 A	15	15	1,2	6,5	
60504	60564	25	145-210 A	20	20	1,2	9	
60506	60566	25	145-210 A	25	25	1,0	11	
60508	60568	35	170-250 A	20	20	1,7	9	
60510	60570	35	170-250 A	25	25	1,5	11	
60512	60572	50	205-300 A	25	25	1,9	11	
60514	60574	50	205-300 A	30	30	1,9	11	
60516	60576	70	245-355 A	25	25	3,0	11	
60518	60578	70	245-355 A	30	30	2,6	11	
60520	60580	70	270-390 A	35	35	2,2	11	
60522	60582	100	325-470 A	40	40	2,8	14	
60524	60584	120	345-540 A	40	40	3,2	14	
60526	60586	140	375-580 A	40	40	3,8	14	

Remark: Designs with other hole-Ø on request. All information are approximate values in consideration of the connector heat for single laying of air cooled connectors and ambient temperature + 35 °C. Minimum value = conductor temperature approx. + 65 °C. Maximum value conductor temperature approx. + 90 °C. The temperature of the conductor is in dependent of the installation, the application, the cooling, the ambient temperature and the removal option, so that, if necessary, reducing factors must be taken into account.

Flexible current-connectors 25-240 mm²
with welded contact areas in narrowly shaped design
suitable for connection of compact switches

Flexible current connectors with, in relation to the cross-section, narrowly shaped design and solid welded contact areas. Therefore ideally suited for the connection of compact switches with narrow current outputs to busbar systems. The width of the connection surfaces are so designed that also supple bars can be replaced. Caused by the massively welded contact surfaces components with extremely low electrical resistance and excellent electrical aging behavior arise.

As standard insulation subsequently mounted silicone- or shrinking hoses are available. In particular the silicone insulated design offers a very good flexibility and a large temperature range from - 50 °C up to + 180 °C.



Technical data

Electrical conductor:

- Braided copper tapes made out of copper ETP1-wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,15 mm

Insulation/silicone tubing:

- Silicone rubber approx. 60 Shore A
- Nature colour
- Free of halogen
- Hardly inflammable, self-extinguishing
- Dielectric strength 20 kV/mm
- Thickness 1 mm
- Operating temperature - 50 °C up to + 180 °C

Heat shrinkable tubing:

- Irradiated cross-linked polyolefin
- Black colour
- Self-extinguishing
- Dielectric strength 20 kV/mm
- Operating temperature - 55 °C up to + 125 °C



Part.-No.			Technical data							
without insulation	silicone insulated	with shrinking tube	cross-section mm ²	current-load	suitable for switchgear	dimensions ca. mm				
						B ₁	B ₂	S	d	L
60600	60600-SI	60600-SH	25	145 - 210 A	125/163 A	12	15	1,9	5,5	According to customers wishes
60602	60602-SI	60602-SH	50	205 - 300 A	250 A	20	20	2,4	9	
60604	60604-SI	60604-SH	70	245 - 355 A	300 A	20	20	3,5	9	
60606	60606-SI	60606-SH	70	245 - 355 A	300 A	24	25	3,1	11	
60608	60608-SI	60608-SH	100	325 - 470 A	350 A	24	25	4,8	11	
60610	60610-SI	60610-SH	120	345 - 540 A	400 A	32	35	3,8	11	
60612	60612-SI	60612-SH	120	345 - 540 A	400 A	32	35	3,8	14	
60614	60614-SI	60614-SH	185	400 - 550 A	500 A	32	35	6,5	11	
60616	60616-SI	60616-SH	185	400 - 550 A	500 A	32	35	6,5	14	
60618	60618-SI	60618-SH	240	550 - 700 A	630 A	32	35	7,4	11	
60620	60620-SI	60620-SH	240	550 - 700 A	630 A	32	35	7,4	14	

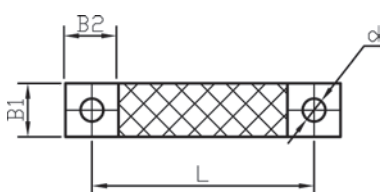
Remark: Insulations in other colours or materials as well as other fixing holes on request. All information about current-load are approximate values in consideration of the connector heat for single laying of air cooled connectors and ambient temperature + 35 °C. Minimum value = connector temperature approx. + 65 °C. Maximum value conductor temperature approx. + 90 °C. The temperature of the conductor is in dependent of the installation, the application, the cooling, the ambient temperature and the heat removal option, so that, if necessary, reducing factors must be taken into account.

Flexible power connectors 20-420 mm²

in multilayer design
with welded contact areas

These multi-layered flexible power strips with welded connection surfaces allow the transmission of currents up to 1000 A via compact and relatively narrow connection surfaces. They are therefore well suited for installation in confined spaces or to carry out movements with simultaneous flow of current. The welding processes used by us allows a compact and massive welding of both 2-layer and 3-layer power strips with a maximum total cross-section of 420 mm².

As standard insulation subsequently mounted silicone- or shrinking hoses are available. In particular the silicone insulated design offers a very good flexibility and a large temperature range from - 50 °C up to + 180 °C.



Technical data

Electrical conductor:

- Braided copper tapes made out of copper ETP1-wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire- \varnothing 0,16 mm (20/30 mm²)
- Single wire- \varnothing 0,20 mm (32-420 mm²)

Insulation/silicone tubing:

- Silicone tubing
- Silicone rubber approx. 60 Shore A
- Nature colour
- Free of halogen
- Hardly inflammable, self-extinguishing
- Dielectric strength 20 kV/mm
- Thickness 1 mm
- Operating temperature - 50 °C up to + 180 °C

Heat shrinkable tubing:

- Irradiated cross-linked polyolefin
- Black colour
- Self-extinguishing
- Dielectric strength 20 kV/mm
- Operating temperature - 55 °C up to + 125 °C



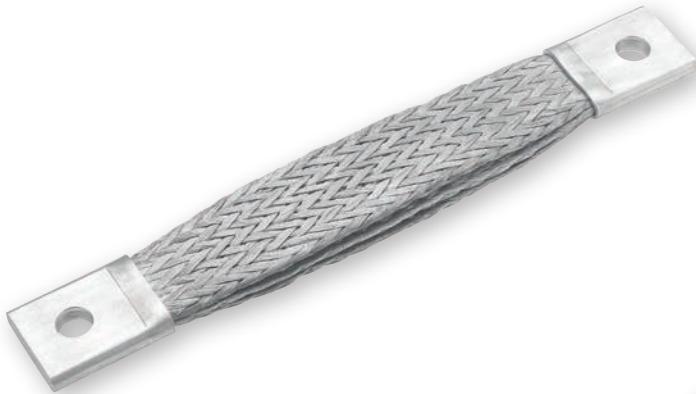
Part.-No.			Technical data						
without insulation	silicone insulated	with shrinking tube	cross-section mm ²	current-load	dimensions ca. mm				
					B ₁	B ₂	S	d	L
2-layer design									
60640	60640-SI	60640-SH	20	110 - 160 A	12	15	1,9	5,5	According to customers wishes
60642	60642-SI	60642-SH	32	140 - 220 A	15	15	2,5	6,5	
60644	60644-SI	60644-SH	50	205 - 300 A	20	20	3,0	9	
60646	60646-SI	60646-SH	50	205 - 300 A	25	25	2,0	11	
60648	60648-SI	60648-SH	70	245 - 355 A	20	20	2,6	9	
60650	60650-SI	60650-SH	100	325 - 470 A	25	25	3,8	11	
60652	60652-SI	60652-SH	100	325 - 470 A	30	30	3,4	11	
60654	60654-SI	60654-SH	140	375 - 540 A	25	25	6,0	11	
60656	60656-SI	60656-SH	140	375 - 540 A	30	30	5,2	11	
60658	60658-SI	60658-SH	140	375 - 540 A	35	35	4,5	14	
60660	60660-SI	60660-SH	200	450 - 650 A	40	40	5,5	14	
60662	60662-SI	60662-SH	240	550 - 700 A	40	40	6,4	14	
60664	60664-SI	60664-SH	280	600 - 800 A	40	40	7,7	14	
3-layer design									
60670	60670-SI	60670-SH	30	125 - 205 A	12	15	2,3	5,5	According to customers wishes
60672	60672-SI	60672-SH	48	180 - 275 A	15	15	3,6	6,5	
60674	60674-SI	60674-SH	75	250 - 360 A	20	20	3,9	9	
60676	60676-SI	60676-SH	75	250 - 360 A	25	25	3,0	11	
60678	60678-SI	60678-SH	150	375 - 580 A	25	25	5,8	11	
60680	60680-SI	60680-SH	150	375 - 580 A	30	30	5,0	11	
60682	60682-SI	60682-SH	210	430 - 630 A	25	25	8,3	11	
60684	60684-SI	60684-SH	210	440 - 640 A	30	30	7,2	11	
60686	60686-SI	60686-SH	210	450 - 650 A	35	35	6,6	14	
60688	60688-SI	60688-SH	300	630 - 850 A	40	40	8,3	14	
60690	60690-SI	60690-SH	360	700 - 900 A	40	40	9,6	14	
60692	60692-SI	60692-SH	420	800 - 1000 A	40	40	11,4	14	

Remark: Insulations in other colours or materials as well as other fixing holes on request. All information about current-load are approximate values in consideration of the connector heat for single laying of air cooled connectors and ambient temperature + 35 °C. Minimum value = connector temperature approx. + 65 °C. Maximum value conductor temperature approx. + 90 °C. The temperature of the conductor is in dependent of the installation, the application, the cooling, the ambient temperature and the heat removal option, so that, if necessary, reducing factors must be taken into account.

Flexible aluminium connections out of aluminium flat braids

For applications that require the use of flexible aluminium connections, we also supply a wide range of customized connections made of flat aluminium strands. The solderless pressed flat connecting areas are also produced with the proven druseidt crimp technology, as with our ready-made copper connectors.

These results in compact connection surfaces with a high degree of compression and consequently extremely favourable electrical resistances. As base material we use our braided aluminium tapes according to page 12 of this catalogue. The connectors can be manufactured with a different connection widths in single or multi-layer design. Special designs, e.g. with pressed-on turned parts or clamp connections, are also possible.



Flexible aluminium connectors with solderless pressed-on aluminium sleeves



Aluminium connectors acc. to customer requirements



Flexible aluminium connectors in multilayer design with solderless pressed-on aluminium sleeves



Flexible aluminium connectors welded to an aluminium busbar

For joining aluminium to copper components, we recommend the use of bimetallic sheets as described on page 121 of this catalogue.

Flexible aluminium connectors

preferably for heating element connections

In industrial furnace constructions, flexible aluminum connections are often required for the connection of electrically operated heaters. Here it is particularly important to install connectors with a low electrical resistance. In addition to the quality of the materials used, the quality and degree of compaction of the pressed contact areas is therefore very important. The special druseidt crimp-technology we use ensures an optimum of compaction of the contact areas and thus the delivery of high-quality products. As base material we use our braided aluminium tapes according to page 12 of this catalogue. Common connection widths for heating element connections are 20 mm and 30 mm. Common clamping diameters for heating rods are 6/8/10/12/16/18/20/25/32 mm. Other also larger clamping diameters are possible on request.

The following designs can be supplied:

- Type 1:** One side clamping- other side flat connection (connection heating element/voltage source)
- Type 2:** Clamp connection on both sides (connection of two heating elements)
- Type 3:** Clamp connection on both sides with additional centrally pressed support sleeve (connection of two heating elements)
- Type 4:** Flat connection on both sides (extension tape)
- Type 5:** Special version with three or more clamping devices (as a star bridge across several elements)

In case of order please indicate:

- Connection width 20 mm or 30 mm resp. wished braid acc. to catalogue page 12
- Desired hole in flat connection area
- In the standard version, the flat connections are always square, e.g. 20 x 20 mm or 30 x 30 mm with a central bore hole. Please announce any deviations from this.
- Desired clamping-Ø
- Desired material of the clamping device A2 or A4 stainless steel
- Length center clamping device to center of bore hole or center bore hole to bore hole
- For special design type 5 additionally number of clamping devices and position (enclose sketch if necessary)



Connector **Type 1**



Connector **Type 2**



Connector **Type 3**



Connector **Type 4**



Connector **Type 5**

Highly flexible stainless steel connectors

made out of braided stainless steel tapes

Material-no. 1.4401

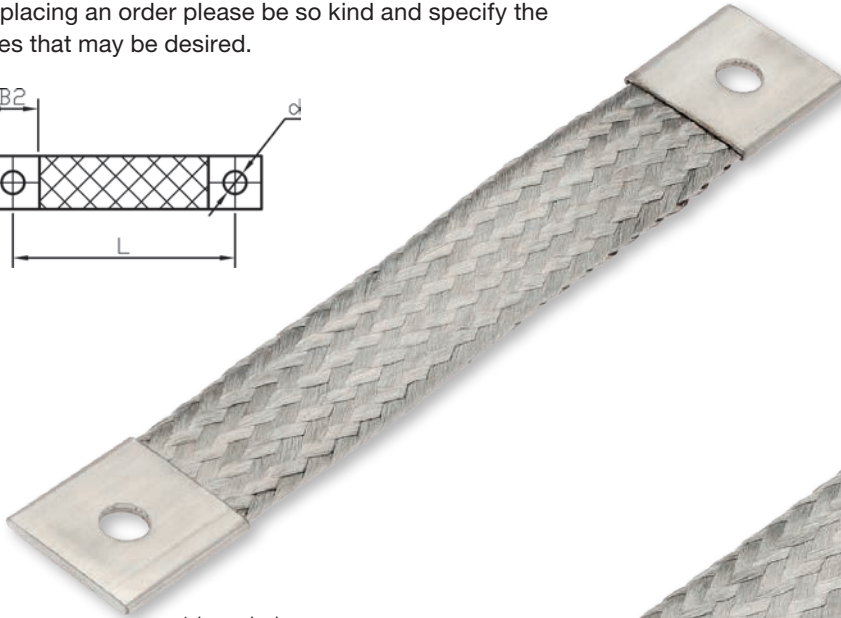
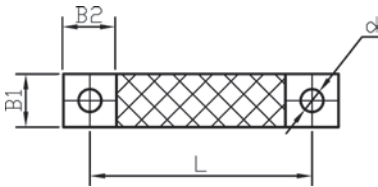
Construction and application

For all applications with special demands to the chemical resistance e.g. in the chemical- and shipbuilding industry, we offer ready assembled connectors manufactured out of our highly flexible braided stainless steel tapes.

They are made of braided stainless steel tapes which are produced of soft annealed 1.4401 stainless steel wires with a single wire-Ø 0,10 mm. Seamless stainless steel sleeves are pressed-on at the ends under high pressure.

We manufacture different components in standard design as well as according to customers' wishes or according to the VG-regulations (e.g. VG 88711 connectors for earthing applications). Contrary to the standard it is possible to change the drilling as well as the length and the dimensions of the contact areas in opposite to our table without problem. When placing an order please be so kind and specify the changes that may be desired.

Part.-No.	Technical data				
	cross-section mm ²	dimensions ca. mm			
		B ₁	B ₂	d	L
1-layer design					
13036	16	20	20	6,5	according to customers wishes
13037	25	30	30	11,0	
13071	35	30	30	11,0	
13072	50	35	35	11,0	
13073	50	40	40	13,0	
2-layer design					
13074	32	20	20	6,5	according to customers wishes
13075	50	30	30	11,0	
13076	70	30	30	11,0	
13077	100	35	35	11,0	
13078	100	40	40	13,0	



1-layer design



2-layer design

Pre-assembled round strands and cable sets

We manufacture both ready assembled connection pieces and complete cable sets from non-insulated, highly flexible round stranded and insulated cables and wires. Production is carried out on modern machines with different degrees of automation so that both small series or individual pieces as well as larger series can be produced efficiently and cost-effectively. In order to be able to continuously supply our customers with a high reproducible quality, we also have the necessary testing facilities. For example, all cable lug connections can be tested in addition to conductivity and material testing by means of pull out testing, electrical resistance measurement, through to micrograph creation and also documented on request.

For further information, please also refer to the pages 4 + 5 of this catalogue. This means that our customers can lead the proof at any time that the electrical connection was made according to the current state of the art and in compliance with the applicable standards and regulations when purchasing ready-made articles. When cables are assembled in-house, this is often difficult to lead then this proof and can lead to problems in the event of damage. In addition to the standard designs described in the catalogue we also manufacture a large number of customized articles. Therefore we are happy to advise you on your applications.

We offer extensive testing and documentation options e.g.

- Electrical conductance and material tests
- Electrical resistance tests
- Pull out tests
- Micrograph creation and micrograph analysis
- Preparation of documentations and test reports



Micrograph creation



Pull-out test



Micrograph analysis

Flexible connectors 10-300 mm² out of round stranded copper cables

Designs

Manufactured out of highly flexible uncoated or tinned copper cables with a wire-Ø 0,07 mm (10-16 mm²) resp. 0,10 mm Ø (25-300 mm²).

design A: with terminals acc. to DIN 46234

design B: with tubular cable lugs for fine stranded cables

design C: with tubular cable lugs for fine stranded cables with narrow flange

Manufacturing in large as well as small quantities in lengths acc. to your wishes. On request it is also possible to order an insulated design (e.g. with PVC-, silicone- or shrinking tubes). With changed drilling on request. When placing an order please specify the length and the changes that may be desired.



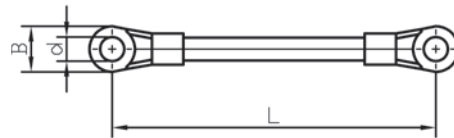
design A

design B

design C

Different designs according to customers wishes

Part.-No.		Technical data			
uncoated	tinned	cross-section mm ²	dimensions ca. mm		
			B	d	L
design A					
15240	15240 vz	10	11	6,5	
15241	15241 vz	16	14	8,5	
15242	15242 vz	25	16	8,5	
15243	15243 vz	35	16	8,5	
15244	15244 vz	50	18	10,5	
15245	15245 vz	70	22	10,5	
15246	15246 vz	95	24	13	
15247	15247 vz	120	24	13	
15248	15248 vz	150	30	13	
15249	15249 vz	185	36	17	
15250	15250 vz	240	38	17	
design B					
15260	15260 vz	10	12	6,5	according to customers wishes
15261	15261 vz	16	15	8,5	
15262	15262 vz	25	16	8,5	
15263	15263 vz	35	18	8,5	
15264	15264 vz	50	22	10,5	
15265	15265 vz	70	25	10,5	
15266	15266 vz	95	29	13	
15267	15267 vz	120	31	13	
15268	15268 vz	150	35	13	
15269	15269 vz	185	38	17	
15270	15270 vz	240	44	17	
15271	15271 vz	300	49	21	
design C					
15272	15272 vz	35	15	6,5	
15273	15273 vz	50	19	10,5	
15274	15274 vz	70	19	10,5	
15275	15275 vz	95	22	13	
15276	15276 vz	120	22	13	
15277	15277 vz	150	26	13	
15278	15278 vz	185	30	17	
15279	15279 vz	240	30	17	



We also manufacture connectors tapes individually designed according to your wishes, e.g. with angled cable lugs or insulated with PVC-, silicone- or heat-shrinkable tubing.

Flexible connectors 2,5-120 mm² out of black or green/yellow coloured Lify wires

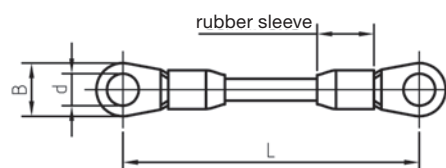
Design

Made of black or green/yellow PVC-insulated Lify cables according to the technical description on page 24 of this catalogue. Single wire diameters 2,5 mm² = 0,07 mm, 6-16 mm² = 0,10 mm and 25-120 mm² = 0,15 mm. With solderless crimped cable lugs according to DIN 46234 at the ends. Cable lug shafts covered with rubber sleeves. Manufacturing in large as well as small quantities in lengths according to your wishes.

The connection holes can be changed on request. Smaller cross-sections from 0,5 mm² as well as with crimped tubular cable lugs on request. When placing an order please specify the length and all changes that may be desired.



Part.-No.		Technical data			
black	green/yellow	cross-section mm ²	dimensions ca. mm		
			B	d	L
13760	13000	2,5	10	5,3	according to customers wishes
13761	13001	6	11	6,5	
13762	13002	10	11	6,5	
13763	13003	16	14	8,5	
13764	13004	25	16	8,5	
13765	13005	35	16	8,5	
13766	13006	50	18	10,5	
13767	13008	70	22	10,5	
13768	-	95	24	13	
13769	-	120	24	13	



We also manufacture assembled cables and cable sets from other insulated cables and with other cable lugs (tubular cable lugs, angled cable lugs etc.) or connecting parts e.g. from:

- H07 VK-cable
- Welding cable H01 N2-D
- Earthing cable ESY/ESUY
- Radox cable or lines or cables according to your wishes

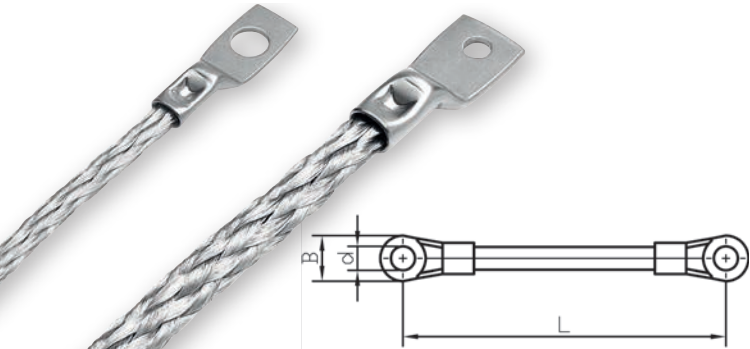


Highly flexible connecting pieces 2,5-50 mm²

out of plait braided stainless steel wires A4 material-no. 1.4401, A4 material-no. 1.4401 with stronger individual wires single wire-Ø 0,10 mm with tubular stainless steel cable lugs A4 with tubular stainless steel cable lugs A4 material-no. 1.4571 material-no. 1.4571

Construction and application

Manufacturing in large as well as small quantities in lengths according to your wishes. For all applications with special demands to the chemical resistance e.g. in the food-, chemical- or shipbuilding industry. Due to the very thin individual wires with a diameter of 0,10 mm, these connections are extremely flexible and also enable assembly in confined spaces. The strand is braided like a plait so that untwisting is prevented as is possible with normal round strands.



Part.-No.	Technical data					
	cross-section mm ²	dimensions mm			According to customers wishes	
		B	d	L		
14400	2,5	9	4,3			
14401		9	5,3			
14402		10	6,4			
14403	6	12	5,3			
14404		12	6,4			
14405		13	8,4			
14406	10	12	5,3			
14407		12	6,4			
14408		13	8,4			
14409	16	14	6,4			
14410		16	8,4			
14411	25	18	6,4			
14412		18	8,4			
14413		20	10,5			
14414	35	21	8,4			
14415		21	10,5			
14416		23	13,0			
14417	50	24	8,4			
14418		24	10,5			
14419		24	13,0			
14420		28	17,0			

Connecting pieces out of stainless steel round ropes

Construction and application

Manufacturing in large as well as small quantities in lengths according to your wishes. Connectors of this type are used wherever the focus is not on flexibility but on higher strength of the ropes. The minimum breaking strengths of the ropes are listed in the table. Very good pull-out values can also be achieved in conjunction with our cable lugs and with our crimp-technology. Further information are available here on request.



Part.-No.	Technical data					
	rope-Ø mm	breaking strength/ropes		dimensions mm		
		kN	kp	B	d	L
14500	3	4,68	477	9	4,3	
14501				9	5,3	
14502				10	6,4	
14503	4	8,33	849	12	5,3	
14504				12	6,4	
14505				13	8,4	
14506	5	13,02	1326	12	5,3	
14507				12	6,4	
14508				13	8,4	
14509	6	18,75	1910	14	6,4	
14510				16	8,4	
14511	8	33,30	3400	18	6,4	
14512				18	8,4	
14513				20	10,5	
14514	10	52,10	5310	24	8,4	
14515				24	10,5	
14516				24	13,0	
14517				28	17,0	

Remark: Minimum breaking strength of the ropes 1570 N/mm²/160 kp/mm². Conversion of the values for strength and breaking forces according to DIN 1301, i.e. 1 kp = 9,80665 N, 1 kN = 1000 N, 1 kp/mm² = 9,08665 N/mm²

Flexible stainless steel connections

from plait braided cables and ropes according to customer wishes

In addition to the above mentioned standard designs we also manufacture customized versions, adapted to the respective application or regulation, e.g. with solderless pressed-on stainless steel cable lugs in ring or hook form following the VG 88711-1 connector forms D10-13, D20-23, D-30-33 or D40-43 and cable outside-Ø 4 mm or 5 mm. Designs with pressed-on special turned parts etc. are possible too.



We also manufacture stainless steel connections individually according to your wishes

The druseidt silicone program

We manufacture a variety of ready assembled cables and cable sets from our highly flexible silicone cables. Different crimping and connection techniques enable the production of cables, components and power transmission elements that are tailored to the respective application. All 1,8/3 kV versions meet the fire protection requirements of DIN EN 45545 for use in the railway industry and similar applications.

The single-insulated design also has an UL-style which also applies to the majority of the assembled cables we manufacture from it. For the technical data of the line, please refer to catalogue pages 20-23.



with crimped cable lugs



with additional insulation crimp



with angled connecting ends



with crimped plugs and sockets



with several crimped contact areas

**Highly flexible power connectors 50-300 mm²
with solderless pressed contact ends**

Highly flexible all-round movable ready assembled power connectors made out of single insulated silicone extruded cable 1,8/3 kV. Seamless contact sleeves are pressed-on at the ends under high pressure without soldering, resulting in an extremely compact connection surface. Due to their very high flexibility and the possibility of movement on all sides, they are very suitable for use as power connections that carry out movements or have to connect devices and/or busbars in confined installations.

The technical data of the insulation material as well as the large temperature range from - 50 °C up to + 180 °C open up a multitude of possible applications for the user. Upon request, multi-layer designs are also available on one side combined in a single connection/contact area and on the other side with individual outlets of different lengths, e.g. according to catalogue page 56.



1-layer design



2-layer design

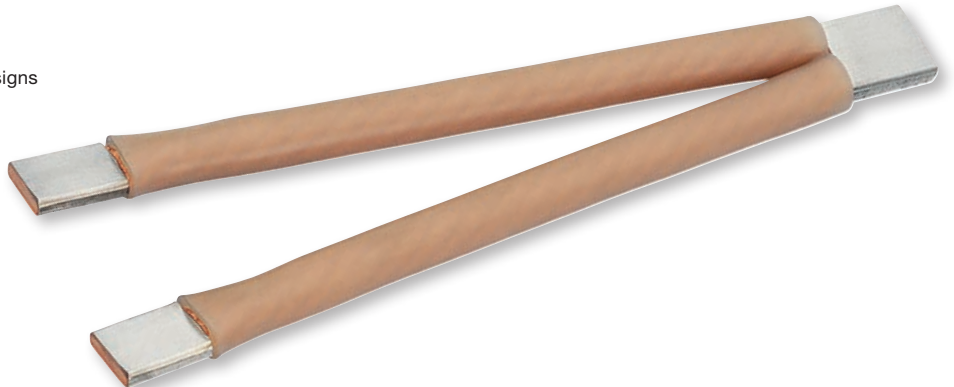


3-layer design



4-layer design

Special designs



Designs according to customer requirements on request e.g. with 90° offset designed connecting areas or several outlets.

Highly flexible power connectors 50-300 mm² with solderless pressed contact ends



Technical data

Electrical conductor:

- Round stranded copper cable out of copper ETP1-wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,10 mm

Contact sleeves:

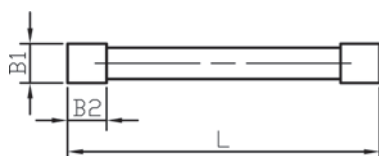
- Seamless copper ETP-material, uncoated

Insulation:

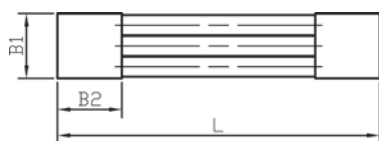
- Silicone rubber approx. 60 Shore A
- Nature colour
- Free of halogen, chlorine content < 4 ppm
- Hardly inflammable, self-extinguishing
- Operating voltage 1,8/3 kV
- Testing voltage 10 kV AC (Sparktest)
- Dielectric strength 20 kV/mm
- Operating temperature - 50 °C up to + 180 °C

Approvals and fire tests of the cable:

- UL-Style 3858
- DIN EN 60332-1-2/VDE 0482-332-1-2
- DIN EN 60332-3-24/VDE 0482-332-3-24
- DIN EN 61034-2/VDE 0482-1034-2
- DIN EN 50305/VDE 0260-305 Section 9.2



single layer design



several layer design

On request also available
with drilling or tinned contact areas

Part.-No.	Technical data						
	cross-section mm ²	current-load	dimensions ca. mm				
			B ₁	B ₂	S	L	
1-layer							
14350	1 x 50	200 A	20	20	4,7		
14360	1 x 70	250 A	20	20	7,5		
14370	1 x 95	300 A	25	25	6,7		
14380	1 x 120	350 A	25	25	7,5		
14390	1 x 150	400 A	30	30	7,7		
2-layer							
14430	2 x 25	250 A	25	25	4,5	according to customers wishes	
14440	2 x 35	300 A	30	30	5,0		
14450	2 x 50	350 A	30	30	6,0		
14460	2 x 70	480 A	40	40	6,7		
14470	2 x 95	560 A	40	40	8,5		
14480	2 x 120	650 A	40	40	9,1		
14490	2 x 150	750 A	40	40	11,8		
3-layer							
14530	3 x 25	375 A	40	40	4,4		
14540	3 x 35	450 A	40	40	6,0		
14550	3 x 50	525 A	50	50	5,8		
14560	3 x 70	720 A	50	50	7,8		
4-layer							
14630	4 x 25	500 A	40	40	7,0		
14640	4 x 35	600 A	50	50	6,5		

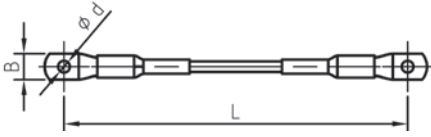
Remark: All information about current load are approximate values for single laying and ambient temperature + 30 °C in acc. with VDE 0298 part 4. In dependence of the allowed heat of the conductors it is likewise possible to work with higher current rates as recommend (in comparison to the tabular values acc. to page 21). If you need more information about planned applications don't hesitate to contact us.

Highly flexible power connections 4-300 mm²

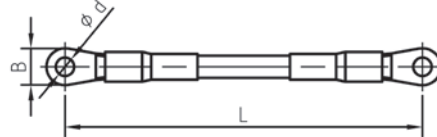
with solderless pressed tubular cable lugs

Highly flexible power connections made of silicone extruded single insulated cable 1,8/3 kV. Optional at the ends with solderless pressed tubular cable lugs or cable lugs according to DIN 46234. The space between lug and cable is covered by a silicone sleeve in all designs. **These ready assembled cables correspond like the cable itself to our UL-style 3858.**

UL-listed cable lugs with appropriate crimp technology as well as silicone sleeves can be found in our catalogue 1 "Professional installation and electrical connection technique for craft, industry and high current applications" which we will be happy to send you free of charge. Technical data of silicone extruded cable please look at page 21 of this catalogue.



design A with tubular cable lugs



design B with cable lugs acc. to DIN 46234



Individual designs acc. to customer requirements:

Part.-No.		Technical data					
design A	design B	cross-section mm ²	current-load	dimensions ca. mm			
				d	B design A	B design B	L
16114	16210	4	30 - 55 A	5,3	10	10	according to customers wishes
16115	16215	6	40 - 70 A	6,5	11	11	
16120	16220	10	50 - 98 A	6,5	12	11	
16125	16225	16	70 - 132 A	8,5	15	14	
16130	16230	25	95 - 176 A	8,5	16	16	
16135	16235	35	115 - 218 A	8,5	18	16	
16140	16240	50	145 - 276 A	10,5	22	18	
16145	16245	70	175 - 347 A	10,5	25	22	
16150	16250	95	215 - 416 A	13,0	29	24	
16155	16255	120	245 - 488 A	13,0	31	24	
16160	16260	150	285 - 566 A	13,0	35	30	
16165	16265	185	320 - 644 A	13,0	38	36	
16167	16267	240	380 - 775 A	13,0	44	38	
16169	-	300	435 - 898 A	17,0	49	-	

Remark: Designs with other cable lug drilling on request. All information about current load are approximate values for single laying and ambient temperature + 30 °C and conductor temperature approx. + 45 °C (min. value) resp. ca. + 90 °C (max. value) in accordance with VDE 0298 part 4. Please refer to page 21 on this leaflet for detailed information of the used silicone cable and other current load values.

with cable lugs crimped 90° offset

with cable lugs in angle design 45°

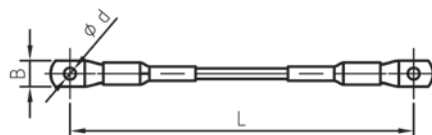
with cable lugs in angle design 90°



Highly flexible power connections 35-240 mm² with solderless pressed tubular cable lugs with narrow flange

Highly flexible power connections made of silicone extruded single insulated cable 1,8/3 kV. At the ends with solderless pressed tubular cable lugs with narrow flange. The space between cable lug and cable is covered by a silicone sleeve in all designs. **These ready assembled cables correspond like the cable itself to our UL-style 3858.**

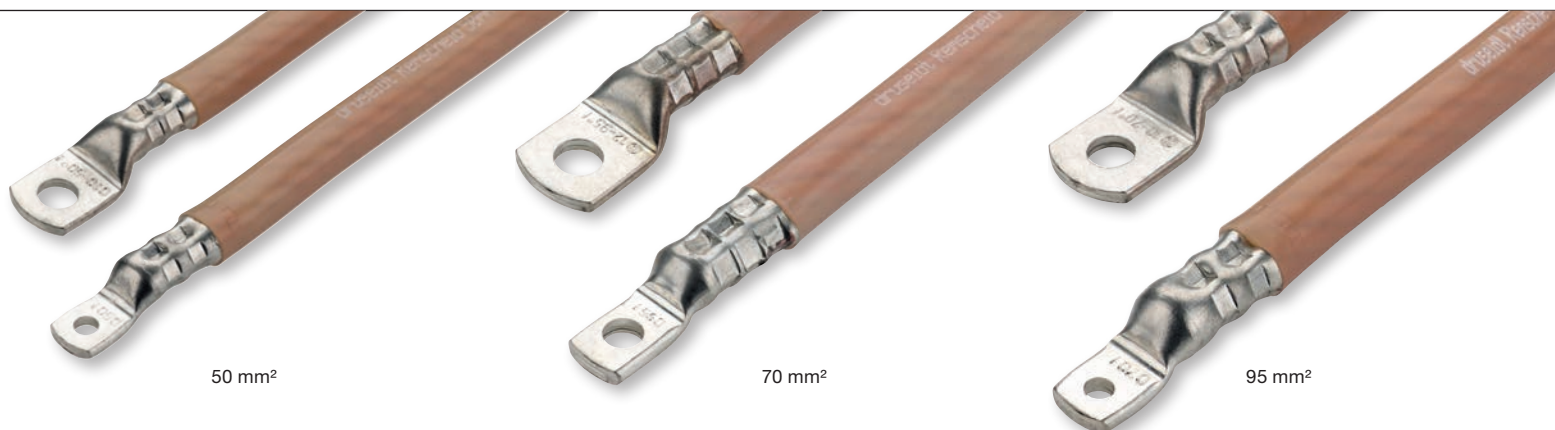
UL-listed cable lugs with approximate crimp technology as well as silicone sleeves can be found in our catalogue 1 "Professional installation and electrical connection technique for craft, industry and high current applications" which we will be happy to send you free of charge. Technical data of silicone extruded cable please look at page 21 of this catalogue.



Part.-No.	Technical data				
	cross-section mm ²	current-load	dimensions ca. mm		
			d	B	L
16201	35	115 - 218 A	6,4	15	according to customers wishes
16202	50	145 - 276 A	10,5	19	
16203	70	175 - 347 A	10,5	19	
16204	95	215 - 416 A	13,0	22	
16205	120	245 - 488 A	13,0	22	
16206	150	285 - 566 A	13,0	26	
16207	185	320 - 644 A	13,0	30	
16208	240	380 - 775 A	13,0	30	

Remark: Designs with other cable lug drilling or 90° angled cable lugs on request. All information about current load are approximate values for single laying and ambient temperature + 30 °C and conductor temperature approx. + 45 °C (min. value) resp. approximate ca. 90 °C (max. value) in accordance with VDE 0298 part 4. Please refer to page 21 on this leaflet for detailed information of the used silicone cable and other current load values.

Comparison of tubular cable lugs with narrow flange and tubular cable lugs in standard design:



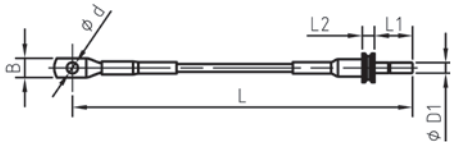
By using tubular cable lugs with a narrow connection flange in combination with our extremely flexible silicone cables, connections can be made safely and permanently under very tight installation conditions.

Connections of this design thus offer very good solution options in the area of even smaller spaces in switchgear and controlgear applications.

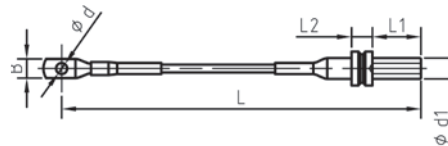
Highly flexible pluggable power connections 10-120 mm²

Highly flexible pluggable power connections made of silicone extruded single insulated cable 1,8/3 kV (technical data of the cables acc. to page 21 of this catalogue). In standard design one side with solderless pressed tubular cable lug at the end and the other side optionally with solderless pressed plug or socket. Plugs and sockets with snap-in-locking system. They lock automatically when connected.

Plugs are inserted only so far that the ring-snaps in. To release, lightly turn and push in plug, than pull out. The space between crimp-connector and cable is covered by a silicone sleeve in all designs. On request, we also manufacture screw-in plug or socket parts for combination with our highly flexible cable sets. **All connections delivered ready assembled by us correspond like the silicone cable itself to our UL-style 3858.**



design A with plug



design B with socket



Part.-No.		Technical data							
design A	design B	cross-section mm ²	current-load	dimensions ca. mm					
				D/d ₁	L	L ₁	L ₂	d	B
16320	16325	10,0	80 A	6,0	according to customers wishes	22,0	7,0	6,5	11,0
16330	16335	16,0	100 A	6,0		22,0	7,0	8,5	15,0
16340	16345	25,0	130 A	10,0		42,5	12,0	8,5	16,0
16350	16355	35,0	150 A	10,0		42,5	12,0	8,5	17,0
16360	16365	50,0	190 A	14,0		43,0	17,0	10,5	22,0
16370	16375	70,0	240 A	14,0		43,0	17,0	10,5	25,0
16380	16385	95,0	280 A	14,0		43,0	17,0	13,0	29,0
16390	16395	120,0	300 A	14,0		43,0	17,0	13,0	31,0

Remark: The specified current load is valid for an ambient temperature of + 30 °C and a conductor temperature of ca. + 90 °C for single laying of an air cooled connector.

Plugs and sockets 80-300 A with snap-in lock and crimping connection



A detailed dimensional and technical description of the used plugs and sockets can be found in our general catalogue 1 "Professional installation- and electrical connection technique for craft, industry and high current application" which we will be happy to send you free of charge.

Highly flexible silicone insulated power connections

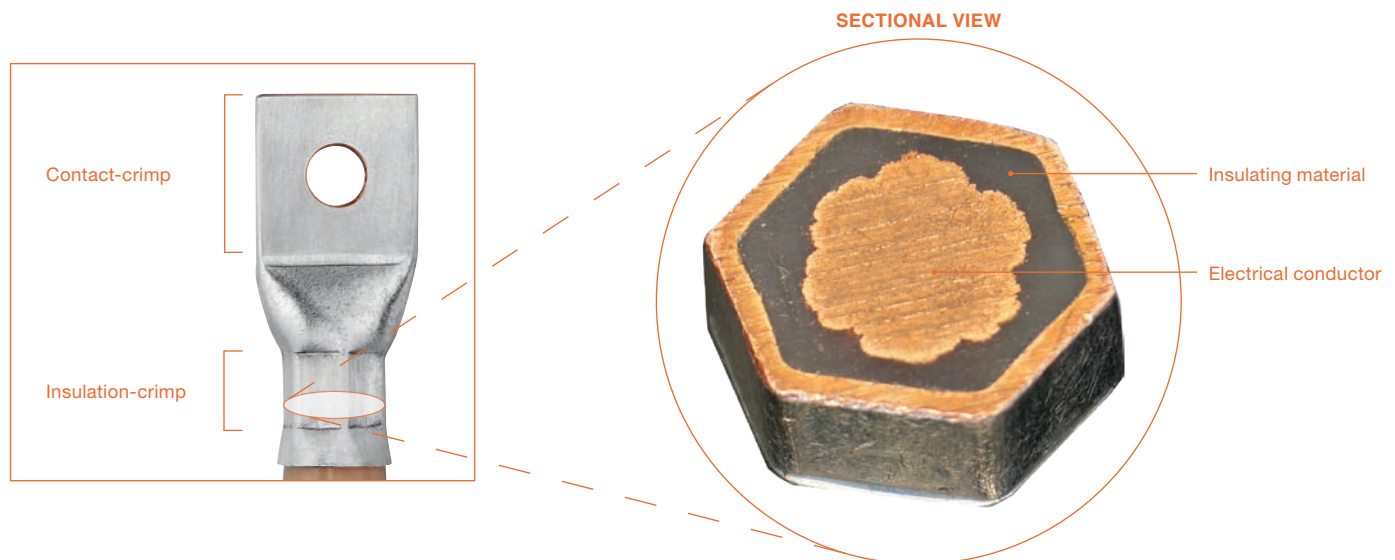
ready assembled with additional insulation crimp

Manufactured out of single insulated silicone-extruded cables 1,8/3 kV. The special druseidt crimp-technology results in high quality moisture-proof electrical connection elements with very good vibration behavior. Therefore ideally suited for applications with vibrations e.g. in the field of railways, wind power plants or screening machines.

Depending on the connection situation, the shape, dimensions of the contact areas and the position of the holes can be changed within the technically possible framework. With pleasure we advise you on your applications.

All ready assembled articles delivered by us correspond like the cable itself, to our UL-style 3858.

The special druseidt crimp technology enables the production of power connections with large contact areas and an additional insulation crimp



Advantages of prefabricated druseidt power connections

- The additional insulation-crimp shifts the bending point into the insulated part of the cable when vibration occur and provides additional protection against moisture and dirt penetration.
- This eliminates the need for an additional shrink tubing for sealing and prevents breaking of the electrical conductors at the junction between cable lug and conductor, as is possible when working with normal cable lug crimp-technology.
- This considerably improves the service-life compared to cables with crimped cable lugs.
- The contact pressing takes place under very high pressure. This minimizes the electrical resistance, virtually eliminates breakage of the connection surfaces and guarantees a high aging ability of the connection.
- Sufficiently dimensioned contact surfaces for optimized screwing/current transmission, e.g. by means of clamping discs according to DIN 6796.
- Available in small and large series, adapted to the respective application.

Highly flexible power connections 10-300 mm²

out of single insulated silicone extruded cables 1,8/3 kV

with solderless crimped contact areas and additional insulation crimp

Technical data

Electrical conductor:

- Round stranded copper cable out of copper ETP 1-wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,07 mm (10-16 mm²)
- Single wire-Ø 0,10 mm (25-300 mm²)

Contact sleeves:

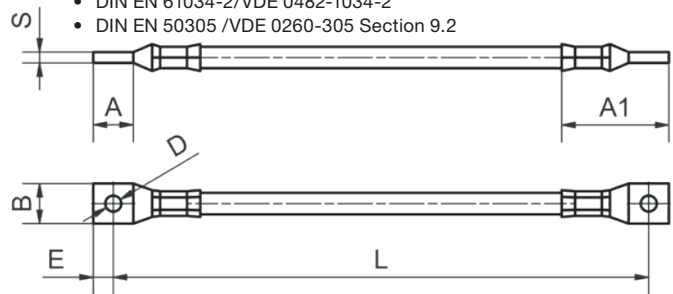
- Seamless copper ETP-material, tinned

Insulation:

- Silicone approx. 60 Shore A
- Nature colour
- Free of halogen, Chlorine content < 4 ppm
- Hardly inflammable, self-extinguishing
- Operating voltage 1,8/3 kV
- Testing voltage 10 kV AC (Sparktest)
- Dielectric strength 20 kV/mm
- Operating temperature - 50 °C up to + 180 °C

Approvals an fire tests:

- UL-Style 3858
- DIN EN 60332-1-2 /VDE 0482-332-1-2
- DIN EN 60332-3-24/VDE 0482-332-3-24
- DIN EN 61034-2/VDE 0482-1034-2
- DIN EN 50305 /VDE 0260-305 Section 9.2



Part.-No.	Technical data								
	cross-section mm ²	current-load	dimensions ca. mm						
			A	A1	B	D	E	S	
16640	10	50 - 98 A	15	45	15	5,5	7,5	4,2	
16641						6,5			
16642	16	70 - 132 A	15	45	15	5,5	7,5	4,2	
16643						6,5			
16644	25	95 - 176 A	20	50	20	6,5	10	4,2	
16645						9			
16647	35	115 - 218 A	25	60	25	9	12,5	4,8	
16648						11			
16650	50	145 - 276 A	25	60	25	9	12,5	4,6	
16651						11			
16653	70	175 - 347 A	25	65	25	9	12,5	5,9	
16654						11			
16656	95	215 - 416 A	30	70	30	11	15	5,7	
16657						14			
16659	120	245 - 488 A	30	70	30	11	15	8	
16660						14			
16662	150	285 - 566 A	35	80	35	14	17,5	8,4	
16665	185	320 - 644 A	35	80	35	14	17,5	9,1	
16668	240	380 - 775 A	40	95	40	14	20	10,6	
16669						17			
16671	300	435 - 898 A	40	95	40	14	20	12,7	
16672						17			

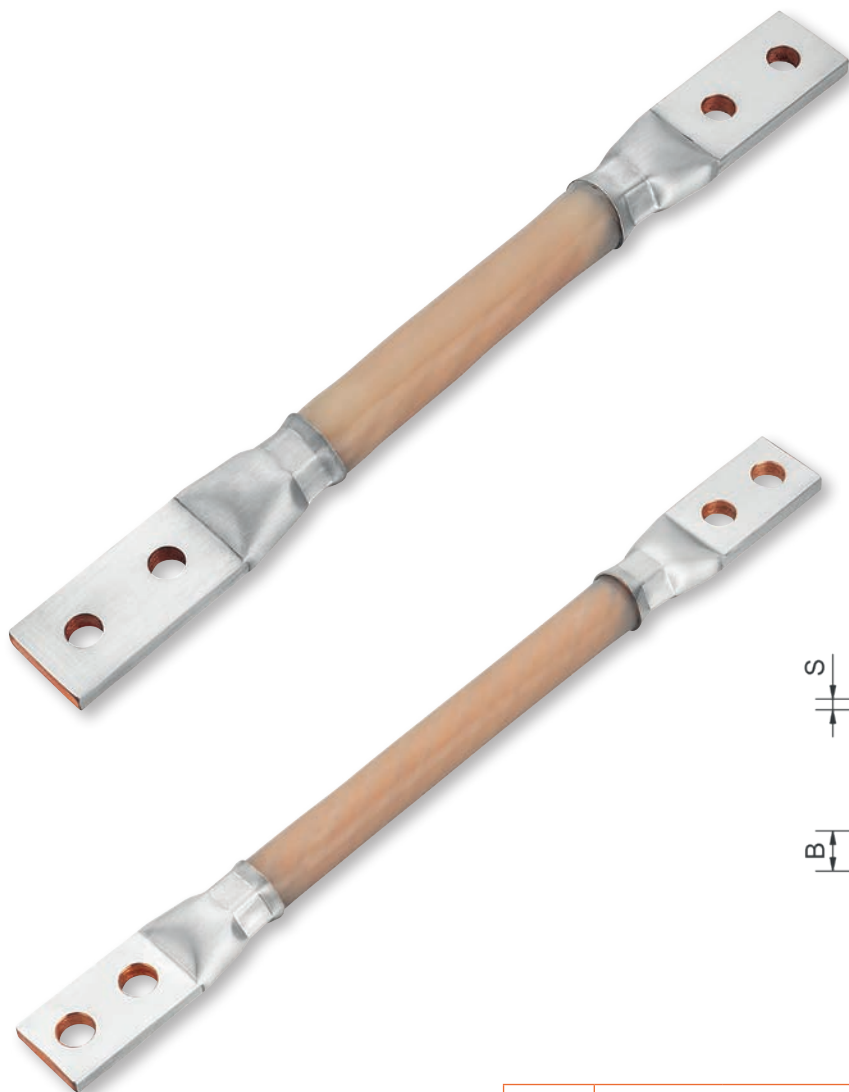
Remark: All information about current load are approximate values in consideration of the connector heat for single laying of air cooled cables and ambient temperature + 30 °C by conductor temperature approx. + 45 °C (min. value) resp. + 90 °C (max. value) in acc. with VDE 0298 part 4. In dependence of the allowed heat of the conductors it is likewise possible to work with higher current rates as recommend (in comparison to the tabular values acc. to page 21). If you need more information about planned applications don't hesitate to contact our company.

according to customers wishes

Highly flexible power connections 70-300 mm²

out of single insulated silicone extruded cables 1,8/3 kV

with solderless crimped contact areas and additional insulation crimp



Technical data

Electrical conductor:

- Round stranded copper cable out of copper ETP 1-wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,10 mm

Contact sleeves:

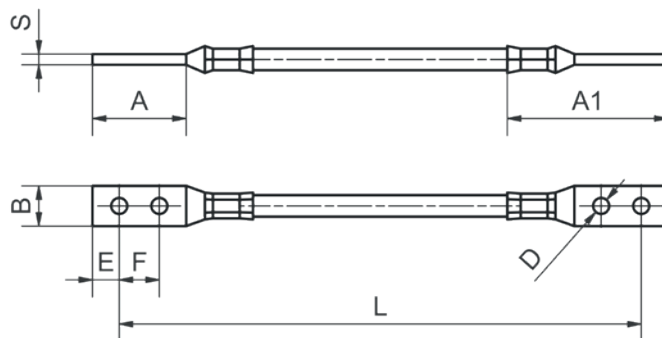
- Seamless copper ETP-material, tinned

Insulation:

- Silicone approx. 60 Shore A
- Nature colour
- Free of halogen, Chlorine content < 4 ppm
- Hardly inflammable, self-extinguishing
- Operating voltage 1,8/3 kV
- Testing voltage 10 kV AC (Sparktest)
- Dielectric strength 20 kV/mm
- Operating temperature - 50 °C up to + 180 °C

Approvals an fire tests of the cable:

- UL-Style 3858
- DIN EN 60332-1-2 /VDE 0482-332-1-2
- DIN EN 60332-3-24/VDE 0482-332-3-24
- DIN EN 61034-2/VDE 0482-1034-2
- DIN EN 50305 /VDE 0260-305 Section 9.2



Part.-No.	Technical data									
	cross-section mm ²	current-load	dimensions ca. mm							
			A	A1	B	D	E	F	S	
16600	70	175 - 347 A	50	90	25	9	12,5	25	5,9	
16601			50	90		11	12,5	25		
16602			65	105		14	15	35		
16603	95	215 - 416 A	60	100	30	11	15	30	5,7	
16604			60	100		14	15	30		
16605			80	125		17	20	40		
16606	120	245 - 488 A	60	100	30	11	15	30	8	
16607			60	100		14	15	30		
16608			80	125		17	20	40		
16609	150	285 - 566 A	60	105	35	14	15	30	8,4	
16610			80	130		17	25	40		
16612	185	320 - 644 A	60	105	35	14	15	30	9,1	
16613			80	120		17	20	40		
16615	240	380 - 775 A	80	135	40	14	20	40	10,6	
16616						17	20	40		
16618	300	435 - 898 A	80	135	40	14	20	40	12,7	
16619						17	20	40		

Remark: All Information about current load are approximate values in consideration of the connector heat for single laying of air cooled cables and ambient temperature + 30 °C by conductor temperature approx. + 45 °C (min. value) resp. + 90 °C (max. value) in acc. with VDE 0298 part 4. In dependence of the allowed heat of the conductors it is likewise possible to work with higher current rates as recommend (in comparison to the tubular values acc. to page 21). If you need more information about planned applications don't hesitate to contact our company.

according to customers wishes

Highly flexible power connections 10-300 mm²

out of single insulated silicone extruded cables 1,8/3 kV

with cable shoe-shaped contact areas and additional insulation crimp

Technical data

Electrical conductor:

- Round stranded copper cable out of copper ETP 1-wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,07 mm (10-16 mm²)
- Single wire-Ø 0,10 mm (25-300 mm²)

Contact sleeves:

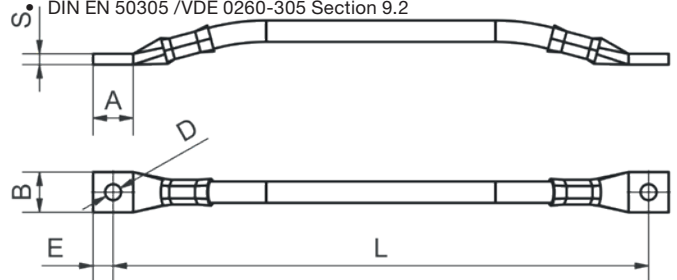
- Seamless copper ETP-material, tinned

Insulation:

- Silicone approx. 60 Shore A
- Nature colour
- Free of halogen, Chlorine content < 4 ppm
- Hardly inflammable, self-extinguishing
- Operating voltage 1,8/3 kV
- Testing voltage 10 kV AC (Sparktest)
- Dielectric strength 20 kV/mm
- Operating temperature - 50 °C up to + 180 °C

Approvals and fire tests of the cable:

- UL-Style 3858
- DIN EN 60332-1-2 /VDE 0482-332-1-2
- DIN EN 60332-3-24/VDE 0482-332-3-24
- DIN EN 61034-2/VDE 0482-1034-2
- DIN EN 50305 /VDE 0260-305 Section 9.2



Part.-No.	Technical data							
	cross-section mm ²	current-load	dimensions ca. mm					
			A	B	D	E	S	L
16740	10	50 - 98 A	15	15	5,5	7,5	4,2	
16741					6,5			
16742	16	70 - 132 A	15	15	5,5	7,5	4,2	
16743					6,5			
16744	25	95 - 176 A	20	20	6,5	10	4,2	
16745					9			
16747	35	115 - 218 A	25	25	9	12,5	4,8	
16748					11			
16750	50	145 - 276 A	25	25	9	12,5	4,6	
16751					11			
16753	70	175 - 347 A	25	25	9	12,5	5,9	
16754					11			
16756	95	215 - 416 A	30	30	11	15	5,7	
16757					14			
16759	120	245 - 488 A	30	30	11	15	8	
16760					14			
16762	150	285 - 566 A	35	35	14	17,5	8,4	
16765	185	320 - 644 A	35	35	14	17,5	9,1	
16768	240	380 - 775 A	40	40	14	20	10,6	
16769					17			
16771	300	435 - 898 A	40	40	14	20	12,7	
16772					17			

according to customers wishes

Remark: All information about current load are approximate values in consideration of the connector heat for single laying of air cooled cables and ambient temperature + 30 °C by conductor temperature approx. + 45 °C (min. value) resp. + 90 °C (max. value) in acc. with DIN 0298 part 4. In dependence of the allowed heat of the conductors it is likewise possible to work with higher current rates as recommend (in comparison to the tabular values acc.to page 21). If you need more information about planned applications don't hesitate to contact our company.

Highly flexible power connections 70-300 mm²

out of single insulated silicone extruded cables 1,8/3 kV

with cable shoe-shaped contact areas and additional insulation crimp



Technical data

Electrical conductor:

- Round stranded copper cable out of copper ETP 1-wires acc. to DIN EN 13602
- Soft annealed, uncoated
- Single wire-Ø 0,10 mm

Contact sleeves:

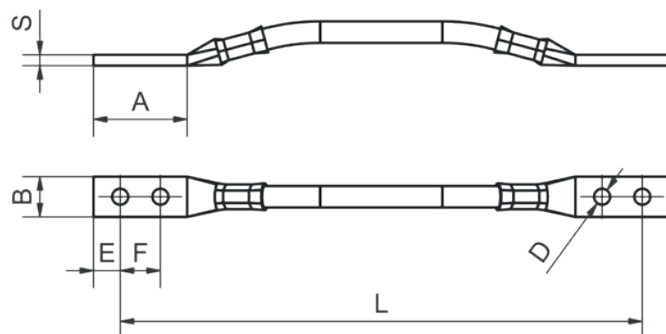
- Seamless copper ETP-material, tinned

Insulation:

- Silicone approx. 60 Shore A
- Nature colour
- Free of halogen, Chlorine content < 4 ppm
- Hardly inflammable, self-extinguishing
- Operating voltage 1,8/3 kV
- Testing voltage 10 kV AC (Sparktest)
- Dielectric strength 20 kV/mm
- Operating temperature - 50 °C up to + 180 °C

Approvals and fire tests of the cable:

- UL-Style 3858
- DIN EN 60332-1-2 /VDE 0482-332-1-2
- DIN EN 60332-3-24/VDE 0482-332-3-24
- DIN EN 61034-2/VDE 0482-1034-2
- DIN EN 50305 /VDE 0260-305 Section 9.2



Part.-No.	Technical data								
	cross-section mm ²	current-load	dimensions ca. mm						
			A	B	D	E	F	S	L
16700	70	175 - 347 A	50	25	9	12,5	25	5,9	
16701			50		11	12,5	25		
16702			65		14	15	35		
16703	95	215 - 416 A	60	30	11	15	30	5,7	
16704			60		14	15	30		
16705			80		17	20	40		
16706	120	245 - 488 A	60	30	11	15	30	8	
16707			60		14	15	30		
16708			80		17	20	40		
16709	150	285 - 566 A	60	35	14	15	30	8,4	
16710			80		17	25	40		
16712	185	320 - 644 A	60	35	14	15	30	9,1	
16713			80		17	20	40		
16715	240	380 - 775 A	80	40	14	20	40	10,6	
16716					17	20	40		
16718	300	435 - 898 A	80	40	14	20	40	12,7	
16719					17	20	40		

Remark: All Information about current load are approximate values in consideration of the connector heat for single laying of air cooled cables and ambient temperature + 30 °C by conductor temperature approx. + 45 °C (min. value) resp. + 90 °C (max. value) in acc. with VDE 0298 part 4. In dependence of the allowed heat of the conductors it is likewise possible to work with higher current rates as recommend (in comparison to the tubular values acc. to page 21). If you need more information about planned applications don't hesitate to contact our company.

according to customers wishes

**Highly flexible ready assembled cables,
manufactured out of silicone extruded cables with several outlets**

We also manufacture highly flexible pre-assembled connections with several outlets consisting out of our extremely flexible silicone extruded cables. Such connectors can be supplied with identical or differently long outlets with cable lugs or pressed-on contact sleeves. Even angled contact areas or connections with crimped plugs or sockets are no problem.

Our intensive manufacturing capabilities allow us to supply extremely flexible electrical connections precisely matched to your application. If required, our design department will be happy to support your efforts to create optimal power transmission solutions.



Highly flexible high current copper connectors

We offer a wide range of technical possibilities for the realization of standard as well as special solutions in connecting widths of 20-200 mm and cross-sections of 25-6000 mm².

We manufacture:

- extremely flexible components
- made out of braided tapes as well as round stranded cables
- optionally made out of uncoated or tin coated wires

On request also available with or without insulation or with coated contact areas.

Highly flexible power connectors and high current connections in solderless pressed design

Features and construction of druseidt power connectors

druseidt high current power connections are extremely flexible components. They are manufactured by flat braided or round stranded wires with a single wire-Ø of 0,07 mm or 0,10 mm. Due to the use of wires with this small single wire-Ø as well as the construction of different layers of flat braided tapes, druseidt power connectors are characterized not only by their high flexibility but also by a very large conductor surface. They thus enable the production of electrical connections with high current capacity. Seamless E-copper/copper ETP sleeves are solderless crimped at the ends under high pressure. The special druseidt-crimp technology enables a high degree of compression and forming and thus the production of extremely compacted contact areas.

Fields of application

Highly flexible power connectors are mainly used to compensate for switching surges, dimensional differences and thermal expansions or even to carry out movements with continuous current flow. Due to their construction, they allow movements in 3 dimensions, in contrast to foil or strip connectors (strip/foil connectors can only be moved in 2 dimensions). High current connectors manufactured by flat braided or round stranded wires are mainly used in the field of power generation and power distribution as current-carrying connections. Typical applications are therefore connections between transformer/generator/switchgear and the busbar system or as a compensating and flexible connection within busbar systems or switchgears. Main applications where movements have to be carried out under current flow are found in the area of welding guns and resistance welding machines. Here too, we offer components individually matched to the application on catalogue pages 67 ff.

Consulting and construction

In order to ensure the best possible design of a power transmission solution, a large number of criteria must be taken into account. For detailed information please also refer to the Technical Appendix of this catalogue (pages 125 ff.). In addition to this, we offer both advice from our office and field staff and constructive support in the implementation and planning of projects and products from our design department. In this way, suitable power transmission solutions for a wide range of applications can be developed together with our customers.

Available designs of high current connectors

In addition to our extensive range of standard and series articles, we also manufacture special designs in every technically possible shaped design. Our diverse manufacturing options in conjunction with our own strand and braid production enable the manufacture of flexible connections tailored to the various applications and installation situations. For example, the following special designs are possible:

- Power connectors with 90 degree offset crimped contact areas
- Power connectors with contact areas of different width, e.g. for connecting units with narrow busbar or transformer outputs to the busbar system
- Power connectors with one or more branches
- Power connectors with several pressed-on contact areas as additional current outlets
- Power connectors with clamping devices, for example for contacting graphite electrodes or round bolts
- Power connectors consisting out of several round strands arranged next to each other for improved mobility in all directions
- Power connectors with angled contact areas
- Power connectors preformed for angled installation situations e.g. as transformer or busbar connection
- Power connectors preformed for use in welding guns or resistance welding machines
- Power connectors with special insulations and/or coated contact areas (tin, nickel, silver, gold)

You will find examples of technically possible special and standard designs on the following catalogue pages 60 ff.

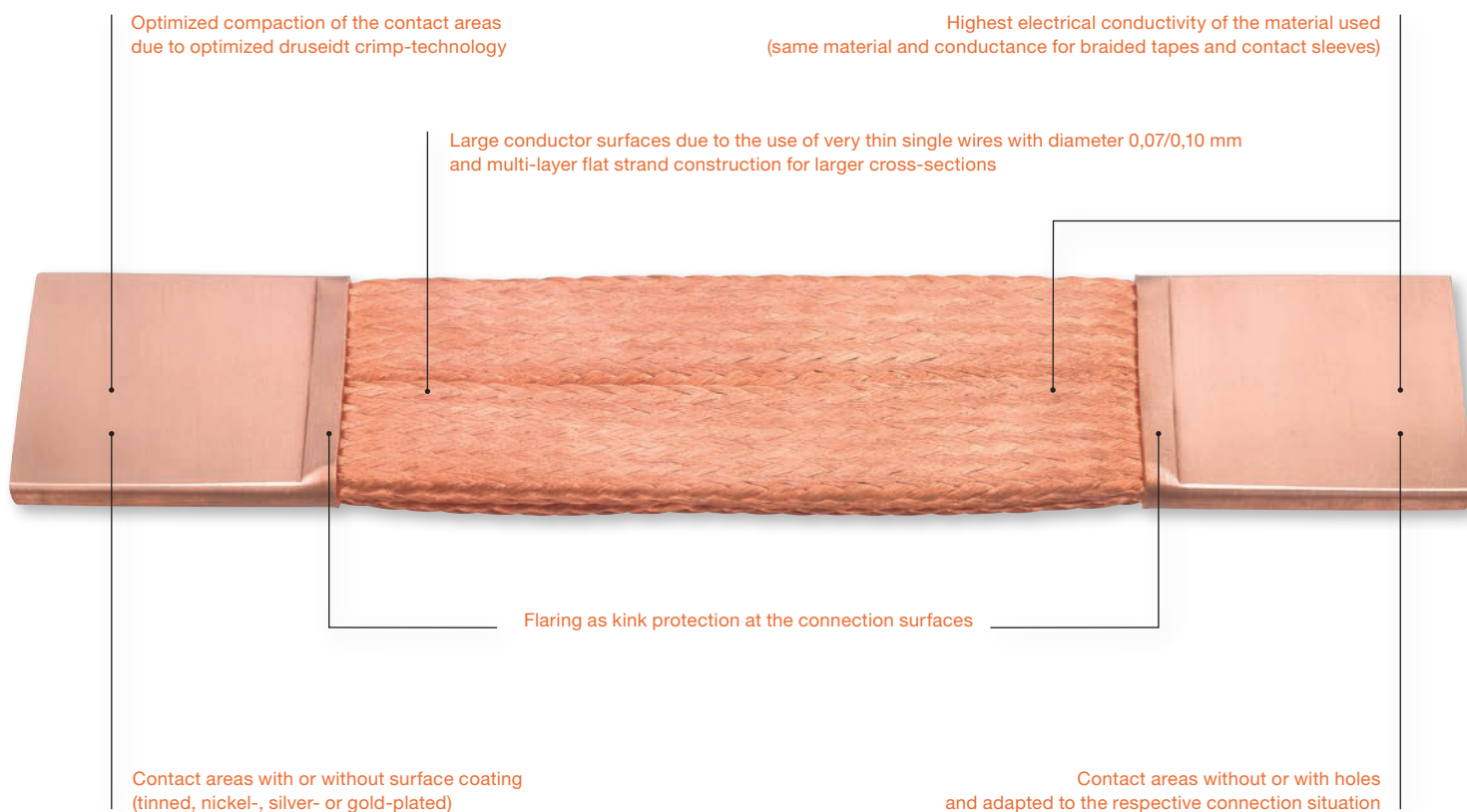
druseidt crimp-technology

For decades, our company has been involved in the improvement and further development of both cable lug crimp-technology and the optimized crimping of larger contact areas of high current power connectors.

When crimping the contact areas of high current power connectors, the entire contact surface is pressed compactly and over a large area with the stranded wires compared to the usable cable lug crimping technique. Presses with very high pressure capacities are used for this which can amount to several hundred tonnes of pressure depending on the size of the contact surface. In combination with the process and tool technology we have developed, the air components are pressed out of the spaces between the individual wires to such an extent that higher current power connectors with extremely favourable and optimized contact and connection resistances are produced.

A comparison of the electrical resistance values with those of competition products often shows significant quality differences here. The lower the electrical resistance of a current transmission element, the lower the electrical losses and the better the ageing behavior of the component and the current connection. By using high-quality products, the power loss can be minimized and the quality and service-life of an electrical connection can be improved accordingly.

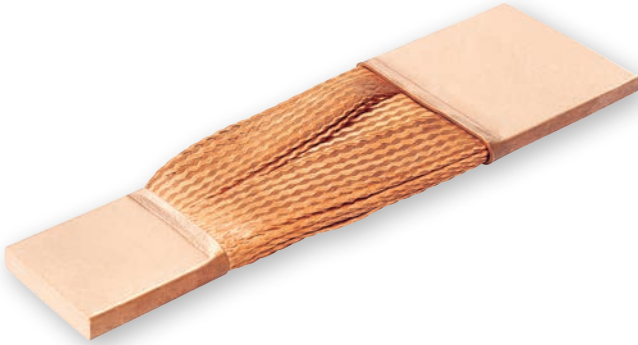
High current power connections in the highest quality through the use of high-quality materials and manufactured with optimized and reproducible production processes



Highly flexible copper connectors for high current applications out of flat copper braids

Our many years of experience in the design and manufacture of high current power connectors, combined with our specialized machinery and our own braid and strand production, enables us to produce customized designs in any technically possible form.

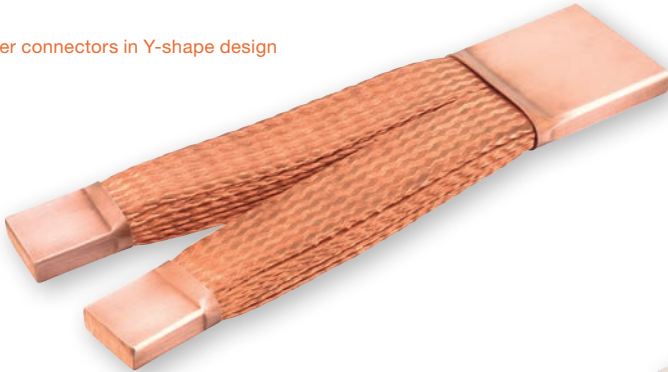
Power connectors with different widths of contact areas



Power connectors with 90 degree offset crimped contact areas



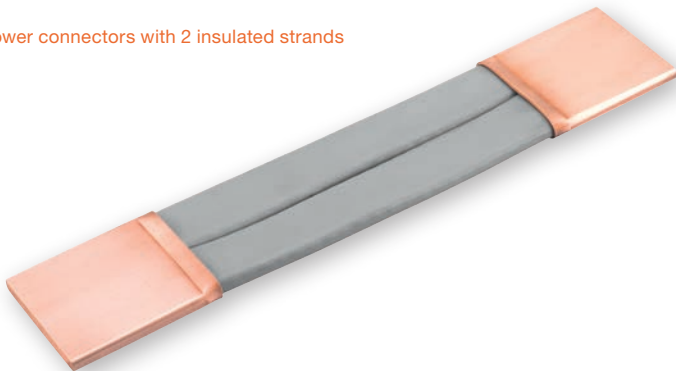
Power connectors in Y-shape design



Power connectors with several pressed-on contact areas



Power connectors with 2 insulated strands



Power connectors with angled contact areas



Power connectors with contact areas pressed across the strands



Power connectors with clamping devices for contacting round bolts/graphite electrodes etc.



Highly flexible connectors out of round stranded copper cables

We adapt our high current power connectors to every technically possible connection situation. Exactly as required by your individual case of application.

Power connectors with 90 degree offset crimped contact areas



Power connections in Y-shape design



Power connectors consisting out of several round strands arranged next to each other for improved mobility in all directions



Power connectors with several pressed-on contact areas



Power connectors with several pressed-on contact areas with or without 90 degree offset pressed contact areas



Power connectors consisting out of several individually insulated round stranded cables

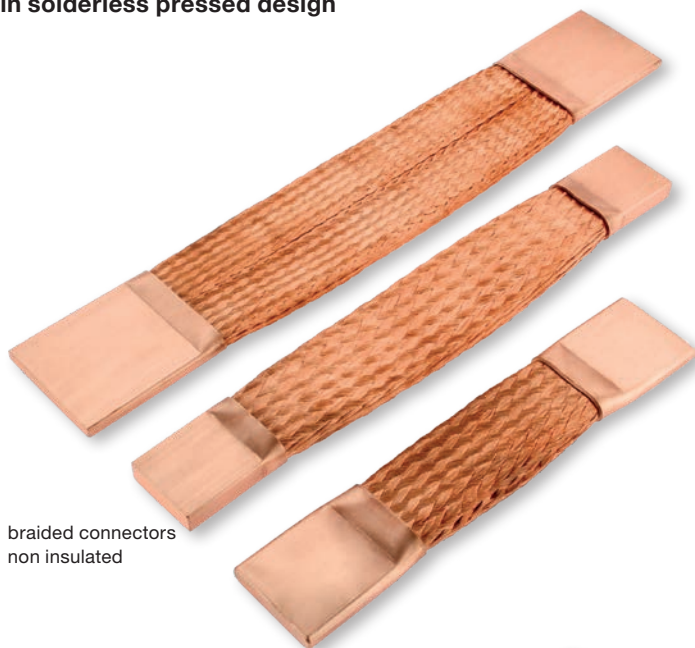


Power connectors insulated with PVC-silicone-, glass-fibre- or heat shrink tubing



Highly flexible connectors

in solderless pressed design



braided connectors
non insulated

Standard design

Uncoated E-Copper braid, highly flexible (wire Ø 0,07/0,10 mm) with solderless pressed contact areas made out of uncoated, seamless E-Copper/Copper-ETP tubes.

Contact areas

Contact areas rectangular with bending protection (standard). Without or bending protection only on one side on request. It is also possible to change the lengths and the widths of all contact areas. In special design we deliver connectors with contact area width 140/150/160/180 and 200 mm too.

Drilling

Standard design without drilling. Drilling on request according to druseidt-type I-III or customer requirements.

Lengths

Individual acc. to customer requirements.

Insulation

Insulated design on request. Standard material is a PVC-hose. Materials like silicone, glass-fibre- or shrinking tubes etc. on request.

Liquid protected design

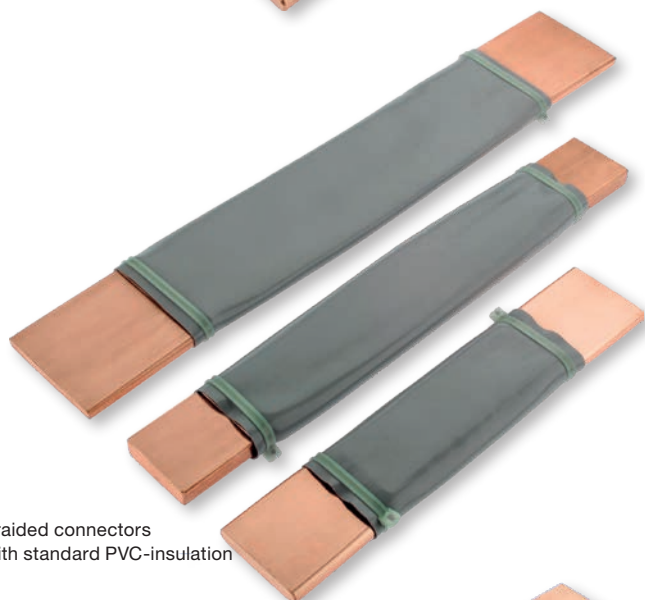
Additional liquid protected design on request.

Special designs

In special design we deliver also connectors made out of tinned wires or with coated contact areas (tin-, nickel-, silver- or gold plated) or in coordination with your application according to your drawings/samples or wishes.

When placing an order please specify

- druseidt-Part-No.
- total length
- If drilling is needed either druseidt-design I-III or acc. to your drawings or sketches.
- If insulation hoses are needed please add the word insulated behind the part-no. If you need another insulation material like PVC please specify this in your order.
- If you need an additional protection against liquids please add the remark with liquid protection.
- If connections with surface coated contact areas are required, please specify (type of coating and possibly desired layer thicknesses)

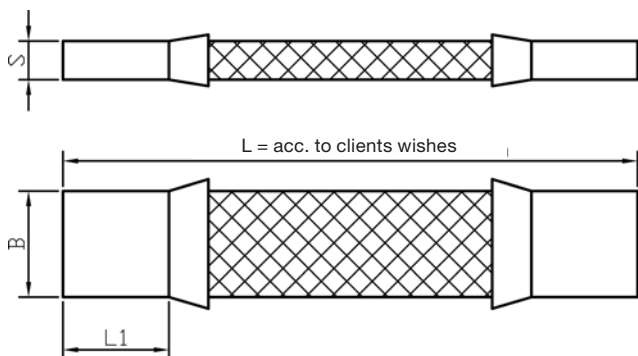


braided connectors
with standard PVC-insulation



braided connectors
PVC insulated
and liquid protected

Highly flexible copper connectors in solderless pressed design 25-4500 mm²



Technical data

Braids:

- made out of copper ETP1-wires acc. to DIN 13602
- soft annealed
- uncoated surface is standard
- tinned surface on request
- wire-Ø 0,10 mm

Contact areas:

- seamless copper-ETP-tube
- uncoated surface is standard
- tin-, nickel-, silver-, gold-coated surface on request

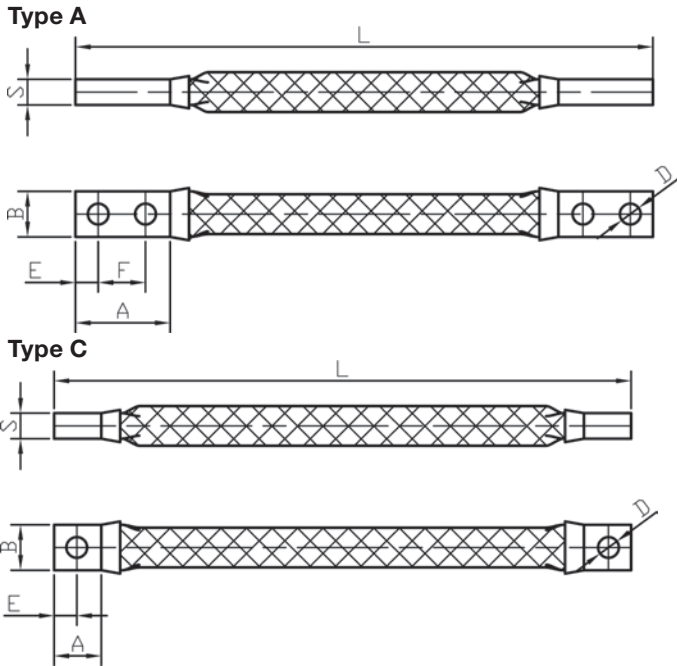
Insulation:

- PVC-hose (standard)
- Silicone-, glass-fibre-, shrinking tubes or others on request

Part-No.	Technical data						standard drilling patterns
	cross-section mm ²	dimensions ca. mm			current-load Ampere		
		B	L ₁	S	DC	AC	
02930	25	20	20	3,5	150	140	Type I
02931	50			5	250	240	
02932	75			6,4	350	340	
02933	100			8	400	380	
02934	25	25	25	3,3	150	140	
02935	50			4,5	300	280	
02936	75			5,5	350	340	
02937	100			6,6	450	420	
02938	125			7,8	500	470	
02939	50	30	30	4	300	290	
02940	75			5	400	390	
02941	100			5,8	450	440	
02942	150			8,5	550	540	
02943	200			10,7	650	640	
02944	300			14,1	800	790	
02945	100	40	40	6,9	500	480	
02946	150			7,1	600	590	
02947	200			8,4	700	680	
02948	250			9,8	800	780	
02949	300			11,7	900	850	
02950	400			13,9	1000	980	
02951	140	50	50	6	650	630	Type II
02952	210			7,4	800	780	
02953	280			9	950	900	
02954	420			13,1	1050	1000	
02955	560			16,2	1350	1200	
02956	140	60	60	6,5	700	680	
02957	210			7,9	900	850	
02958	350			10,4	1150	1100	
02959	490			13,1	1350	1300	
02960	560			14,6	1400	1350	
02961	340	80	80	8,9	1200	1100	Type III
02962	520			10,9	1500	1400	
02963	700			13,7	1700	1600	
02964	840			15,5	1900	1800	
02965	1000			18,7	2100	1950	
02966	500	100	100	10	1600	1500	
02967	670			11,5	1850	1790	
02968	860			14	2100	2000	
02969	1000			16,5	2250	2150	
02970	1200			19	2450	2350	
02971	1500			22,5	2700	2550	
02972	610	120	120	10,8	1900	1750	
02973	1000			14,8	2650	2500	
02974	1540			20	3400	3200	
02975	2000			24,5	3950	3800	
02976	3000			34	4800	4550	
02977	4500			49	5400	5400	

Remark: All information about current-load are approximate values for a non insulated design. The reducing factor for an insulated design depending on the application is between 15-20 %. Please notice that the temperature of the conductor is in dependent on the installation, the application, the cooling, the ambient temperature etc. So that if necessary reducing factors are to be considered. With pleasure our employees assist your company in finding optimal solutions.

**Air cooled high current cables
made out of stranded copper cables
with and without insulation, in solderless pressed design**



Standard design

Manufactured out of highly flexible round stranded copper cables with bare wires, wire-Ø 0,10 mm (standard) or 0,30 mm on request. With solderless pressed contact areas made out of uncoated, seamless E-Copper/copper-ETP tubes.

Contact areas

Contact areas rectangular with bending protection (standard). Without or bending protection only on one side on request. On request it is also possible to change the length of all contact areas.

Drillings

Standard drilling acc. to type A or C or acc. to your wishes.

Length

According to your wishes.

Insulation

Standard insulation material is a PVC-hose. Other materials like silicone, glass-fibre- or shrinking tubes etc. on request.

Special designs

In special design we deliver also connectors made out of tinned wires or with coated contact areas (tin-, nickel-, silver- or gold plated) or in coordination with your application according to your drawings, samples or wishes.

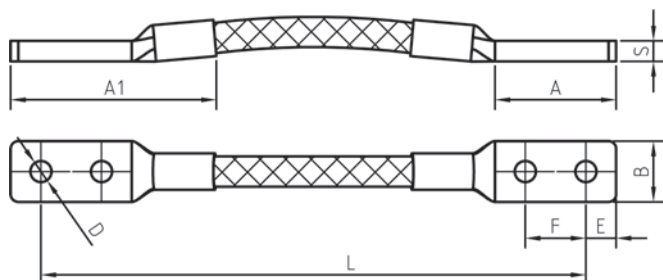
	Part-No.		Technical data									
	Un-insulated	PVC-insulated	cross-section mm ²	current-load	dimensions ca. mm							
					A	B	D	E	F	S	L	
Type A	15378	15448	70	300 A	30	15	7	7,5	15	8,5		
	15379	15449	95	360 A	40	20	9	10	20	8,2		
	15380	15450	120	420 A	40	20	9	10	20	10,0		
	15391	15451	150	480 A	50	25	11	12,5	25	11,5		
	15381	15452	185	570 A	50	25	11	12,5	25	13,5		
	15382	15453	240	670 A	60	32	11	16	32	12,8		
	15383	15454	300	780 A	80	40	14	20	40	13,3		
	15384	15455	400	950 A	80	40	14	20	40	15,5		
	15385	15456	500	1100 A	80	40	14	20	40	23,5		
	15386	15457	600	1250 A	80	55	14	20	40	18,8	according to customers wishes	
	15387	15458	700	1375 A	80	55	14	20	40	20,2		
	15388	15459	750	1450 A	80	55	14	20	40	21,8		
15389	15460	850	1550 A	80	55	14	20	40	22,3			
15390	15461	1000	1800 A	80	55	14	20	40	26,9			
Type C	15398	15465	70	300 A	15	15	7	7,5	-	8,5		according to customers wishes
	15399	15466	95	360 A	20	20	9	10	-	8,2		
	15400	15467	120	420 A	20	20	9	10	-	10,0		
	15411	15468	150	480 A	25	25	11	12,5	-	11,5		
	15401	15469	185	570 A	25	25	11	12,5	-	13,5		
	15402	15470	240	670 A	32	32	11	16	-	12,8		
	15403	15471	300	780 A	40	40	14	20	-	13,3		
	15404	15472	400	950 A	40	40	14	20	-	15,5		
	15405	15473	500	1100 A	40	40	14	20	-	23,5		
	15406	15474	600	1250 A	40	55	14	20	-	18,8		
	15407	15475	700	1375 A	40	55	14	20	-	20,2		
	15408	15476	750	1450 A	40	55	14	20	-	21,8		
15409	15477	850	1550 A	40	55	14	20	-	22,3			
15410	15478	1000	1800 A	50	55	14	20	-	26,9			

Remark:

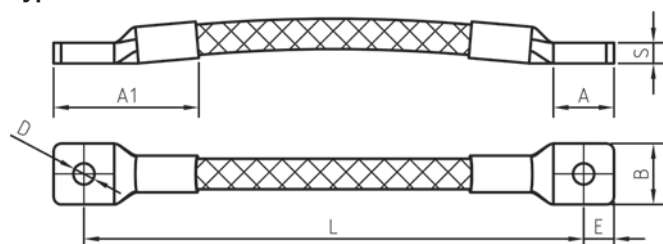
All information about current-load are approximate values for single laying of air cooled cables and ambient temperature + 35 °C and a conductor temperature of circa + 70 °C. The temperature of the conductor is in dependent on the installation, the application, the cooling, the ambient temperature etc. so that if necessary reducing factors are to be considered. The reducing factor for an insulated design depending on the application is between 15-20 %.

**Air cooled high current cables
made out of stranded copper cables,
with and without insulation,
in solderless pressed design**

Type A



Type C



Standard design

Manufactured out of highly flexible round stranded copper cables with bare wires, wire-Ø 0,10 mm (standard) or 0,30 mm on request. With solderless pressed contact areas made out of uncoated, seamless E-Copper/copper-ETP tubes.

Contact areas

Contact areas shaped like a cable lug, so that two cables can also be mounted against each other on one connection bar.

Drillings

Standard drilling according to type A or C or according to your wishes.

Lengths

According to your wishes.

Insulation

Standard insulation material is a PVC-hose. Other materials like silicone, glass-fibre or shrinking tubes etc. on request.

Special designs

In special design we deliver also connectors made out of tinned wires or with coated contact areas (tin-, nickel-, silver- or gold plated) or in coordination with your application according to your drawings, samples or wishes.

	Part-No.		Technical data									
	Un-insulated	PVC-insulated	cross-section mm ²	current-load	dimensions ca. mm							
					A	A ₁	B	D	E	F	S	
Type A	14645	14700	70	300 A	30	50	15	7	7,5	15	8,5	according to customers wishes
	14646	14701	95	360 A	40	70	20	9	10	20	8,2	
	14647	14702	120	420 A	40	70	20	9	10	20	11,0	
	14648	14703	150	480 A	50	80	25	11	12,5	25	11,5	
	14649	14704	185	570 A	50	80	25	11	12,5	25	13,0	
	14650	14705	240	670 A	60	90	32	11	16	32	12,5	
	14651	14706	300	780 A	80	135	40	14	20	40	13,5	
	14652	14707	400	950 A	80	135	40	14	20	40	15,5	
	14653	14708	500	1100 A	80	135	40	14	20	40	22,0	
	14654	14709	600	1250 A	80	135	55	14	20	40	17,0	
	14655	14710	750	1450 A	80	135	55	14	20	40	21,0	
	14656	14711	850	1550 A	80	135	55	14	20	40	22,3	
14657	14712	1000	1800 A	80	135	60	14	20	40	24,5		
Type C	14660	14715	70	300 A	15	35	15	7	7,5	-	8,5	according to customers wishes
	14661	14716	95	360 A	20	50	20	9	10	-	8,2	
	14662	14717	120	420 A	20	50	20	9	10	-	11,0	
	14663	14718	150	480 A	25	55	25	11	12,5	-	11,5	
	14664	14719	185	570 A	25	55	25	11	12,5	-	13,0	
	14665	14720	240	670 A	32	62	32	11	16	-	12,5	
	14666	14721	300	780 A	40	95	40	14	20	-	13,5	
	14667	14722	400	950 A	40	95	40	14	20	-	15,5	
	14668	14723	500	1100 A	40	95	40	14	20	-	22,0	
	14669	14724	600	1250 A	40	95	55	14	20	-	17,0	
	14670	14725	750	1450 A	40	95	55	14	20	-	21,0	
	14671	14726	850	1550 A	40	95	55	14	20	-	22,3	
14672	14727	1000	1800 A	50	105	60	14	20	-	24,5		

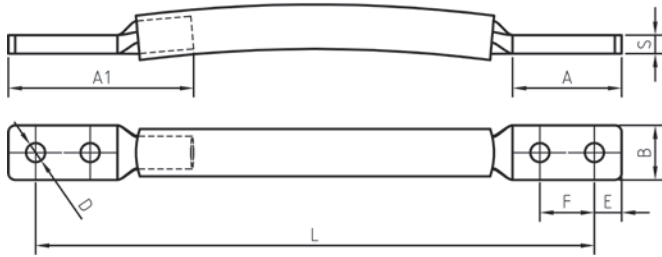
Remark:

All information about current-load are approximate values for single laying of air cooled cables and ambient temperature + 35 °C and a conductor temperature of circa + 70 °C. The temperature of the conductor is in dependent on the installation, the application, the cooling, the ambient temperature etc. so that if necessary reducing factors are to be considered. The reducing factor for an insulated design depending on the application is between 15-20 %.

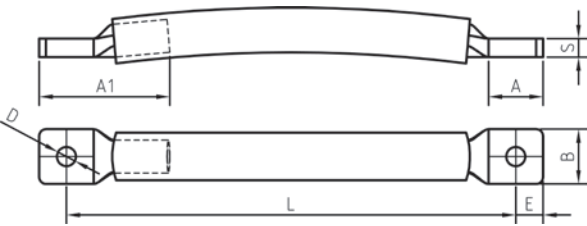


High current cables with fire protection hose

Type A



Type C



Applications

Everywhere, where flexible high current connections with an extremely heat resistance insulation material are needed. E.g. inside of steel-, foundry-, glass-melting or non-ferrous industry as well as inside of the chemical-, railway- or shipbuilding industry.

Special designs

In special design we deliver also connectors made out of tinned wires or with coated contact areas (tin-, nickel, silver- or gold plated) or in coordination with your application according to your drawings, samples or wishes.

Standard design

Manufactured out of highly flexible round stranded copper cables with wire-Ø 0,10 mm (standard) or 0,30 mm on request. With solderless pressed contact areas made out of uncoated, seamless E-copper tubes.

Contact areas

Contact areas shaped like a cable lug, so that it is possible to install also two cables to one connection bar.

Drillings

Standard drilling acc. to Type A or C or acc. to your wishes.

Length

According to your wishes.

Insulation

Special fire protection hose. Protection against high temperatures, open flames and metal splashes. With inner hose made out of calcium-silicate-yarns and outer silicone cover according to description on catalogue page 120.

Inner sleeve

Non inflammable temperature resistance continuously up to approx. + 800 °C, shortly up to approx. + 1100 °C

Silicone cover

Hardly inflammable, self-extinguishing, temp. resistance continuously up to approx. + 300 °C, shortly up to approx. + 500 °C.



	Part-No.	Technical data										
		cross-section mm ²	current-load	dimensions ca. mm								L
				A	A ₁	B	D	E	F	S		
Type A	15338	70	250 A	30	50	15	7	7,5	15	8,5	according to customers wishes	
	15339	95	300 A	40	70	20	9	10	20	8,2		
	15340	120	350 A	40	70	20	9	10	20	11,0		
	15341	150	400 A	50	80	25	11	12,5	25	11,5		
	15342	185	475 A	50	80	25	11	12,5	25	13,0		
	15343	240	570 A	60	90	32	11	16	32	12,5		
	15344	300	650 A	80	135	40	14	20	40	13,5		
	15345	400	800 A	80	135	40	14	20	40	15,5		
	15346	500	925 A	80	135	40	14	20	40	22,0		
	15347	600	1050 A	80	135	55	14	20	40	17,0		
15348	750	1225 A	80	135	55	14	20	40	21,0			
Type C	15358	70	250 A	15	35	15	7	7,5	40	8,5	according to customers wishes	
	15359	95	300 A	20	50	20	9	10	40	8,2		
	15360	120	350 A	20	50	20	9	10	-	11,0		
	15361	150	400 A	25	55	25	11	12,5	-	11,5		
	15362	185	475 A	25	55	25	11	12,5	-	13,0		
	15363	240	570 A	32	62	32	11	16	-	12,5		
	15364	300	650 A	40	95	40	14	20	-	13,5		
	15365	400	800 A	40	95	40	14	20	-	15,5		
	15366	500	925 A	40	95	40	14	20	-	22,0		
	15367	600	1050 A	40	95	55	14	20	-	17,0		
15368	750	1225 A	40	95	55	14	20	-	21,0			

Remark:

All information about current-load are approximate values for single laying of air cooled cables and ambient temperature + 35 °C and a conductor temperature of approx. + 70 °C. The temperature of the conductor is in dependent on the installation, the application, the cooling, the ambient temperature etc. so that if necessary reducing factors are to be considered. With pleasure our employees assist your company in finding optimal solutions.

Flexible connectors used in welding guns and welding machines in air- and water cooled design

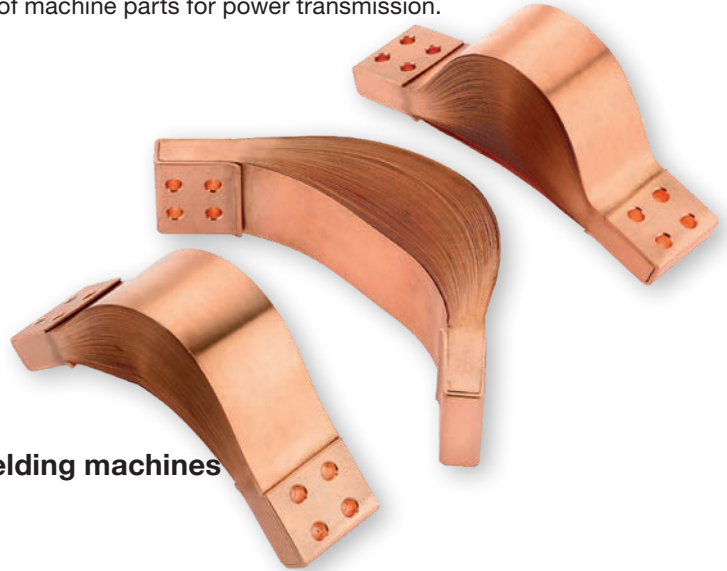
We manufacture flexible connectors for different kinds of application inside of welding guns and welding machines in serious production as well as spare parts according to your drawings or samples. Following designs are standard:

- Manufactured out of round stranded copper cables
- Manufactured out of braided copper tapes
- Manufactured out of copper strips for welding guns and welding machines
- Manufactured out of copper strips with water cooled contact areas
- Manufactured out of copper strips in electron-beam welded design
- Manufactured as water cooled cables

Flexible laminated connectors used in welding guns

Where current leading connections within welding guns have to carry out movements in max. two dimensions (not transverse to the foils), our flexible laminated connectors are used. They are manufactured as standard from copper foils with thickness 0,10 mm or 0,20 mm in a press-riveted design. In the press riveting process we use, layered foils are riveted under pressure. In order to be able to offer the rivets appropriate hold, either caps or cover plates are provided at the ends, when then serve as a contact surface. The strength of the copper material intended for production must be adapted to the movement to be carried out. Only laminated connectors that are correctly designed in terms of dimensions and materials achieve the longest possible service life. Electron beam welded versions are also available for special applications.

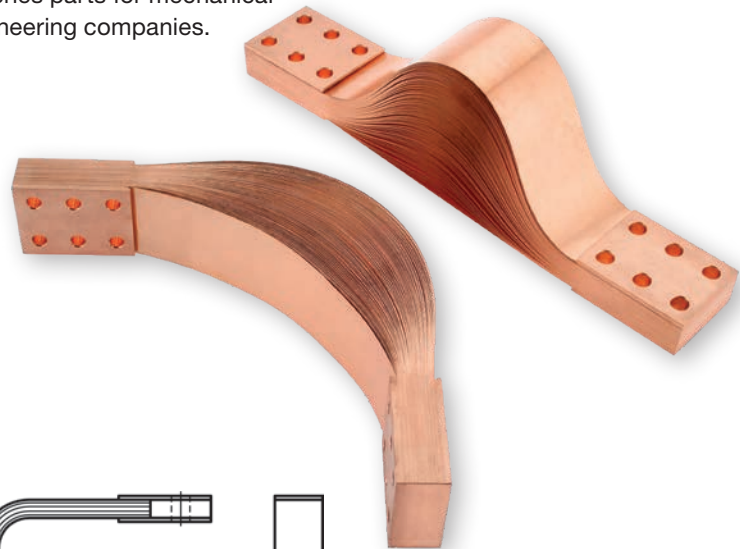
With this welding process the welding procedure is made without any appreciable heat effect on the copper material, so that the desired spring effect of the copper material is maintained. We are happy to advise you on your applications and offer you our experience as early as the design phase of machine parts for power transmission.



Flexible laminated connectors used in resistance welding machines

In addition to our designs of laminated connectors for welding guns, we also manufacture a variety of designs for applications in the field of resistance welding machines. From the smallest foil connector similar to the welding gun designs up to cross-sections of 2000 mm² and more as well as connection surfaces in widths of up to 200 mm. We are also specialized in the manufacture of solid and flexible current transfer components for conductive heating systems. Wherever current transmission elements have to carry out movements, we are your suitable contact partner.

Whether press riveted or welded, whether with air- or water-cooled connection areas, we manufacture suitable parts and components tailored to your application. CNC machined solid copper parts according to drawings or customer requirements are also part of our delivery programme. We manufacture individual and spare parts as well as complete electrical machine equipment or series parts for mechanical engineering companies.

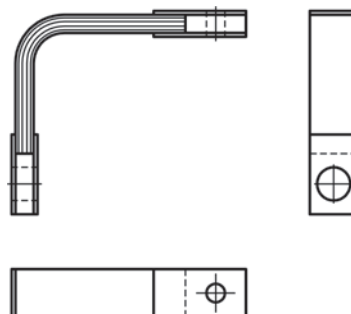


Necessary order details:

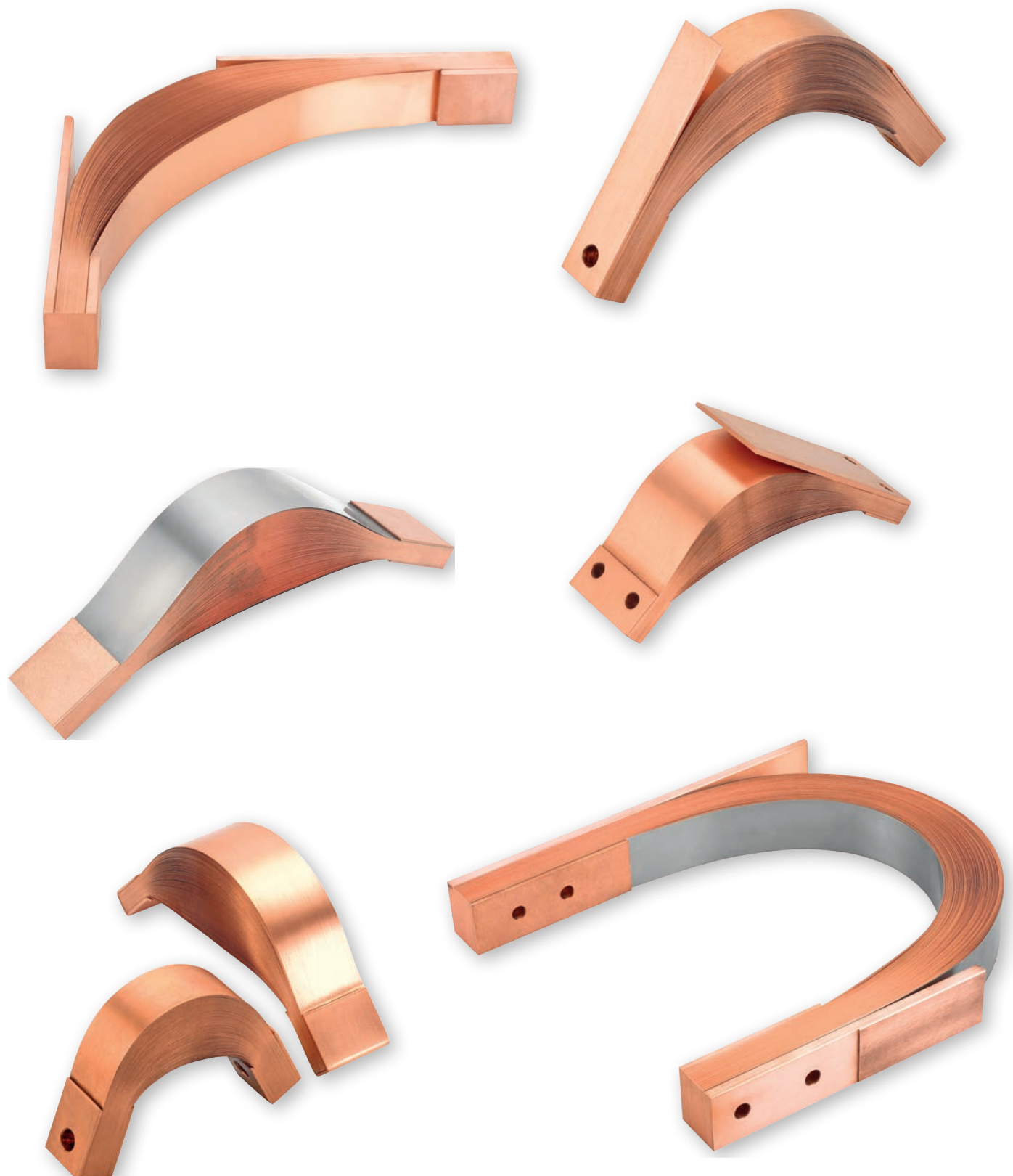
For laminated connectors not yet purchased from us, we require the following information for dimensional dimensioning:

- Cross-section
- Dimension acc. drawing
- Outer stretched length
- Mounting position 90 or 180 degrees pre-bent
- Desired drilling

To facilitate order/inquiry processing, you can enter the required dimensions directly in our drawing form on page 134 of this catalogue and send it to us. Please do not hesitate to contact us if you have any questions.



We supply laminated foil connectors for welding applications in almost every technically possible design, also with additional splash protection lamella made of stainless steel or with extended connection plates for execution of unwinding movements. Here a few examples.



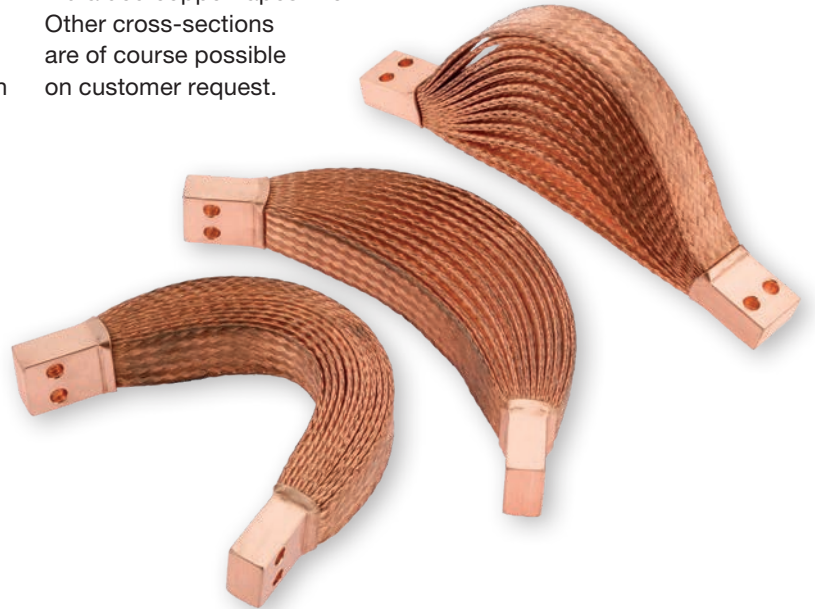
Highly flexible air cooled braided connectors

used in welding guns

Where current connections within welding guns have to perform movements in all 3-dimensions, a particularly high degree of flexibility is required. Our braided connectors consisting of several layers of highly flexible braided copper tapes with a single wire-Ø of 0,10 mm are used here. At the ends seamless copper contact sleeves are pressed-on under high pressure without using any other materials. The connection areas are flared towards the stranded wires as kink protection. We use our flat braided copper tapes that we manufacture in our company as the basic material. The conductor structure and the braiding angles are designed for carrying out also movements. With a correct dimensioning, very good service lives can be achieved. For welding gun applications we supply connections according to customer standard, sample or drawing with connection surfaces of 30 - 50 mm width consisting of several layers like

- braided copper tapes 35 mm²
- braided copper tapes 50 mm²
- braided copper tapes 70 mm²
- braided copper tapes 120 mm²

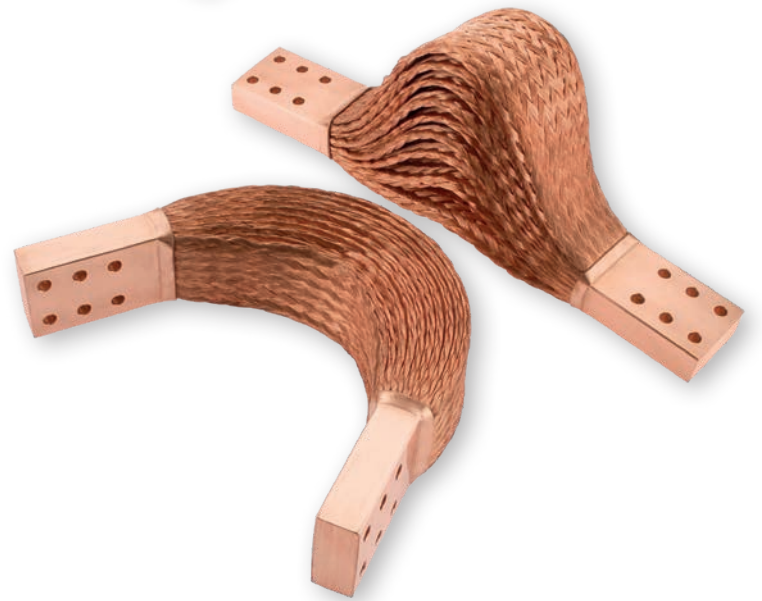
Other cross-sections are of course possible on customer request.



Highly flexible air cooled braided connectors

used in resistance welding machines

Also for applications in the field of resistance welding machines, flexible power connections may be required that have to perform movements in several dimensions. For such applications we also manufacture flexible connections consisting of several layer of flat braided copper tapes similar to the welding gun designs but in connection width up to 120 mm or wider and in cross-sections up to approx. 4000 mm². Our highly flexible braided copper tapes with single wire-Ø 0,10 mm are also used here. Versions with perforated or non-perforated protective hoses are also available. On request, we are also happy to offer our constructive support in the design of flexible power connections.

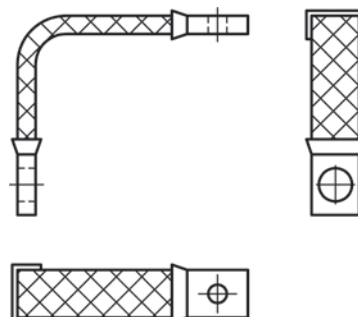


Necessary order details:

For braided connectors not yet purchased from us, we require the following information for dimensional dimensioning:

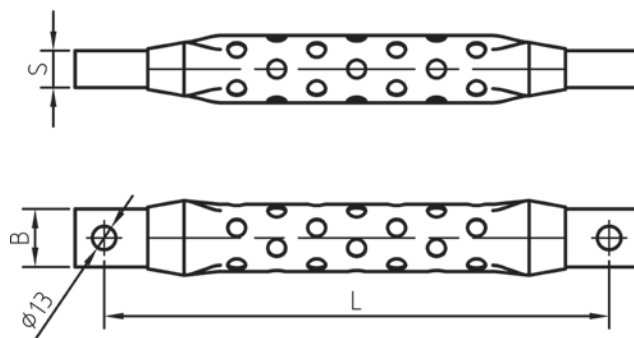
- Cross-section
- Dimension acc. drawing
- Outer stretched length
- Mounting position 90 or 180 degrees pre-bent
- Desired drilling

To facilitate order/inquiry processing, you can enter the required dimensions directly in our drawing form on page 134 of this catalogue and send it to us. Please do not hesitate to contact us if you have any questions.

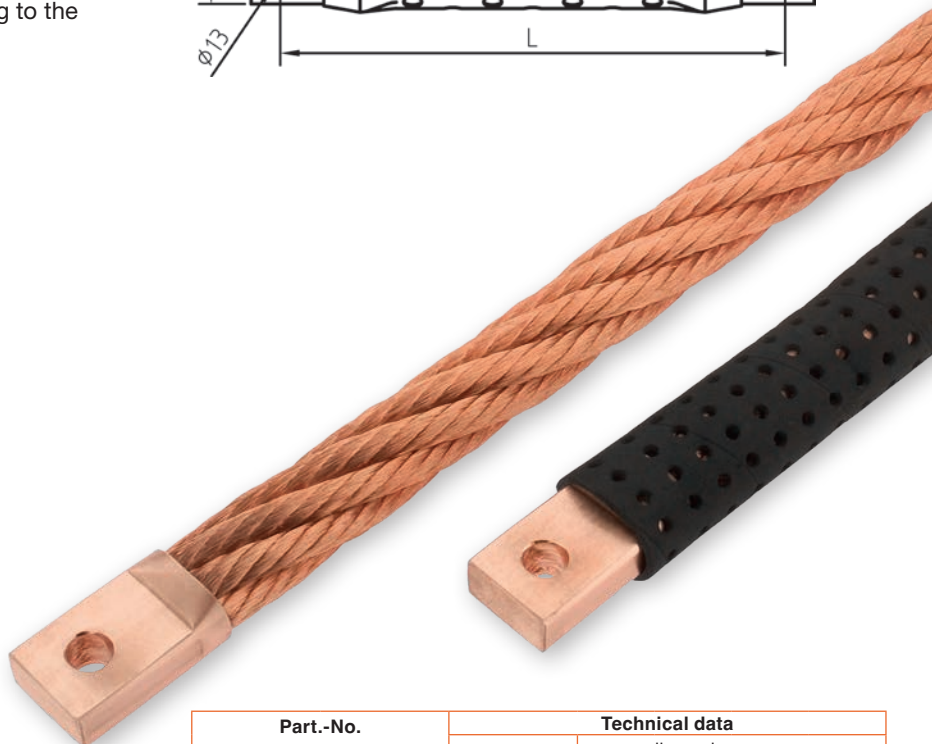
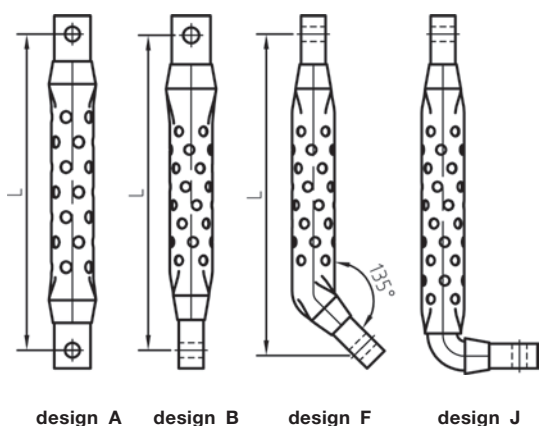


Air cooled round stranded cables for welding machines

Insulated or non-insulated flexible cables manufactured out of uncoated round stranded copper cables with a wire-Ø of 0,10 mm. All contact areas are equipped with seamless solderless pressed E-copper tubes. For a better thermal removal our standard insulation consists out of a flexible perforated insulation hose. The special construction of the conductor ropes combined with the kink protection at the end of the contact areas offer a good lifetime of the cables. We deliver the cables in different designs according to the following data table and design drawings.



Designs



When placing an order please specify:

- druseidt Part-No.
- Design A/B/F or J
- Length (dimension L)

Part.-No.		Technical data				
uncoated	insulated	cross-section mm ²	dimensions ca. mm			
			A	B	S	L
15330	15350	200	40	32	11,8	according to customers wishes
15331	15351	250	40	32	13,0	
15332	15352	300	40	32	15,0	
15333	15353	400	40	32	20,3	
15334	15354	500	40	32	23,0	
15335	15355	600	40	38	25,0	
15336	15356	750	40	38	30,5	
15337	15357	850	40	38	32,0	

Allowable current load

according to DIN EN ISO 5828

$$I_x = I_{2P} \sqrt{\frac{100}{X}}$$

X = duty cycle

The values based on a rise in temperature of 60 °C and contact areas fixed on water cooled busbars.

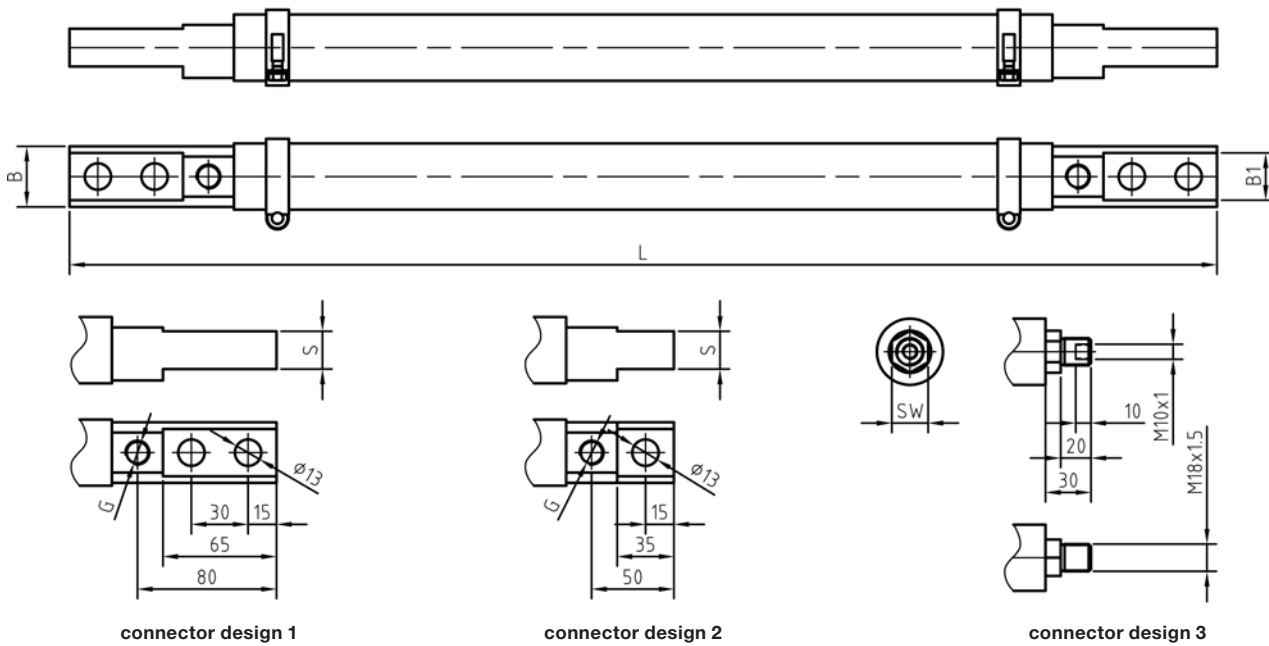
Length	Current load I _{2P} in Ampere by cross-section mm ²						
	200	250	315	400	500	630	800
160	2500	2800	3150	3550	4000	-	-
200	2240	2500	2800	3150	3550	-	-
250	2000	2240	2500	2800	3150	3550	4000
315	1800	2000	2240	2500	2800	3150	3550
355	1700	1900	2120	2360	2650	3000	3350
400	1600	1800	2000	2240	2500	2800	3150
450	1500	1700	1900	2120	2360	2650	3000
500	1400	1600	1800	2000	2240	2500	2800
560	-	-	-	1900	2120	2360	2650
630	-	-	-	1800	2000	2240	2500

Water cooled single conductor cables

used in welding devices

Our water cooled cables for applications inside of welding machines or welding devices are available in different designs. Type B is equipped with contact ends according to our druseidt specification and the types C and D are in accordance with DIN EN ISO 8205-2. The connection between the contact ends and the conductor rope is realized by a solderless crimp-process, so that an optimized electrical resistance and a low loss current transfer is guaranteed. The construction of the conductor ropes as well as the high quality water hoses offer an excellent flexibility and mechanical stability. The cables can be used also for welding robot applications.

The wall thickness (approx. 4,5 mm) of our standardized hose is in acc. to the description on page 73. For special applications, requiring a very high flexibility, we offer hoses with a reduced wall thickness. Additionally to our standardized designs we deliver cables according to your drawings/samples or wishes up to a cross-section of 1000 mm².



Deliverable standard designs:

Type B = contact areas on both sides design 1

Type C = contact areas on both sides design 2

Type D = contact areas one side design 2 and design 3 at the other side

Other variations are available on request.

Remark:

Information about current-capacities for welding applications is contained in the DIN EN ISO 8250-2. Information for current capacities for other applications is available on request.

Operating pressure: max. 6 bar

Testing pressure: 10 bar

Part.-No.	Technical data						
	cross-section mm ²	dimensions ca. mm					
	B	B ₁	S	G	S	L	
30638 B	120	25	21	13	1/4 "	-	according to customers wishes
30640 B	150	28	24	15	1/4 "	-	
30641 B	185	28	23	16	1/4 "	-	
30644 B	240	32	26	18	1/4 "	-	
30645 B	300	32	26	18	1/4 "	-	
30646 B	400	38	32	21	1/4 "	-	
30647 B	500	42	34	24	1/4 "	-	
30638 C	120	25	21	13	1/4 "	-	according to customers wishes
30640 C	150	28	24	15	1/4 "	-	
30641 C	185	28	23	16	1/4 "	-	
30644 C	240	32	26	18	1/4 "	-	
30645 C	300	32	26	18	1/4 "	-	
30646 C	400	38	32	21	1/4 "	-	
30647 C	500	42	34	24	1/4 "	-	
30638 D	120	25	21	13	1/4 "	21	according to customers wishes
30640 D	150	28	24	15	1/4 "	24	
30641 D	185	28	23	16	1/4 "	24	
30644 D	240	32	26	18	1/4 "	24	
30645 D	300	32	26	18	1/4 "	27	

Water cooled single conductor cables according to customer requirements

We also supply water-cooled single conductor cables for welding guns, welding robots or resistance welding devices that are customized to the installation situation. The cable heads can also be made according to the customers' wishes, samples or drawings.

Water cooled cables with pre-bent cooling water hoses or hoses with wall thickness other than standard are also available for corresponding order quantities. In this way, the service life of the cables can be further increased by selecting suitable components.



Cooling water hoses for water cooled welding cables



Part.-No.	dimensions ca. mm		Technical data
	inner-Ø	Wall-thickness	description
15320	25	4,5	sturdy flexible rubber hose electrically non-conductive
15321	28	4,5	operating pressure: max. 6 bar
15322	32	4,5	bursting pressure: approx. 18 bar
15323	35	4,5	suitable for water temperatures up to + 70 °C
15324	38	4,5	dielectric strength: 5 kV
15325	42	4,5	

Water cooled cables according to customers' wishes

We produce water cooled cables for various kinds of applications and with contact ends matched to the customers' wishes or adapted to the respective installation situation. The design of the cooling water hoses can also be adapted to the application.



Water cooled high current cables

These special cables are ideally suited for the transmission of high currents in the steel, foundry, non-ferrous or glass melting industries, for example within melting and heating plants such as electric-arc, ladle, induction, reduction, vacuum or graphitizing furnaces.

We produce water cooled cables with conductor cross-sections up to 6500 mm² matched to their respective application, e.g. as

- single or multi conductor cables
- hollow core cables
- with pipe connections
- high power cables with or without rotating joints for electric arc and ladle furnaces

A fast repair of all common types of cables in a short time also belongs to our service and delivery program.



Water cooled high current cables

with solderless pressed cable heads
preferably for mains frequency



Water cooled cables in standard design



Solderless pressed cable head
in druseidt crimp-technology

Construction and application

For mains frequency applications we deliver single- or multi-conductor cables up to a cross-section range of 2000 mm². Single conductor cables are manufactured in the cross-section range up to 1000 mm² and from 1200 mm² multi-conductor cables. Ideally suited as space-saving flexible high current cables in the field of induction plants inside of the steel melting-, foundry-, non-ferrous metal or glass-melting industry or similar applications.

Cable heads and cooling

All druseidt cable heads are manufactured out of E-copper/ copper-ETP with extremely high conductivity. To prevent slippage of the cooling water hoses surely they are provided with an edged surface. The location and design of the cooling bores are so selected, that an optimized flow of cooling water as possible is given. The cables are delivered without nipples as standard. These can be additionally ordered as accessories according to the table on page 82. In contrary to the standard design it is also possible to displace the cooling bores 90° or to change the thread size.

druseidt coolant water hoses

Our coolant water hoses are of high quality and have been proven in practice for many years. They are built up in multilayer design, electrically insulated with flame retardant, self-extinguishing cover. These hoses reach even under adverse operating conditions a good life time. **The maximum allowed operating pressure is 6 bar** and all cables are tested with a pressure of 10 bar before leaving our factory.

druseidt crimp technology

The connection between the flexible copper ropes and the cable heads will be realized by a special solderless crimping process. The therefore used special crimp technology, in combination with a pressure of some hundred tons, guarantee an optimized electrical connection as well as an economical production process. The flexible conductor ropes are crimped extensively all around and optimally compressed. By using stored machine settings the druseidt crimp technology is reproducible at any time, minimizes the electrical resistances, thus reducing the electrical losses.

Cables with additionally clamps (cable design B)

To ensure secure fixture, all single conductor cables can be equipped with additional clamping parts for easy mounting of longer cables. These additionally into the conductor introduced solid parts ensure an easy fitting to the points marked by clamping and holding devices. Squeezing the hose together and as consequence hose damages as well as a reduced water flow are thereby avoided.

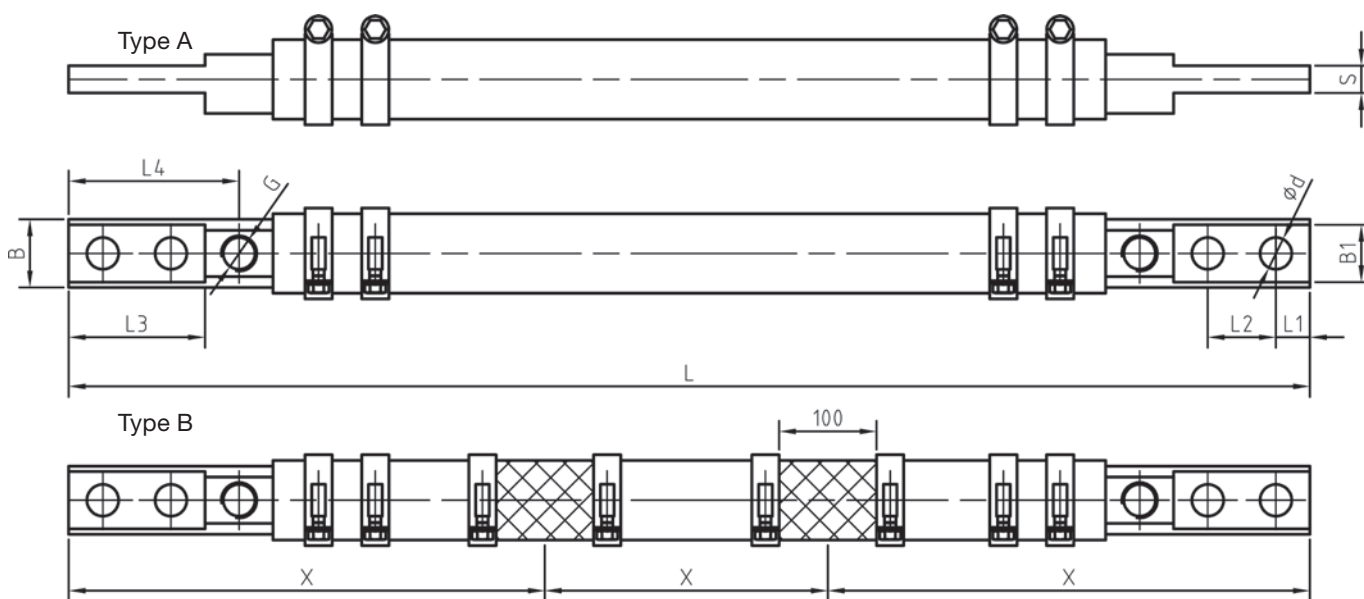
Current load

The heating losses are dependent on the specific loading per unit area and are proportional to the square current. Our declared values about current load are only possible approximate values. We advise you with pleasure on your individual applications.

Water cooled high current cables 120-1000 mm²

with solderless pressed cable heads

preferably for mains frequency



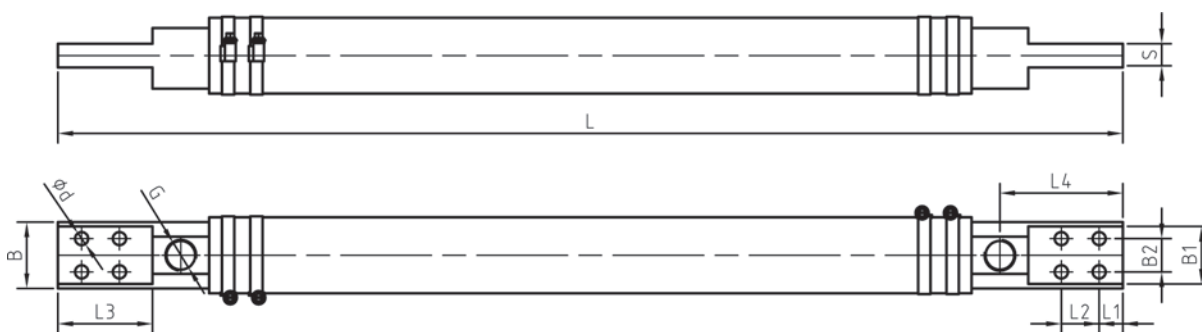
Remark:
 Type B with additional clamping parts for easy and secure mounting of longer cables.
 When ordering, please specify the number and position of the desired clamping pieces

Part-No.		Technical data												
Type A	Type B	cross-section mm ²	current load	dimensions ca. mm										L
				L1	L2	L3	L4	B	B1	d	G	S		
30600 A	30600 B	120	1600 A	12,5	25	50	60	25	23	11	1/4"	10	according to customers wishes	
30601 A	30601 B	185	2500 A	15	30	60	75	30	28	14	3/8"	12		
30602 A	30602 B	300	3700 A	15	30	60	75	35	32	14	3/8"	15		
30603 A	30603 B	400	4500 A	20	40	80	95	42	37	18	3/8"	20		
30604 A	30604 B	500	5500 A	20	40	80	95	55	51	18	3/8"	20		
30605 A	30605 B	750	7500 A	20	40	80	95	55	49	18	3/8"	25		
30606 A	30606 B	1000	10000 A	25	50	100	120	70	63	22	1/2"	30		

Water cooled high current cables 750-2000 mm²

with solderless pressed cable heads

preferably for mains frequency



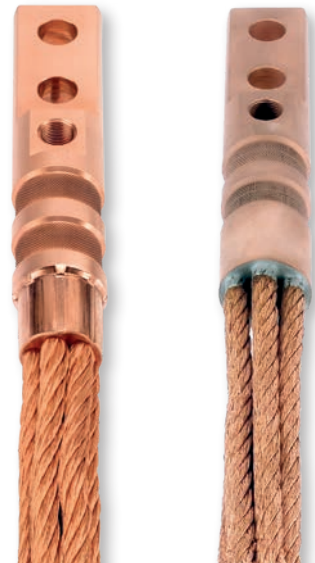
Part-No.		Technical data												
		cross-section mm ²	current load	dimensions ca. mm										L
				L1	L2	L3	L4	B	B1	B2	d	G	S	
30615		750	7500 A	20	40	85	105	65	61	30	14	3/4"	22	according to customers wishes
30616		1000	10000 A	25	40	100	130	70	65	35	14	1"	25	
30617		1200	12000 A	30	50	120	150	80	74	40	14	1"	30	
30618		1600	16000 A	30	50	120	150	90	83	40	14	1"	35	
30619		2000	20000 A	35	60	140	170	100	94	40	14	1"	35	

Water cooled hollow core cables

with solderless pressed or soldered cable heads preferably for medium frequency



Hollow core cables in standard design



Cable heads solderless crimped resp. in soldered design

Construction and application

Due to their special conductor construction and the relative large surface of the flexible inner conductors druseidt hollow core cables are especially suitable for applications in the field of medium frequency up to 10 kHz. At frequencies up to 2 kHz cables are manufactured as standard with bare or on request tinned inner conductors. For applications > 2 kHz inner conductors with double enamel-insulated wires are used. Thus the displacement current (skin-effect) by AC-current in conjunction with the higher frequency is taken into account. Because the penetration depth of the current gets smaller when the frequency increases, that current capacity of the conductor will be reduced more and more. When splitting the conductor in many isolated wires the effective electrical cross-section raise and increase the current capacity of the cable. All conductors with bigger cross-sections are wrapped around a non-magnetic spring core which keeps them at a distance and allow an optimal cooling water flow. Due to the construction of hollow core cables larger quantities of cooling water can be enforced, so that an improved heat dissipation takes place.

Cable heads and cooling

All druseidt cable heads are manufactured out of E-copper/ copper-ETP with extremely high conductivity. To prevent slippage of the cooling water hoses surely, they are provided with an edged surface. The location and design of the cooling bores are so selected, that an optimized flow of cooling water as possible is given. The cables are delivered without nipples as standard. These can be additionally ordered as accessories according to the table on page 82. In contrary to the standard design it is also possible to displace the cooling bores 90° or to change the thread size.

druseidt coolant water hoses

Our coolant water hoses are of high quality and have been proven in practice for many years. They are built up in multilayer design, electrically insulated with flame retardant, self-extinguishing cover. These hoses reach even under adverse operating conditions a good life time. **The maximum allowed operating pressure is 6 bar** and all cables are tested with a pressure of 10 bar before leaving our factory.

Connection of the cable heads with the inner conductor

In case of hollow core cables for applications up to 2 kHz (Part-No. 30673-30679), the connection between the flexible copper ropes and the cable heads will be realized by a special crimping process. The therefore used special druseidt crimp technology guarantees, in combination with a pressure of some hundred tons, an optimized electrical connection. The flexible conductor ropes are crimped extensively all around and being optimal compressed. The connection with the cable heads of hollow core cables for application up to 10 kHz (Part-No. 30610-30686) with enameled wires, will be realized by a soldering process.

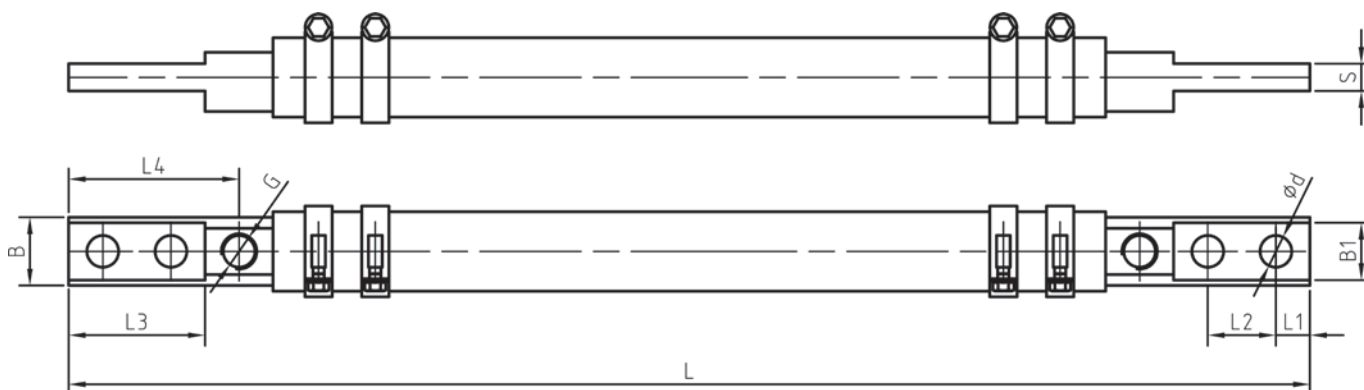
Current load

The heating losses are dependent on the specific loading per unit area and are proportional to the square of current. Our declared values about current load are only possible approximate values. We advise you with pleasure on your individual applications.

Cables in special design and cable repairs

Additionally to our standard designs we manufacture also cables in special design with individual cable heads or designs according to your wishes (e.g. replacement parts for all common electro-furnaces from all well known manufacturers on the market). We also undertake cable repairs in a short time for our cables as well as those of other manufacturers.

Water cooled hollow core cables



Water cooled hollow core cables 300-1000 mm²

for medium frequency up to 2000 Hz
with solderless crimped cable heads

Part-No.	Technical data														
	cross-section mm ²	current load A at				dimensions ca. mm									
		50 Hz	500 Hz	1000 Hz	2000 Hz	L1	L2	L3	L4	B	B1	d	G	S	L
30673	300	3700	3300	3100	2900	20	40	80	95	42	37	18	3/8"	20	according to customers wishes
30674	400	4500	4100	3800	3600	20	40	80	95	50	43,3	18	3/8"	25	
30675	500	5500	5000	4800	4600	20	40	80	95	55	49	18	3/8"	25	
30676	600	6200	5600	5400	5100	20	40	80	95	60	52	18	3/8"	30	
30677	700	7100	6000	5800	5400	20	40	80	95	60	52	18	3/8"	30	
30678	800	8000	7100	6200	5900	25	50	100	115	70	63,3	22	3/8"	30	
30679	1000	10000	7500	6800	6000	25	50	100	115	70	63,3	22	3/8"	30	

Water cooled hollow core cables 70-1015 mm²

for medium frequency up to 10000 Hz
with soldered cable heads

Part-No.	Technical data															
	cross-section mm ²	current load A at					dimensions ca. mm									
		50 Hz	1000 Hz	2000 Hz	4000 Hz	10000 Hz	L1	L2	L3	L4	B	B1	d	G	S	L
30610	70	950	920	900	800	700	12,5	25	50	65	25	22,9	11	1/4"	10	according to customers wishes
30611	105	1400	1300	1200	1100	900	15	30	60	75	30	27,5	14	3/8"	12	
30612	140	1900	1700	1600	1500	1350	15	30	60	75	35	31,6	14	3/8"	15	
30613	175	2300	2000	1900	1750	1550	20	40	80	95	42	36,9	18	3/8"	20	
30614	210	2750	2400	2250	2100	1750	20	40	80	95	42	36,9	18	3/8"	20	
30680	315	3800	3250	3050	2800	1900	20	40	80	95	42	43,3	18	3/8"	20	
30681	315	4600	4100	3850	3450	2200	20	40	80	95	50	43,3	18	3/8"	25	
30682	420	5600	5000	4850	4000	2500	20	40	80	95	55	49	18	3/8"	25	
30683	525	6700	6000	5700	4800	3000	20	40	80	95	60	52	18	3/8"	30	
30684	700	7500	6300	5900	5300	3400	20	40	80	95	60	52	18	3/8"	30	
30685	815	8500	7200	6400	5700	3700	25	50	100	115	70	63,3	22	3/8"	30	
30686	1015	10000	7400	6600	-	-	25	50	100	115	70	63,3	22	3/8"	30	

Water cooled hollow core cables 300-1000 mm²

for medium frequency up to 2000 Hz
with solderless crimped cable heads



Water cooled hollow core cables
with pipe connection on one side



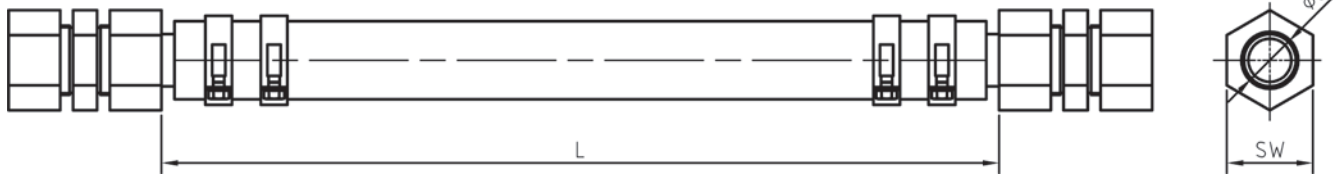
Hollow core cable
with solderless crimped cable head

Construction and application

We deliver water cooled hollow core cables equipped with pipe connections on one as well as on both sides. druseidt high current pipe connections realize watertight, current leading connections between cables and high current pipes. Flexible water cooled cables can be integrated in high current pipe systems as well as pipe outlets from electro-furnaces or other units. In the standard range fittings for a pipe-Ø 28 - 70 mm are available (described on catalogue page 81). Larger sizes or customized solutions are available on request. The connection between the flexible copper ropes and the cable heads will be realized by a special solderless crimping process. The therefore used special druseidt-crimp technology enables an extensively optimized compression all around the conductor.

druseidt-coolant water hoses

Our coolant water hoses are of high quality and have been proven in practice for many years. They are built up in multilayer design, electrically insulated with flame retardant, self-extinguishing cover. These hoses reach even under adverse operating conditions a good life time. **The maximum allowed operating pressure is 6 bar** and all cables are tested with a pressure of 10 bar before leaving our factory.



Design with pipe connection
on both sides of the cable

When placing an order please specify:

- Pipe connection on one or on both sides
- If applicable design of the second cable head
- Diameter of the pipe connection
- Design of the pipe connection
- hexagonal (standard)
- octagon
- as groove nut
- Cable cross-section and current load
- Cable length



Water cooled hollow core cable
screwed with a high current pipe

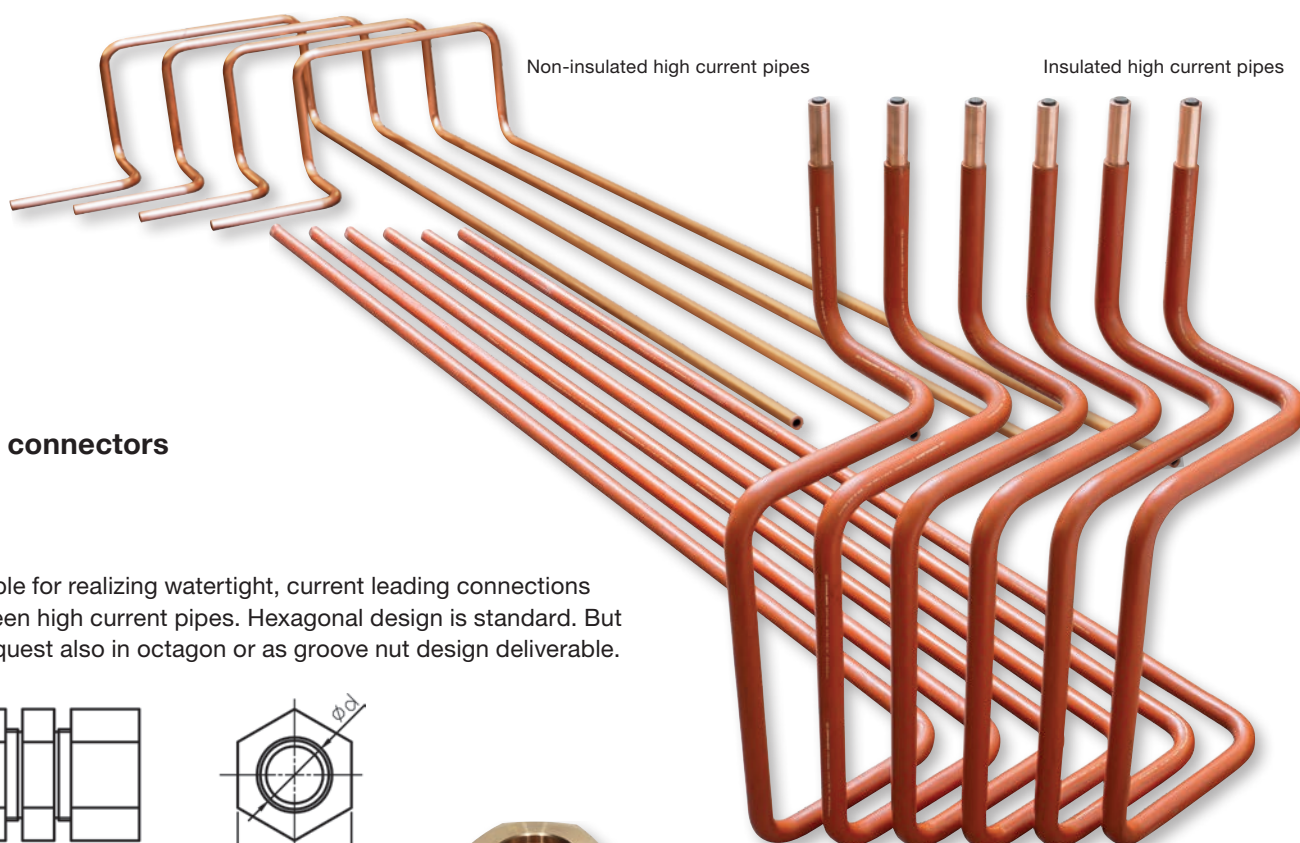
Water cooled high current pipe-systems

We carry out the engineering and manufacture of high current pipe-systems in non-insulated as well as insulated design. Such systems can be supplied ready for installation with all associated components like supports, water cooled cables, water distributors, insulating materials etc. (for example for production plants of polysilicon and similar applications). On request we accompany your installation including preparation of all necessary documentation up to final acceptance. Of course, the production of bent tubular components is possible at any time according to your drawings.

druseidt – your partner for high power transmission

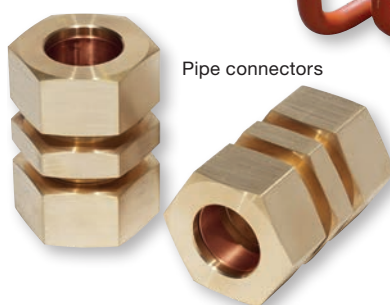
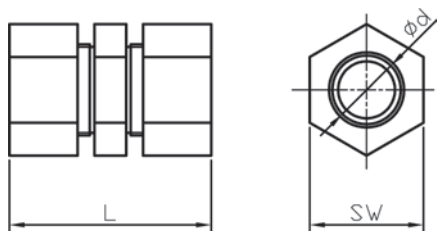
We design and deliver:

- Water cooled high current pipe-systems and tubular components
- Water cooled cables
- Busbar systems and busbar components
- Welded constructions consisting out of non-ferrous metals
- Flexible connectors made out of braids or strips
- Non-ferrous metal parts manufactured on milling- and turning machines as well as in punched and bended design
- Individual solutions according to your requirements



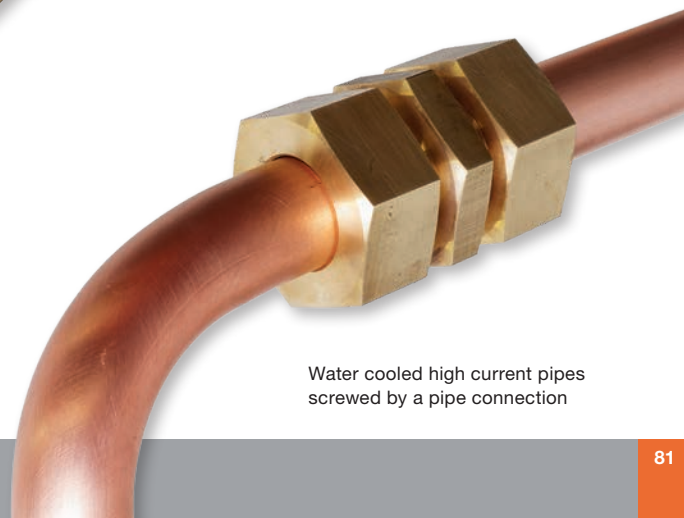
Pipe connectors

Suitable for realizing watertight, current leading connections between high current pipes. Hexagonal design is standard. But on request also in octagon or as groove nut design deliverable.



Pipe connectors

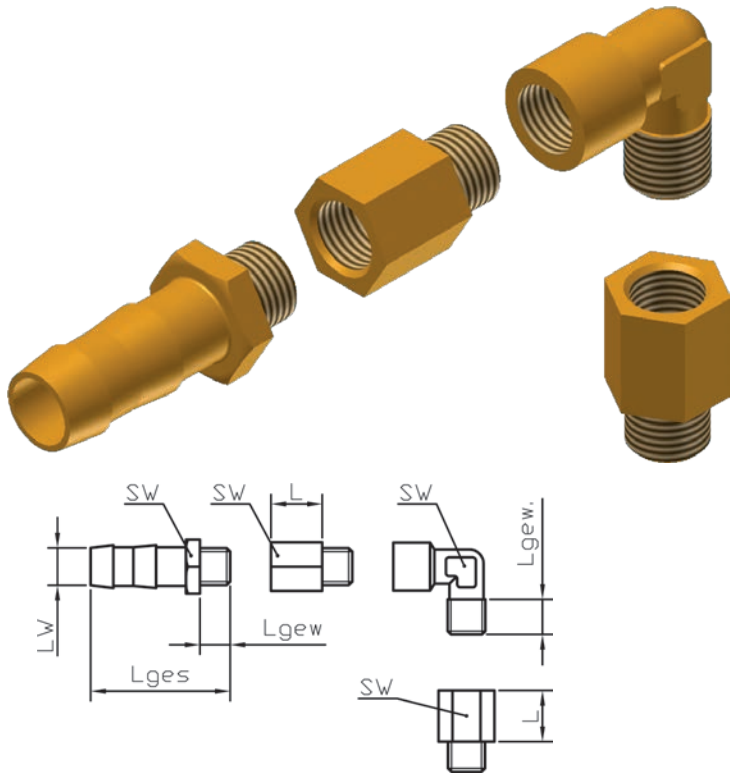
Part-No.	Technical data			
	dimensions ca. mm			
	for current pipe Ø d	plug length min.	Sw	L
15490	28	45	50	90
15491	30	45	50	90
15492	35	45	60	90
15493	40	45	65	95
15494	42	45	65	95
15495	48	45	70	95
15496	50	50	70	105
15497	60	50	80	105
15498	70	50	90	105



Water cooled high current pipes screwed by a pipe connection

Water hose connectors, elbows and extension nipples

Material: brass uncoated



Part-No.	Technical data				
	connecting thread	dimensions ca. mm			L
		Sw	Lw	Lgew	
Water hose connectors					
16181	1/4"	19	13	10	48
16182	3/8"	19	13	10	48
16183	3/4"	24	13	10	50
16184	1/2"	27	19	11	95
16185	1"	38	25	11	51
Elbows					
16186	1/4"	13	-	12	-
16187	3/8"	17	-	12	-
16188	3/4"	21	-	15	-
16189	1/2"	26	-	15	-
16190	1"	30	-	16	-
Extension nipples					
16191	1/4"	17	-	-	18
16192	3/8"	19	-	-	19
16193	3/4"	24	-	-	22
16194	1/2"	17	-	-	30
16195	1"	22	-	-	40

Note: When ordering Part-No. 16194 and 16195, Sw = inside hexagon

Cooling water hoses for water cooled cables



Part-No.	Technical data			description
	inside-Ø mm	wall thickness ca. mm		
15432	25	6,0		Electrically non-conductive cooling water hose Cover flame retardant, self-extinguishing Operating pressure: max. 10 bar Bursting: pressure 30 bar Suitable for water temperature up to + 80 °C, shortly up to + 110 °C Dielectric strength: min. 6 kV
15433	30	6,5		
15434	35	6,5		
15435	42	6,5		
15435/50	50	8,0		
15436	55	8,0		
15436/60	60	8,0		
15437	70	8,0		
15437/80	80	8,0		
15438	90	10,0		
15439	100	10,0		

Stainless steel clamps



Part-No.	Technical data			description
	clamping-Ø mm	width mm		
15480	16 - 25	12	Stainless steel clamps used in areas where extremely high band tensile forces are required. With it's tensile strength the high fracture torque and even tension force distribution, the clamps are well suited to seal our cooling water hoses.	
15481	20 - 32	12		
15482	25 - 40	12		
15483	35 - 50	12		
13040	40 - 60	12		
15484	50 - 70	12		
13041	60 - 80	12		
15485	70 - 90	12		
13042	80 - 100	12		
15486	90 - 110	12		
15487	110 - 130	12		

Water cooled high current cables

For the transmission of high currents within electrically operated melting and heating equipment, such as electric-arc or ultra high power (UHP) furnaces, water-cooled high current cables with very high conductor cross-sections are required.

Such high current components have to guarantee a reliable current transfer without having too great electrical losses under the consideration of the application with its mechanical and environmental-related influences. Quality, durability and reliability are very important requirements, as unnecessary maintenance and downtime cause substantial costs for the user.

The druseidt company manufactures water cooled high current cables since many years. In standard design in cross-section ranges up to 6500 mm² and with cable head diameters up to 200 mm. Larger sizes for special applications are available on request.

Further developments in materials, manufacturing technology, as well as to guarantee a consistently high quality standard are guidelines and prerequisite to successfully exist in the market. Accordingly to the different requirements and operating conditions the druseidt company offers various kinds of designs exactly coordinated with the application of the user.



High quality and reproducible manufacturing processes

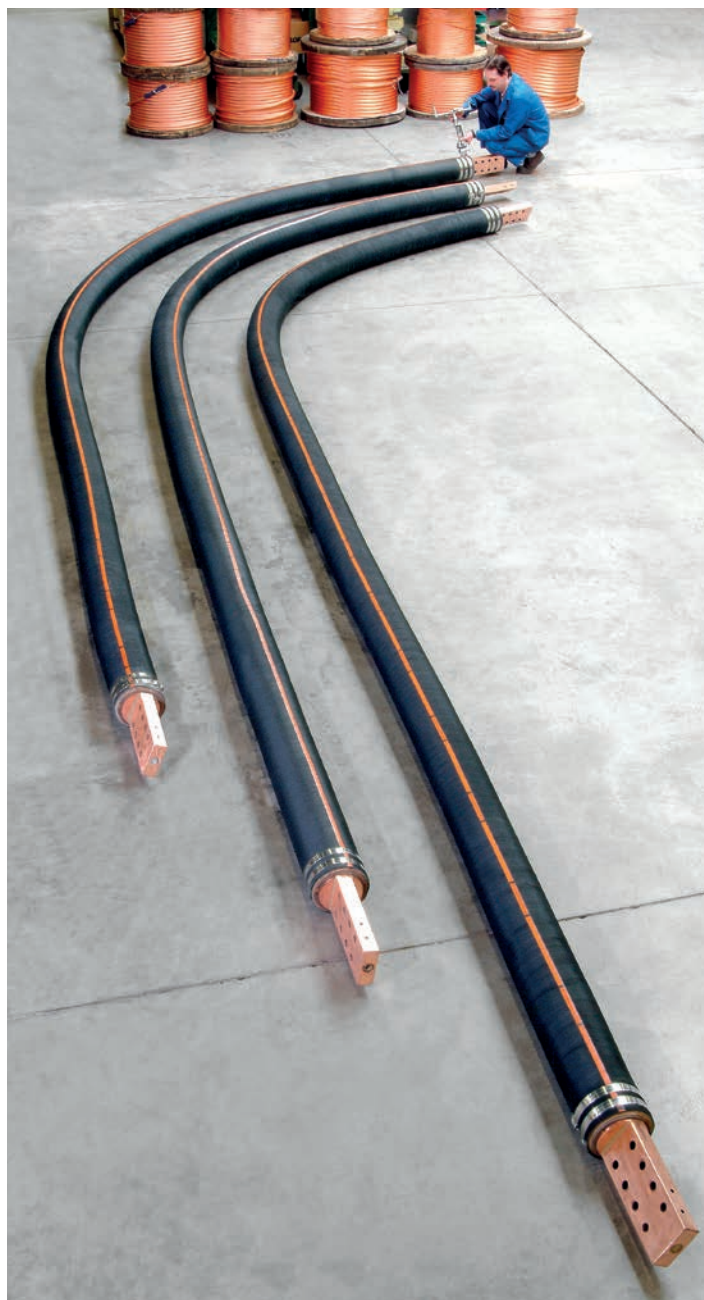
The construction and the manufacturing process of our water cooled high current cables is carried out under the following objectives:

- Optimization of the current transfer process by reducing the electrical resistance and the electrical losses
- Optimization of the cooling water flow
- Protection against heat, abrasion and mechanical wear
- Consideration of possible torsional stress
- Use of high quality materials
- Ensure a constant quality by ensuring the reproducibility of manufacturing processes

Construction and application

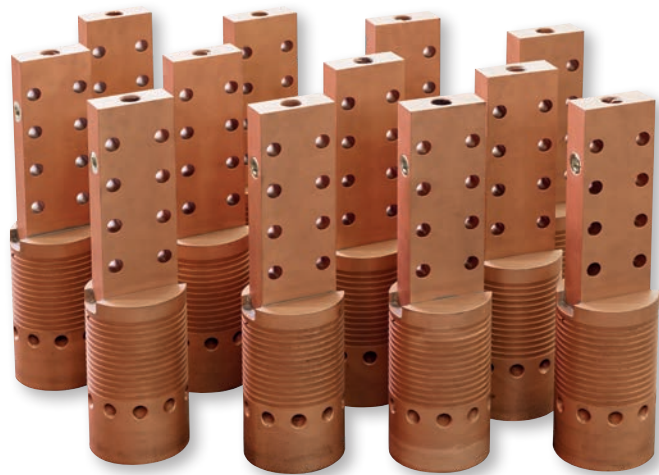
Our water cooled high current cables for electric arc- and ladle furnaces are used as flexible connectors between the electrode arms and the transformer system. The construction and the design depends, besides of the necessary current load, on the mounting situation, the planned movements and the general environmental influences. These points are the parameters which have the main influence of the construction and so ultimately of the lifetime of the cables.

druseidt cables in standard design consist out of several flexible stranded copper ropes in a cross-section range of 400 mm² or 500 mm² wrapped around a supporting tube. Every second single conductor rope is protected against abrasion by a perforated hose. The wire diameter and the construction of the copper ropes are selected this way to minimize the mechanical wear as much as possible.



Cable heads and cooling

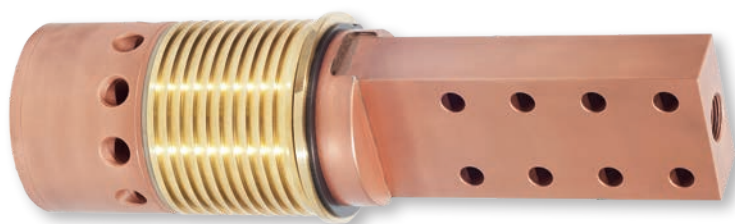
All druseidt cable heads are manufactured out of E-copper/ copper-ETP with extremely high conductivity. To prevent slippage of the cooling water hoses surely, they are equipped additionally with a toothed surface. Both, laterally and front head, a sufficiently sized threaded hole, to hold hose connectors or connection pipes, is inserted. Further all cable heads have a separate borehole per every single conductor rope in order to realize an optimized cooling water flow.



Cable heads with rotating joints

In order to minimize occurring strong or permanent torsional stress of the coolant water hoses and their connection to the cable head it is possible to equip the cable heads additionally with a rotating joint on one cable side. An important criterion for the proper functioning of rotating joints is a durable seal that reliably prevents the ingress of dust and other media over a long period of time.

Stuck or sluggish rotating joints influence their function and can lead to damage/cable breakage of the ropes.



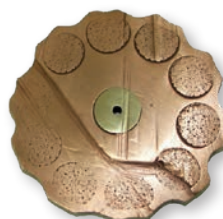
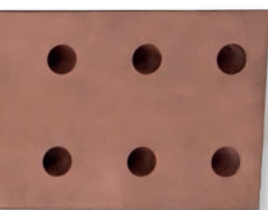
With our new, further developed rotating joints, we also offer not inconsiderable advantages here compared to other systems on the market.

All cable heads with rotating joints will be delivered with an additional transport lock to protect them against twisting, so that a correct installation is guaranteed on site.

druseidt crimp technology

The connection between the flexible copper ropes and the cable heads will be realized by a special solderless crimping process. The therefore used special crimp technology guarantees, in combination with a pressure of some hundred tons, an optimized electrical connection as well as an economical production process.

The flexible conductor ropes are crimped extensively all around and optimally compressed. Compared to the segment pressures of competitors, our crimping technology has the advantage of a much more intensive compaction (see picture). By using stored machine settings the druseidt crimp technology is reproducible at any time, minimizes the electrical resistances, thus reducing the electrical losses.



segment
pressure



druseidt
crimp technology

Especially to soldered cables, crimped designs have the following significant benefits:

- Lower electrical resistance and as a result lower electrical losses which contributes to the power increase in the furnaces.
- Better lifetime, since no heat on the E-copper conductors and not a retraction of solder in the flexible part is done (reduce the risk of fracture of the E-copper ropes).
- No crystallization of tin regarding the combination of water and electricity

druseidt crimp technology minimizes the electrical resistance and reduces the electrical losses.

druseidt coolant water hoses

An essential criterion for the lifetime of water cooled cables is the quality of the coolant water hoses. So we use only high quality standard, practice proven, electrically insulating tubes with flame retardant, self-extinguishing cover. According to the stress and the environmental influences we offer three different hose designs.

1. Abrasiv-hose with traffic light effect

druseidt standard hose for normal applications. Multilayer built-up cooling water hose with abrasion resistant outer cover. To control the wear and the abrasion the hose is equipped with a so called traffic light effect, which based on the green respectively red rubber layer inside of the hose casing. So it is possible to control the hose condition optically. The latest moment for changing and repairing the cables should be given when the red rubber layer is visible (for example in case of visible burn marks or abrasion).



2. Abrasiv-hose with additional applied abrasion protection

Ideal solution for extreme abrasion problems. Based on our standard Abrasiv-hose but manufactured without the green and red rubber layers. Thickness of the base hose is 12 mm. Thickness of the abrasion protection is 8 mm = ca. 20 mm total thickness including abrasion protection.



3. Abrasiv-hose with additional applied heat protection

If you have problems with radiated heat or metal splashes we recommend to use our Abrasiv-hose with additional applied heat protection. Based on our standard Abrasiv-hose with traffic light effect it is possible to apply an additional heat protection in a length according to customers wishes. The heat protection consists out of a up to + 700 °C heat resistant material with an additional up to + 300 °C resistant silicone cover.



Technical data:

- electrically non-conductive $R > 10^9 \Omega$
- Water temperature + 80 °C permanently, up to + 110 °C short term
- Operating pressure 6 bar, Maximum pressure 18 bar
- Outer wall hardly inflammable and self-extinguishing
- mechanically highly resilient and abrasion-resistant

Protection against abrasion and radiated heat

The operating and environmental conditions have a significant impact of the lifetime of the water cooled high current cables. Due to the installation location and construction of the plants, in practice often occur particularly severe problems in terms of abrasion or radiated heat.

Our standard used Abrasiv-hose with traffic light effect is of high quality and has a very good abrasion resistance. However, it is often useful to take a life extension through the use of our additionally offered special hoses or activities. So we provide different kinds of solutions.



1. druseidt Abrasiv-hose with additional applied abrasion-protection. Extremely abrasion resistant through additional abrasion protection with a thickness of ca. 8 mm. No loosening or slipping of bumpers. No additional assembly of bumpers or winding a second abrasion-hose is necessary. Very good lifetime and therefore a very good value for money.

Protection against abrasion

1. druseidt-Abrasiv-hose with additional abrasion protection applied directly to the hose
2. druseidt-Abrasiv-hose with traffic light effect and additional mounted second abrasion-hose
3. druseidt Abrasiv-hose with traffic light effect with additional mounted bumpers

Protection against radiated heat

4. druseidt-Abrasiv-hose with traffic light effect and additional applied heat protection
5. druseidt-Abrasiv-hose with traffic light effect an additional mounted heat protection made out of Therm Textile
acc. description on catalogue page 120.

2. druseidt-Abrasiv-hose with traffic light effect and additional winded second abrasion-hose. Also the second abrasion-hose is equipped with a flame retardant, self-extinguishing cover. Such abrasion-hoses are deliverable with a different wall thickness.

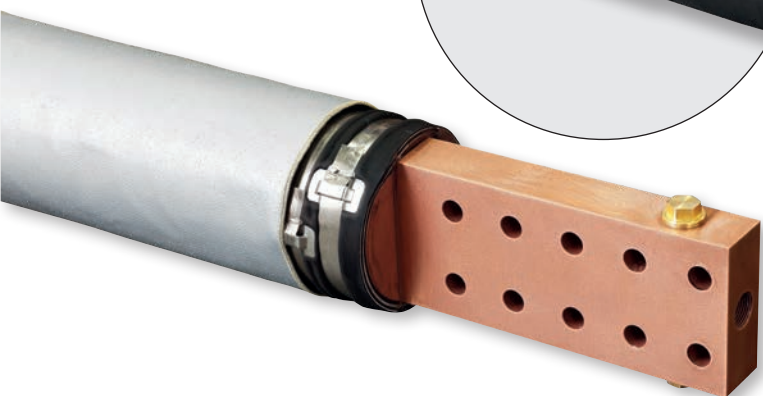


3. druseidt-Abrasiv-hose with traffic light effect and additional mounted bumpers made out of flame retardant, self-extinguishing rubber material. Bumper width ca. 170 mm, thickness ca. 23 mm.



4. druseidt-Abrasiv-hose with traffic light effect and additional applied heat protection. The length of the heat protection can be set according to the application from the customer. The inner core of the heat protection is temperature resistant up to + 700 °C and has an additional external protection through to a + 300 °C resistant silicone coating to achieve a beading of liquid metal splashes. Since the heat protection is applied tight directly to the hose an installation of several cables side by side is possible without any problems.

5. druseidt-Abrasiv-hose with traffic light effect and additional heat protection made out of Therm Textile (different possibilities). Inner core temperature resistant up to + 700 °C. Outer core made out of silicone temperature resistant up to + 300 °C. Deliverable in sewn design or with Velcro fastener. Disadvantage compared with a heat protection applied directly to the hose is that the material is not tight against the tube and tears in use or decomposes. But such designs of heat protection can be replaced when worn as far as the hose underneath is undamaged. We therefore offer an extra strong heat protection version for this types of water cooled cables as described on catalogue page 120.

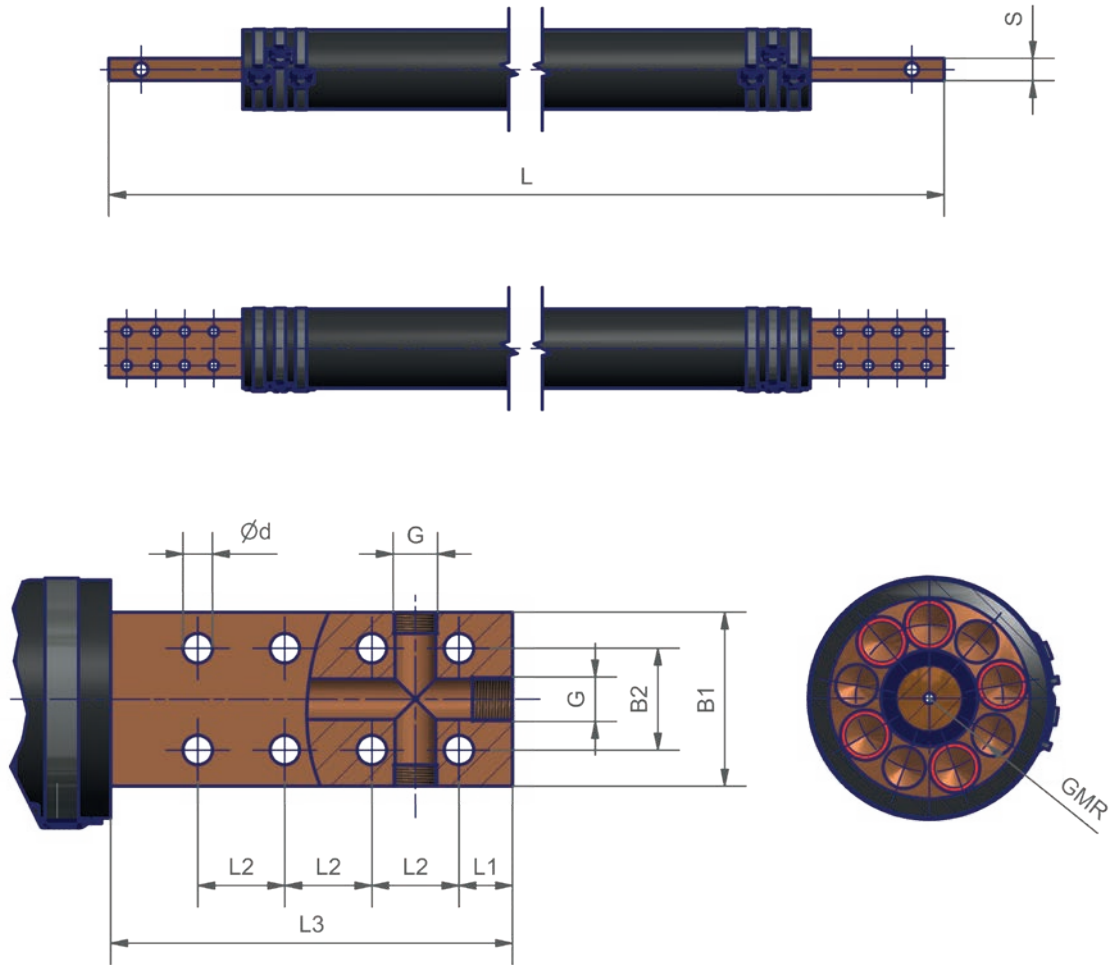


Water cooled high current cables

with solderless pressed cable heads
preferably for electric arc- and ladle furnaces

Manufactured out of several flexible stranded copper ropes with a **cross-section range of 400 mm²** wrapped around a supporting tube. In standard design equipped with our Abrasiv-hose with traffic light effect. Other hoses or equipped with a rotating joint on one side on request.

Operating pressure: max. 6 bar
Testing pressure: 10 bar
Current load: As approximate value we recommend 4,5 A/mm²

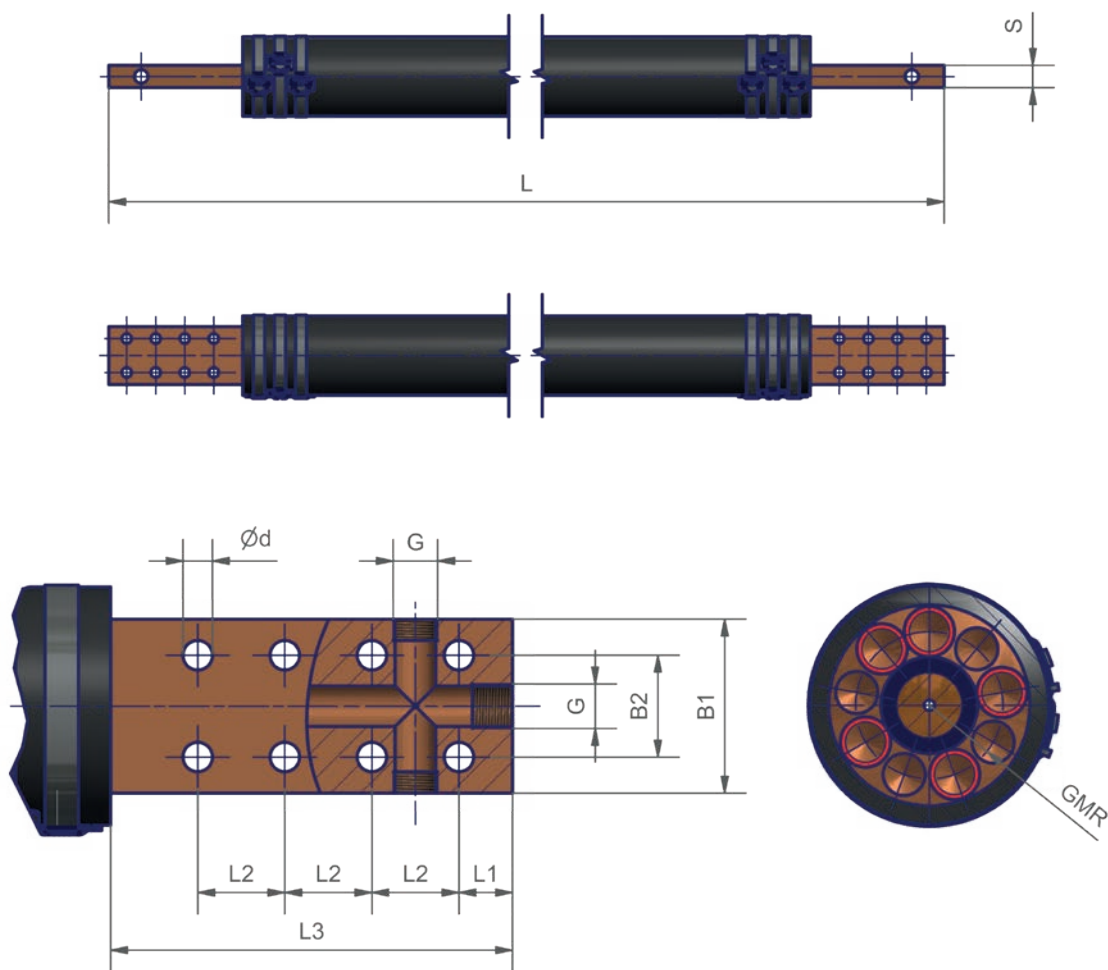


Part-No.	Technical data													
	Cable constr. n x mm ²	cross-section mm ²	outer hose I Ø x ca. Wth.	dimensions ca. mm										
				L	L1	L2	L3	B1	B2	d	G	S	GMR	
30510	5 x 400	2000	100 x 13	according to customers wishes	30	50	175	90	50	6 x 18	3/4"	35	34,5	
30511	6 x 400	2400	100 x 13		20	60	200	90	60	6 x 18	3/4"	40	34,5	
30512	7 x 400	2800	115 x 13,5		25	50	210	100	60	6 x 18	3/4"	50	42	
30513	8 x 400	3200	120 x 13,5		20	50	210	108	60	8 x 18	3/4"	50	44,5	
30514	9 x 400	3600	133 x 14		25	50	210	120	65	8 x 18	3/4"	50	51	
30515	10 x 400	4000	150 x 14		40	63,5	300	140	75	8 x 18	1"	50	59,5	
30516	11 x 400	4400	150 x 14		40	63,5	300	140	75	8 x 18	1"	50	59,5	
30517	12 x 400	4800	160 x 14		40	63,5	300	140	75	8 x 22	1"	60	64,5	
30518	13 x 400	5200	170 x 14		40	63,5	300	155	75	8 x 22	1"	60	69,5	
30519	14 x 400	5600	180 x 14		40	63,5	300	169	75	8 x 22	1"	60	73,5	
30520	15 x 400	6000	190 x 14	40	63,5	300	170	75	8 x 22	1"	60	78,5		

Water cooled high current cables
with solderless pressed cable heads
preferably for electric arc- and ladle furnaces

Manufactured out of several flexible stranded copper ropes with a **cross-section range of 500 mm²**, wrapped around a supporting tube. In standard design equipped with our Abrasiv-hose with traffic light effect. Other hoses or equipped with a rotating joint on one side on request.

Operating pressure: max. 6 bar
 Testing pressure: 10 bar
 Current load: As approximate value we recommend 4,5 A/mm²



Part-No.	Technical data													
	Cable constr. n x mm ²	cross-section mm ²	outer hose I Ø x ca. Wth.	dimensions ca. mm										
				L	L1	L2	L3	B1	B2	d	G	S	GMR	
30525	4 x 500	2000	100 x 13	according to customers wishes	30	50	210	80	50	8 x 18	3/4"	40	32,5	
30526	5 x 500	2500	100 x 13		20	60	230	85	55	8 x 18	1"	50	32,5	
30527	6 x 500	3000	110 x 13,5		30	60	250	95	60	8 x 18	1"	50	37	
30528	7 x 500	3500	120 x 13,5		30	60	250	105	60	8 x 18	1"	50	42	
30529	8 x 500	4000	133 x 14		40	65	300	120	76	8 x 22	1"	50	48,5	
30530	9 x 500	4500	150 x 14		40	65	300	130	76	8 x 22	1"	50	57	
30531	10 x 500	5000	160 x 14		40	65	300	140	76	8 x 22	1"	50	62	
30532	11 x 500	5500	170 x 14		40	65	300	160	76	8 x 22	1"	50	67	
30533	12 x 500	6000	180 x 14		40	65	300	160	89	8 x 22	1"	60	72	
30534	13 x 500	6500	190 x 14		30	72	360	160	89	10 x 22	1"	60	77	

Cables with other cable constructions, e.g. single ropes 260 mm² each on request.

Water cooled cables made by druseidt – high quality “made in Germany”



Water cooled cables in standard design equipped with Abrasiv-hose with traffic light effect. The red coloured identification mark serves as a control possibility that the cable or hose are assembled without twist.



Water cooled standard cables but with Abrasiv-hose with additional abrasion protection applied directly to the hose. The ideal solution for abrasion problems.

Water cooled cables in special design

On request we produce also water cooled high current cables with individual designed cable heads according to your drawings or samples or in non-standard cable constructions within a short time.

Cable repairs

We undertake cable repairs in a short time and economically priced, both for our cables as well as those of other manufacturers.

The following services are included in the standard repair:

- Demounting the cable
- Inspection and cleaning of the cable heads
- Inspection and cleaning of the inner conductors
- If available, removing, inspection and cleaning of the rotating joint as well as replacement of the sealing gaskets and slide rings
- Replacement of the coolant water hose
- Tightening with a tension band
- Pressure test with 10 bar
- Resistant measurement
- Disposal of the old hoses

Flexible connectors made out of copper- and aluminium foils

We offer a wide range of standardized laminated connectors as well as multifarious designs according to your drawings or wishes. All articles are produced in high quality on modern plants with suitable materials and manufacturing processes in coordination with your applications. Following manufacturing processes are at our disposal:

- Press-/diffusion welding
- Inert gas welding (WIG/MIG)
- Electron-beam welding
- Soldering/brazing
- Riveting
- Extrusion of insulated supple bars

Take the chance to profit from our experience in designing and manufacturing of flexible high current components and contact us. With pleasure our employees assist your company in finding optimal solutions.

Flexible connectors made out of copper- and aluminium foils

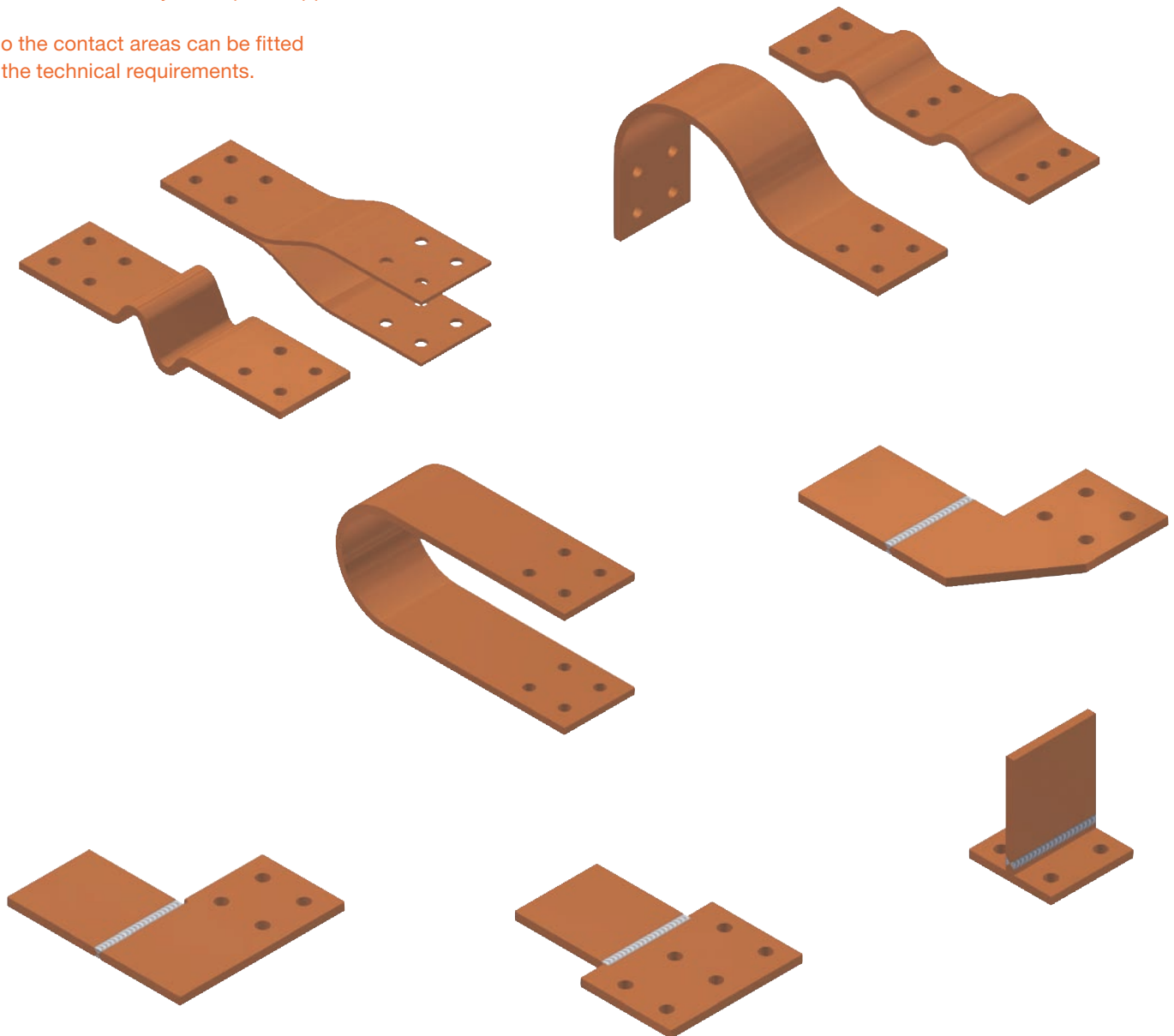
Construction and application

Flexible connectors consisting out of to packages stacked copper or aluminium foils. The contact areas are compacted by special welding or riveting processes. So we get contact elements with a constant conductor cross-section about the whole connector length. Additionally it is possible to weld bended busbar pieces, clamps or other solid copper parts on to the flexible foil packages.

Such connectors have become particularly well established as connections between transformers, generators, rectifiers or switching devices and prefabricated networks. They can compensate expansions caused by an increase of temperature as well as movements caused by vibrations of switchgears, transformers or generators. Another part is utilized as flexible components to realize movements inside of machine parts, contactors or welding guns e.g. according to catalogue pages 68 and 69.

We produce a wide range of laminated connectors in coordination with your required applications.

Also the contact areas can be fitted to the technical requirements.



Manufacturing processes

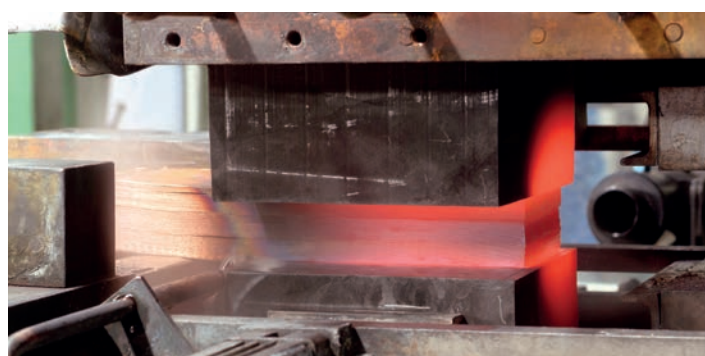
Press-welded copper connectors

druseidt foil connectors consist of a number of layers of copper or aluminium foils with thickness e.g. 0,2 or 0,3 mm. Various manufacturing processes are available for the production, shaping and design of the connection areas. The connection areas of standard expansion connectors made of copper are produced in a press-welded design. Pressure welding is a special resistance welding process that enables entire surfaces to be welded compactly and safely without the use of any kind of other welding additives. The heating during the welding process is generated by means of current and the material of the copper connectors, which represents a resistance. The individual foils of the workpiece are then jointed together in the connection area under pressure.

The welded connection will be realized by diffusion processes (so-called grain diffusion, i.e. intergrowth of the crystals of adjacent foils) when the foils of the heated workpiece are deformed and pressed together so that a perfect molecular structure of the contact areas is created. The middle expansion part of the connector still remains flexible.

Inert gas welded copper and aluminium foil connectors

The pressure welding process cannot be used by aluminium connectors, foil connectors with contact areas of different widths on both sides or larger angled contact areas. Such connectors are manufactured by means of inert gas welded and welded-on solid contact pieces. These processes can also be used to weld clamping devices, suitable for connection to pipes or round bolts, to flexible foil expansion parts.



Pressure welding process for copper connectors



Inert gas welded aluminium and copper connectors



Press-welded copper connectors

Flexible expansion connectors

Material: copper HCP-foils

Contact areas: press-welded

The expansion connectors in the following tables consist out of copper HCP-foils according to DIN 13599 with a thickness of 0,1 mm or 0,3 mm. The contact areas are manufactured in a press-welded design as described on page 93.

The press-welding procedure is a special resistance welding process, which enables a welding of packages of copper foils with different strength in a defined area together. By working with this procedure it is not necessary to use any form of welding additives. So press-welded connectors are excellent electrical conductors due to their perfect molecular connection.

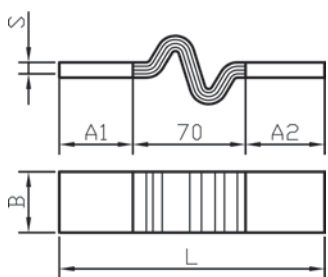
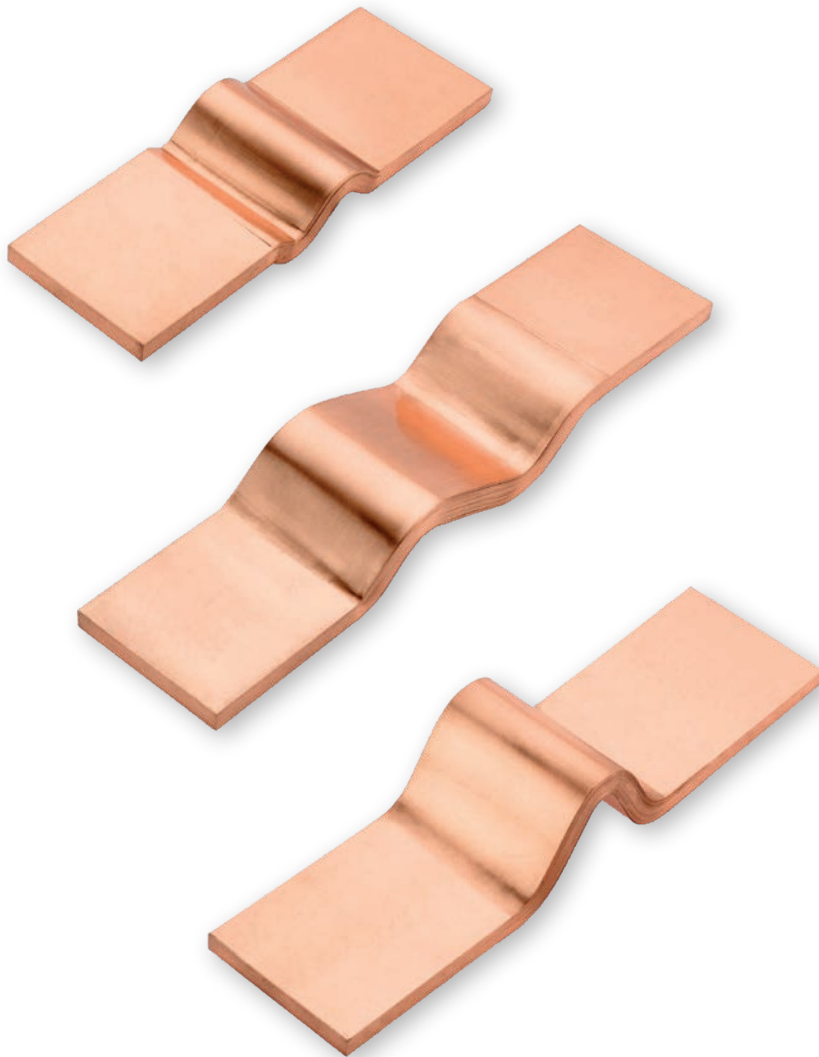
The contact areas can be bored, milled or bent without problem. The width of the contact areas are so selected that it is possible to install several expansion connectors in a distance of 2 mm side by side (e.g. for generator connections etc.). With drilling on request, e.g. according to DIN 43673 part 1 + 2, DIN 46206 part 2 or according to your drawings/samples or wishes. On request it is also possible to deliver designs with coated contact areas (e.g. tinned or silvered acc. description on catalogue page 97).

When placing an order, please specify:

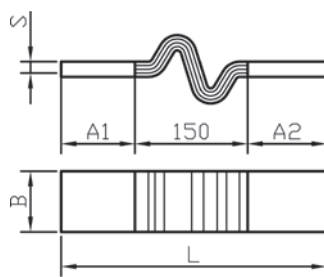
- Part-No.
- Thickness of the foils (0,1 mm or 0,3 mm)
- Design A, B, or C
- Length of the contact areas A1/A2
- With or without drilling

Example:

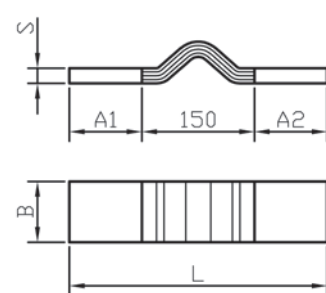
- Part-No. 15509 (B x S = 98 x 10 mm)
- Design B (expansion part 150 mm)
- Contact areas A1/A2 100 mm = total length 350 mm (100 + 100 + 150 mm)
- Thickness of the foils 0,1 mm
- Without drilling



design A



design B



design C

Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm			
		B	S	A ₁	A ₂
15500	140	28	5		
15501	190	38	5		
15502	240	48	5		
15503	290	58	5		
15504	390	78	5		
15505	380	38	10	according to customers wishes	according to customers wishes
15506	480	48	10		
15507	580	58	10		
15508	780	78	10		
15509	980	98	10		
15510	570	38	15		
15511	720	48	15		
15512	870	58	15		
15513	1170	78	15		
15514	1470	98	15		
15515	760	38	20		
15516	960	48	20		
15517	1160	58	20		
15518	1560	78	20		
15519	1960	98	20		

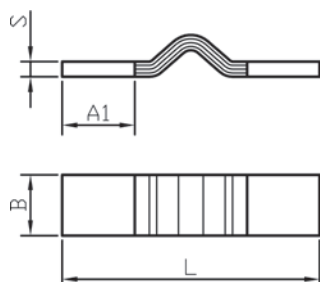
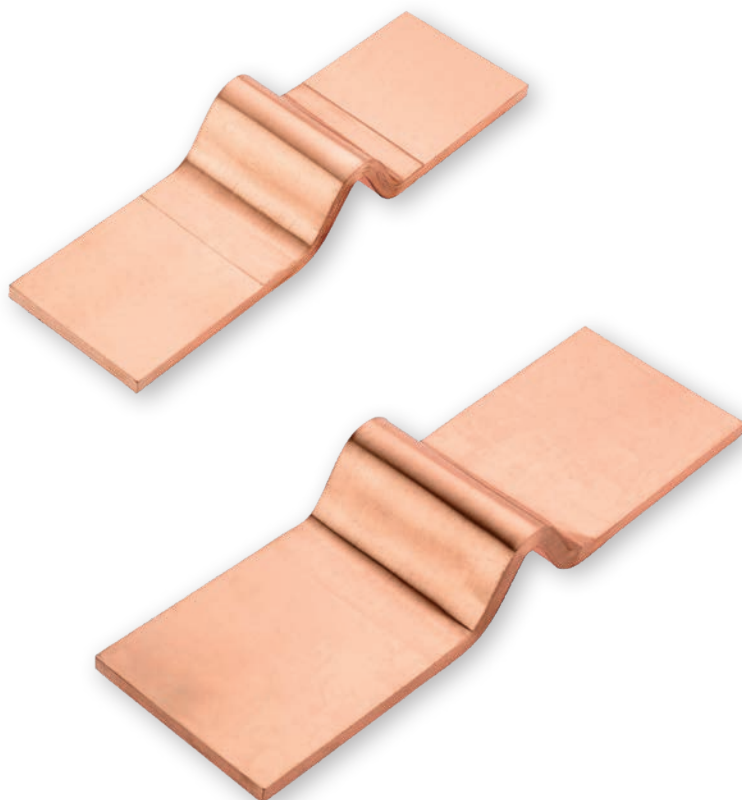
Remark: The minimum current capacity of expansion connectors is in accordance with the values of solid busbars (cf. DIN 43671 resp. DIN 46276 part 1 + 2).

Flexible expansion connectors

Material: copper HCP-foils

Contact areas: press-welded

Expansion connectors in standard design. The width and the thickness of the contact areas are in coordination with the usual dimensions of the traditional busbar systems. With drilling on request, e.g. according to DIN 43673 part 1 + 2, DIN 46206 page 2 or according to your drawings/samples or wishes. On request it is also possible to deliver expansion connectors with other dimensions or in bended design according to your drawings as well as with coated contact areas (e.g. tinned or silvered) as described on catalogue page 97.



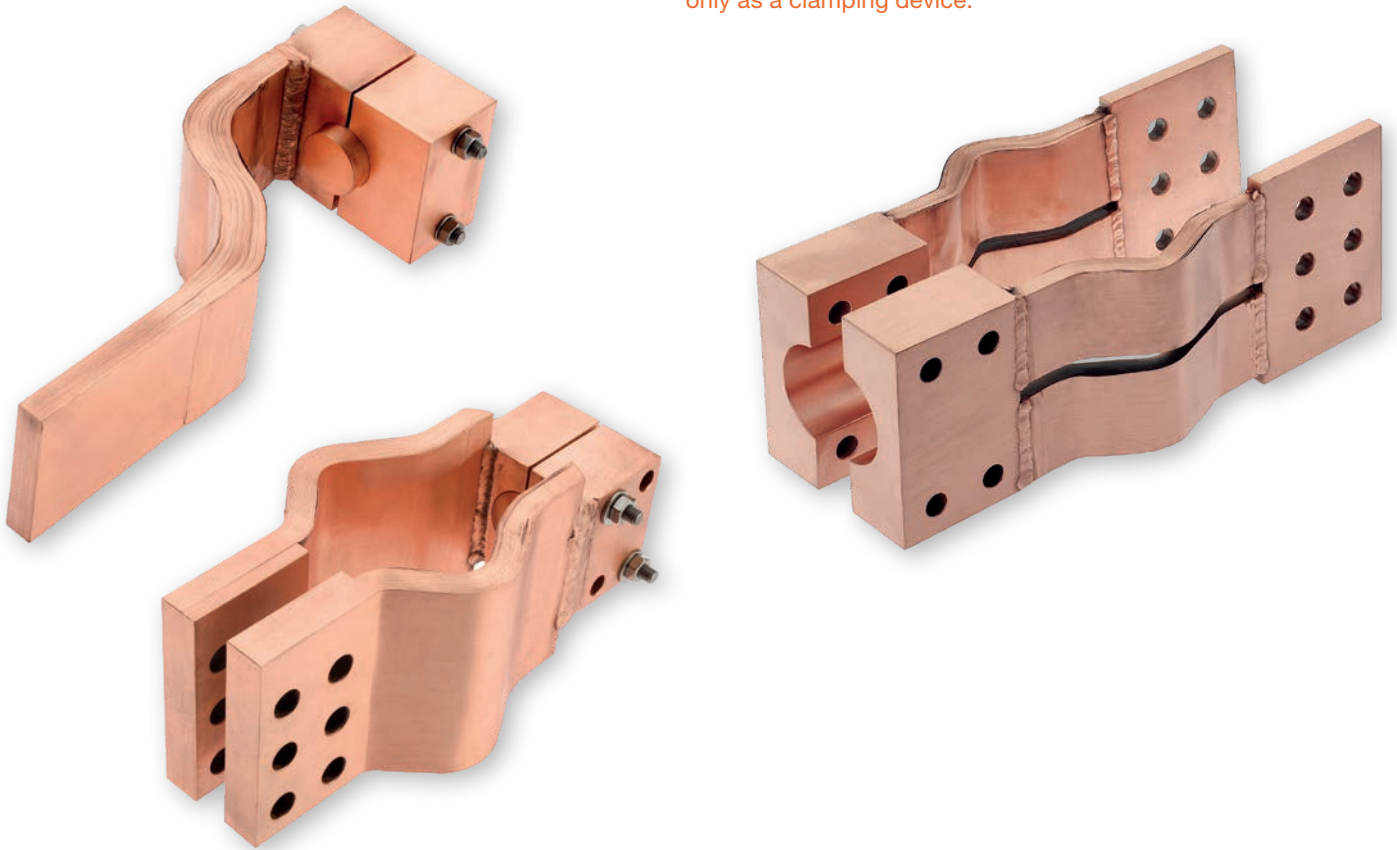
Part-No.	Technical data					weight kg/pcs.
	cross-section mm ²	dimensions ca. mm				
		B	A ₁	S	L	
15730	200	40	40	5	230	0,48
15731	320	40	40	8	230	0,77
15732	400	40	40	10	230	0,96
15733	480	40	40	12	230	1,15
15734	600	40	40	15	230	1,28
15735	800	40	40	20	230	1,92
15736	250	50	50	5	250	0,65
15737	400	50	50	8	250	1,04
15738	500	50	50	10	250	1,30
15739	600	50	50	12	250	1,55
15740	750	50	50	15	250	1,95
15741	1000	50	50	20	250	2,60
15742	300	60	60	5	270	0,83
15743	480	60	60	8	270	1,33
15744	600	60	60	10	270	1,66
15745	720	60	60	12	270	1,99
15746	900	60	60	15	270	2,51
15747	1200	60	60	20	270	3,32
15748	400	80	80	5	310	1,25
15749	640	80	80	8	310	1,99
15750	800	80	80	10	310	2,50
15751	960	80	80	12	310	3,01
15752	1200	80	80	15	310	3,75
15753	1600	80	80	20	310	5,00
15754	500	100	100	5	350	1,74
15755	800	100	100	8	350	2,81
15756	1000	100	100	10	350	3,48
15757	1200	100	100	12	350	4,17
15758	1500	100	100	15	350	5,27
15759	2000	100	100	20	350	6,96
15760	2500	100	100	25	350	8,70
15761	600	120	120	5	390	2,26
15762	960	120	120	8	390	3,68
15763	1200	120	120	10	390	4,52
15764	1440	120	120	12	390	5,50
15765	1800	120	120	15	390	6,97
15766	2400	120	120	20	390	9,04
15767	3000	120	120	25	390	11,57
15768	800	160	160	5	470	3,64
15769	1280	160	160	8	470	5,99
15770	1600	160	160	10	470	7,28
15771	1920	160	160	12	470	8,72
15772	2400	160	160	15	470	11,02
15773	3200	160	160	20	470	14,56
15774	4000	160	160	25	470	18,26
15775	4800	160	160	30	470	21,84

Remark: The minimum current capacity of expansion connectors is in accordance with the values of solid busbars (cf. DIN 43671 resp. DIN 46276 part 1 + 2).

Flexible transformer connections with expansion part

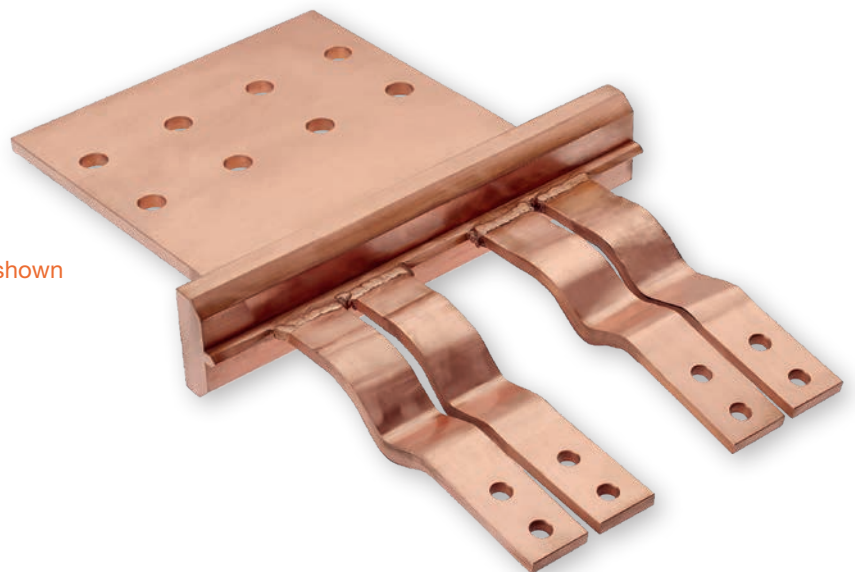
For the connection of transformers with outlets as pipe bushings or round bolts, we manufacture flexible connections made of copper with expansion parts and welded-on clamping device for round connections. They are designed to deliver power of several thousand amperes per connection, e.g. for steelworks, transformers and are designed individually for the transformers.

These products can be supplied either with a clamp on one side and a flat connection on the other side for transitions to busbar systems or contact plates, or with a clamp on both sides for connection of pipe systems. Depending on the capacity and the required cross-section, both the upper and the lower part of the clamp can be designed with an expansion part or only the upper part with expansion part and the lower part only as a clamping device.



Transformer bushings

We also manufacture transformer bushings with welded-on expansion connectors according to drawings or customer requirements, e.g. with flat connections as shown in the adjacent photo.



Flexible connectors out of copper foils according to customer requirements

We manufacture almost all technically possible flexible connections from copper foils in foil thickness 0,02 mm up to 0,5 mm according to customer requirements. Whether series parts, individual items or spare parts we supply components tailored to your application.

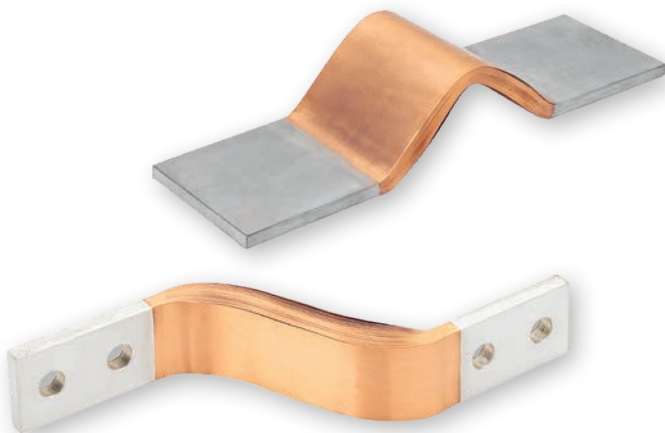
The production is supported by our innovative design department. Here we work together with our customers to develop coordinated power transmission solutions for a wide range of applications. Here some examples of possible designs.



Flexible connectors out of copper foils with surface finishing

On request, we can also supply copper foil connectors with tin-plated or silver-plated contact areas and in addition, a subsequently completely tin-plated or silver-plated version.

This special process is often more cost-effective than coating individual surfaces as the surfaces that are not to be coated have to be masked by hand and the adhesive tape removed again afterwards. We would be happy to advise you on your applications here too.



Copper foil connectors with tinned or silvered contact areas



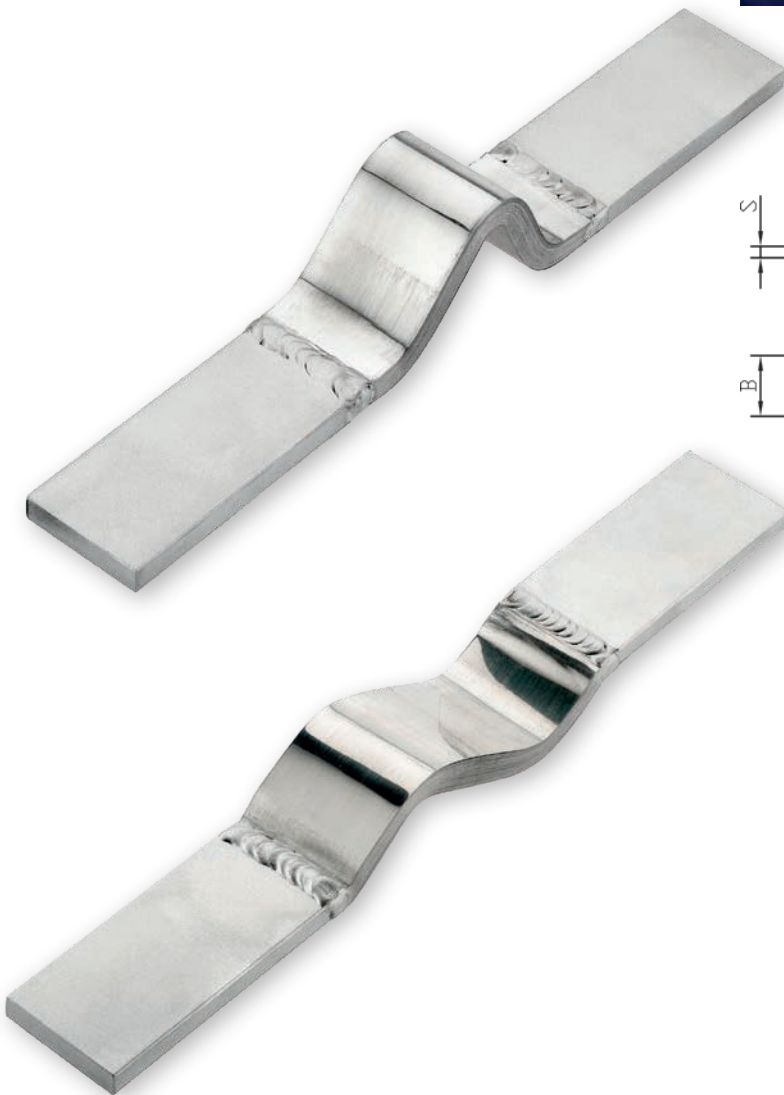
Copper foil connectors subsequently complete – by tin- or silver-plated

Flexible Aluminium expansion connectors

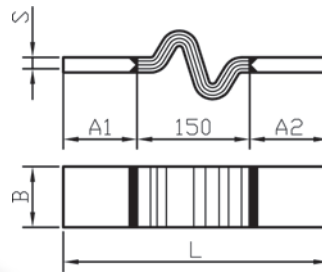
Material: Pure aluminium foils

Contact areas: welded-on solid pieces

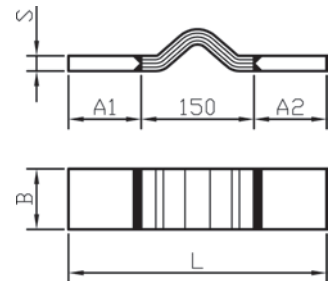
Flexible aluminium expansion connectors are made of pure aluminium foils with a thickness of 0,3 mm. Solid pieces of aluminium are welded-on at the ends. The parts to be welded are melted locally under inert gas by means of an electrically arc. The inert gas used prevents the oxidation of the molten metal. The widths of the expansion connectors listed below are dimensioned in such a way that several connectors can be mounted side by side with a distance of approx. 2 mm (e.g. as connections in the area of generators). On request also with holes e.g. according to DIN 43673 part 1 + 2, DIN 42606, part 2 or according to specification/drawing.



Design B



Design C



Part-No.	Technical data				
	cross-section mm ²	dimensions ca. mm			
		B	S	A ₁	A ₂
15530	380	38	10		
15531	480	48	10		
15532	580	58	10		
15533	780	78	10	wishes	wishes
15534	980	98	10		
15535	570	38	15	according to customers	according to customers
15536	720	48	15		
15537	870	58	15		
15538	1170	78	15		
15539	1470	98	15		
15540	760	38	20	according to customers	according to customers
15541	960	48	20		
15542	1160	58	20		
15543	1560	78	20		
15544	1960	98	20		

Remark: The minimum current capacity of expansion connectors is in accordance with the values of solid busbars (cf. DIN 43670 resp. DIN 46276 part 1 + 2)

When placing an order, please specify:

- Part-No.
- Design B or C
- Length of the contact areas A1 / A2
- With or without drilling

Example:

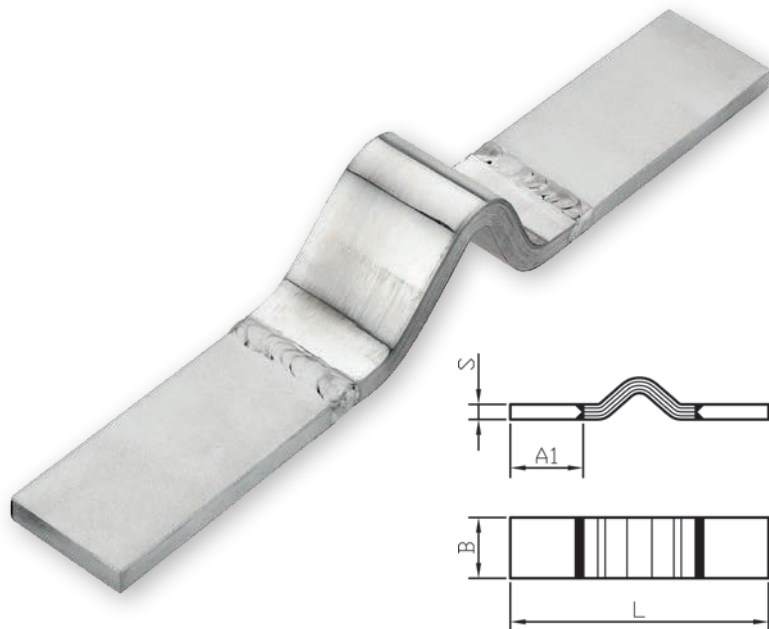
- Part-No. 15534 (B x S = 98 x 10 mm)
- Design C
- Contact areas A1/A2 100 mm = total length 350 (100 + 100 + 150 mm)
- Without drilling

Flexible expansion connectors

Material: aluminium foils

Contact areas: inert gas welded

Expansion connectors in standard design. The width and the thickness of the contact areas are in coordination with the usual dimensions of the traditional busbar-systems. With drilling on request, e.g. according to DIN 43673 part 1 + 2, DIN 46206 part 2 or according to your drawings/samples or wishes. On request it is also possible to deliver expansion connectors with other dimensions or in bended design according to your drawings.

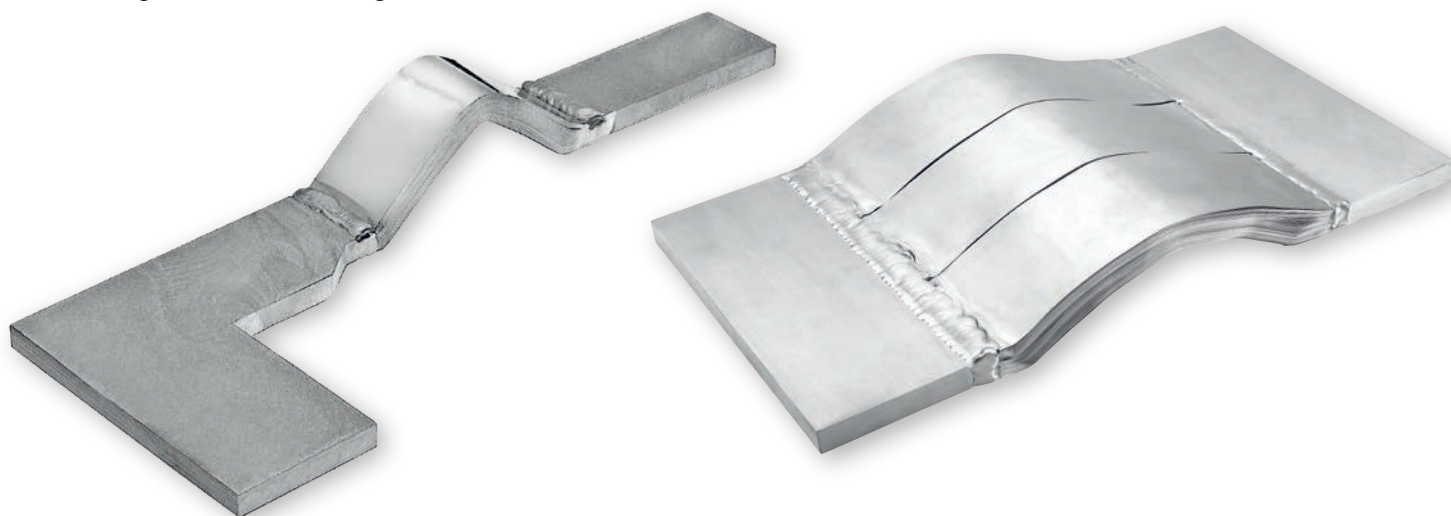


Part-No.	Technical data					
	cross-section mm ²	dimensions ca. mm				weight kg/pcs.
		B	A ₁	S	L	
03030	200	40	40	5	250	0,16
03031	400	40	40	10	250	0,32
03032	600	40	40	15	250	0,48
03033	200	40	80	5	280	0,18
03034	400	40	80	10	280	0,36
03035	600	40	80	15	310	0,57
03036	250	50	50	5	270	0,22
03037	500	50	50	10	270	0,43
03038	250	50	80	5	300	0,25
03039	500	50	80	10	300	0,47
03040	750	50	80	15	310	0,71
03041	300	60	60	5	290	0,28
03042	600	60	60	10	290	0,55
03043	300	60	80	5	300	0,29
03044	600	60	80	10	300	0,56
03045	900	60	80	15	310	0,87
03046	800	80	80	10	330	0,82
03047	1200	80	80	15	330	1,30
03048	1000	100	100	10	370	1,20
03049	1500	100	100	15	370	1,70
03050	1200	120	120	10	410	1,50
03051	1800	120	120	15	410	2,20
03052	1600	160	160	10	490	2,30

Remark: The minimum current capacity of expansion connectors is in accordance with the values of solid busbars (cf. DIN 43670 resp. DIN 46276 part 1 + 2).

Flexible expansion connectors acc. to customer requirements

We also weld laminated aluminium connectors according to your wishes, samples or drawings. Also in larger cross-sections, e.g. 360 x 25 mm.



Aluminium connectors acc. to customer wishes

Aluminium connectors with large cross-section, e.g. 360 x 25 mm

PVC-insulated supple bars

**Material: Cu-ETP uncoated or tinned
insulated by a black vinyl compound in lengths á 2 m**

Construction and application

Supple bars are insulated flat electrical conductors. They consist of several layers of uncoated or tin plated Cu-ETP strips (99,9 % copper) and are insulated with a flexible high quality vinyl compound.

This special compound is self-extinguishing and free of lead. The flexibility of the bars offers an installation into difficult

equipment or small places. They have become particularly well established as connectors in switchgears and between transformers, generators, switching devices and pre-fabricated power systems up to an operating voltage of 1 kV. As a consequence of their large surface area and their favorable thermal radiation properties, they transmit larger current loads than solid busbars of the same cross-section. So it is possible to use components with smaller dimensions. The elasticity of the vinyl compound realizes a deforming of busbars also when working with larger cross-sections.

By bending and twisting it is also possible to change the connection level in a minimum of space.

Our supple bars enable an individual fitting of the components, a reduction of the cross-section and a reduction of the installation time. So they are a very interesting cost-saving product.

Technical data

Electrical conductor:

- copper strips Cu-ETP (99,9 % copper)
- surface uncoated or tinned
- stability $> = 200 \text{ N/mm}^2$
- electrical conductivity 57 S x m/mm^2

Insulation:

- special vinyl compound
- black, free of lead
- thickness 1,8-2 mm
- self-extinguishing acc. to UL 94 V0
- shore hardness 85 A
- elasticity 365 %
- AC voltage between potential and insulating material 16,5 kV
- AC voltage between two insulated supple bars in contact 33 kV
- operating voltage max. 1 kV
- operating temperature $-20 \text{ }^\circ\text{C}$ up to $+105 \text{ }^\circ\text{C}$

Delivery lengths:

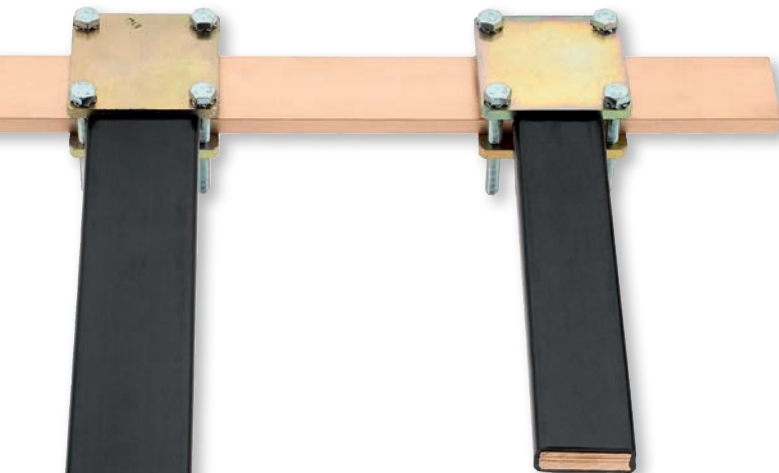
- standard lengths 2 m
- other lengths e.g. 3 m on request

Supple bars with halogen-free insulation on request

Installation

Simple mounting by drilling, punching or underside clamping. The copper strips are sliding when bending the bars, therefore it is necessary to bend the bars before starting the cutting, drilling or punching process.

To prevent a displacement of the copper strips a tightly clamping of the bars is necessary too when carrying out the drilling or punching process.



PVC-insulated supple bars

Table with columns: Part-No., cross-section mm², copper-strips number x dimension mm, current load in dependence of the conductor heat in °C (65°, 75°, 85°, 95°, 105°), and copper-weight kg/% m. Rows list various bar types like 15650, 15651, etc., with their respective specifications.

Remark: Stocked standard design bare and the * marked tinned designs. In special design all dimensions are deliverable with a tin coated surface and in variable lengths (e.g. 3 m). All information about current load are approximate values in consideration of the heat for single laying of air cooled bars and ambient temperature + 35 °C. The temperature of the conductor is in dependent on the installation, the application, the cooling, the ambient temperature etc., so that if necessary reducing factors are to be considered. With pleasure our employees assist your company in finding optimal solutions.

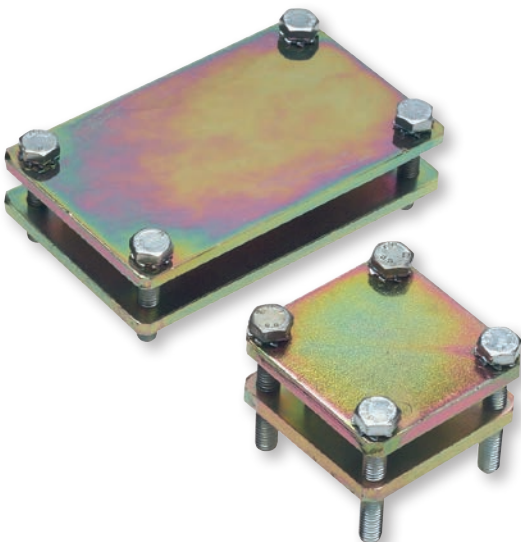
Finished machined supple bars/drawing components



As more and more switchgear and power transmission devices come onto the market in more compact designs, laminated supple bars offer an extremely inexpensive and space-saving way of making power connections within power transmission systems. Due to the different bending technologies available in our company, we can also produce extremely deformed, finished laminated supple bars bent, perforated, drilled according to customer requirements or drawings. We manufacture individual parts and smaller quantities as well as series parts with continuous deliveries at short notice. Here are a few examples of our diverse bending options.



Bus- and supple bar connectors



Part-No.	Technical data					weight kg/% pcs.
	dimensions ca. mm					
	compartment L x B	outer dimension L x B	screws	torque		
02220	18 x 18	35 x 39	M 6 x 25	6 Nm	11,00	
02221	33 x 33	50 x 50	M 6 x 40	6 Nm	22,00	
02222	35 x 51	57 x 75	M 6 x 30	6 Nm	29,00	
02223	41 x 41	60 x 60	M 6 x 50	6 Nm	32,00	
02224	42 x 64	63 x 63	M 6 x 30	6 Nm	36,00	
02225	53 x 53	75 x 75	M 6 x 50	6 Nm	50,00	
02226	42 x 82	63 x 103	M 6 x 30	6 Nm	45,00	
02227	64 x 64	80 x 80	M 6 x 50	6 Nm	54,00	
02228	82 x 82	120 x 120	M10 x 50	20 Nm	139,00	
02229	102 x 102	140 x 140	M12 x 80	25 Nm	320,00	

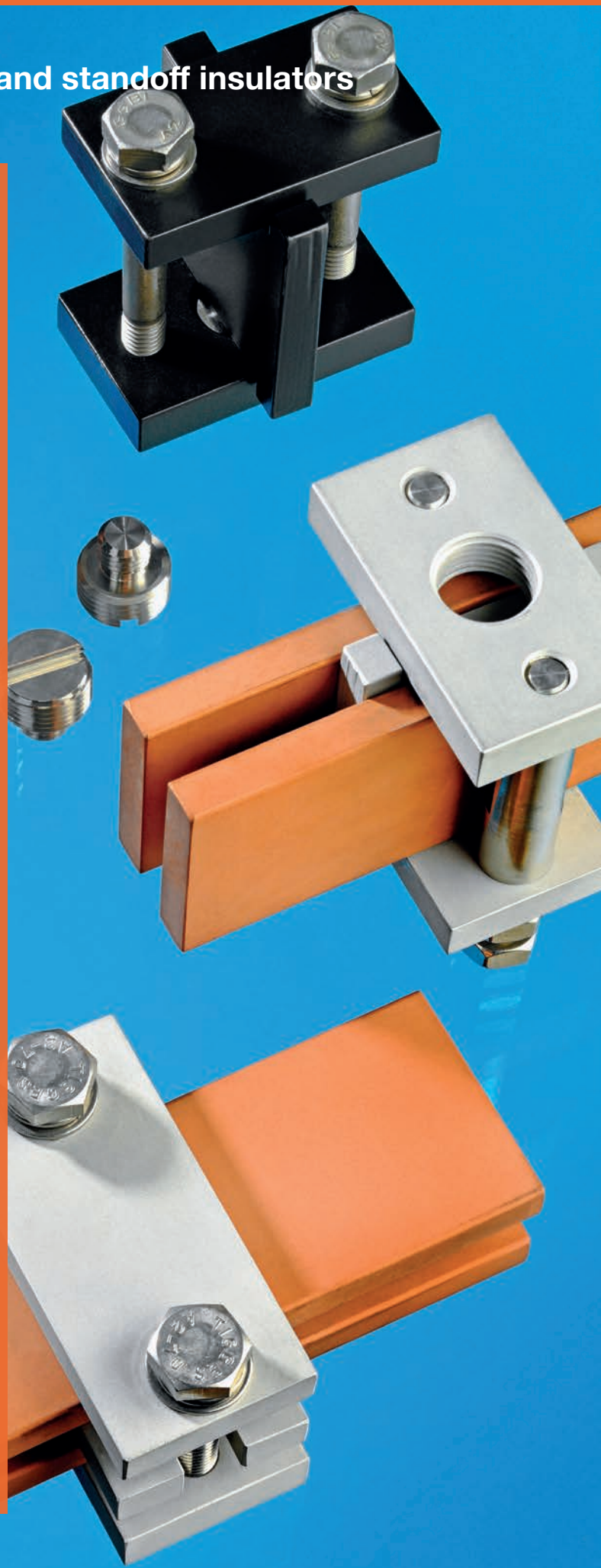
Remark: Material zinc coated and chrome plated steel. Suitable to connect busbars between each other as well as busbars with our insulated supple bars. Busbar connectors with other dimensions as in our table are available on request.

Busbar supports, busbar holders and standoff insulators

As accessories for the installation of busbars in conjunction with our flexible connections, we supply also various designs of busbar supports, busbar holders and standoff insulators.

- Busbar supports for phase distances 70/100/125 mm
- Busbar holders for busbar widths 30 - 120 mm
- Stand-off insulators out of polyester resin material with double hexagon spanner flats
- Stand-off insulators out of polyester resin material with single hexagon spanner flat
- Stand-off insulators out of polyamide with single spanner flat

We also manufacture busbars and busbar components from copper and aluminium flat material up to complete busbar systems. Detailed information are available here in our catalogue no. 4 "Busbars, non-ferrous metal working and accessories" which we will be happy to send you free of charge on request.



Busbar supports

type tested acc. to DIN EN 61439 (VDE 0660-600-1) 2012-06 resp. 61439:2011

operating voltage 1 kV AC, temperature range - 40 °C up to + 130 °C

Busbar supports made out of glass fibre reinforced unsaturated polyester (UP) similar to DIN 16911 Type 803. Free of halogen, in light grey colour. Three-phase supports, phasing-distance 100 mm (Part-No. 15645) resp. 125 mm (Part-No. 15646).

Two-phase supports with a phasing-distance of 70 mm (Part-No. 15647) suitable for N- and PE-bars The supports offer a vertical clamping of busbars with a thickness of 5 mm or 10 mm resp. 10 mm or 12,7 mm (1/2"). The adjustment of the height can be regulated by the length of the distance bushings.

Technical data

Deformation resistance	ISO 75	+ 250 °C
Behaviour in case of fire	UL 94	Class V-0 at 3,2 mm
Density	ISO 1183	ca. 1,75 g/ccm
Special throughout resistance	IEC 60093	10 ¹² Ohm
Dielectric strength (1 mm)	IEC 60243	20 kV/mm
Deposit tracking	IEC 60112	CTI 600

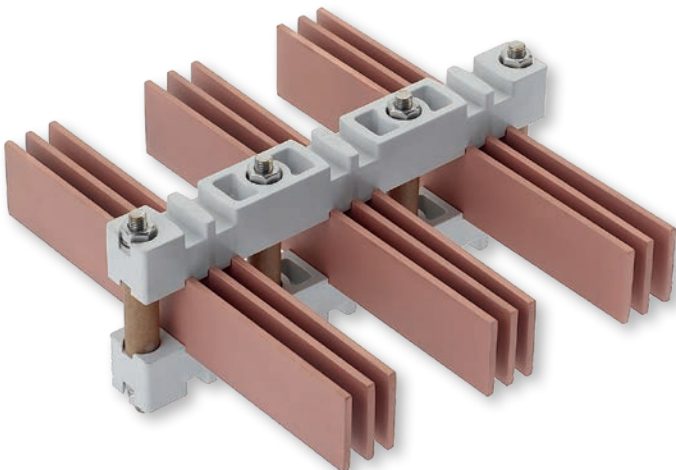
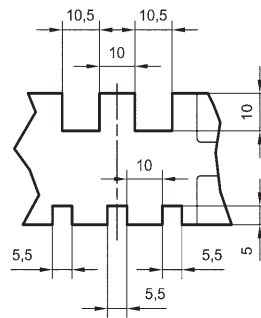
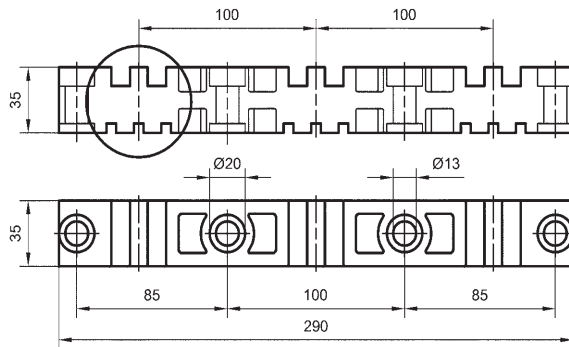
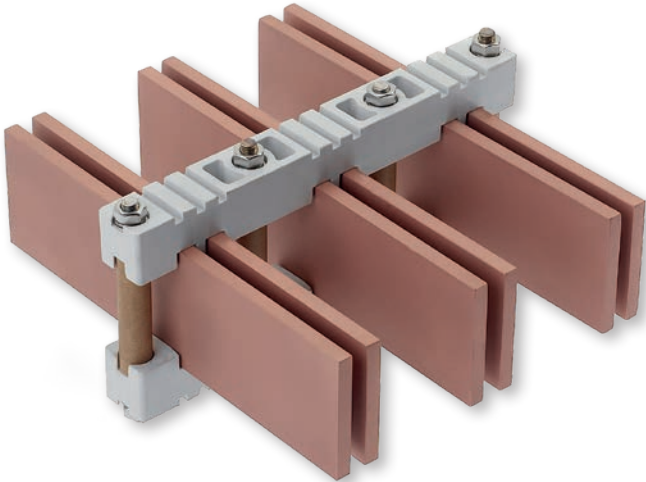
Part-No. 15645

Busbar supports, phasing-distance 100 mm

For two busbars with a thickness of 10 mm or three busbars with a thickness of 5 mm per phase. The values for the short-circuit-strength and the necessary support distances are listed on page 131.

Part-No. 15639

Distance bushings length 1 m in a paper laminate



Current load

AC up to 60 Hz

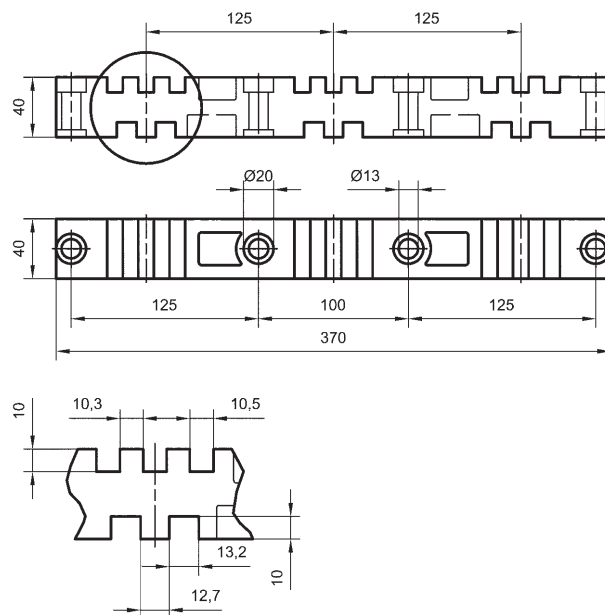
E-Copper bars dimensions mm	continuously current load by no. of busbars		
	1	2	3
20 x 5	320 A	590 A	810 A
30 x 5	445 A	790 A	1050 A
40 x 5	565 A	980 A	1280 A
50 x 5	685 A	1170 A	1475 A
20 x 10	500 A	965 A	-
30 x 10	670 A	1240 A	-
40 x 10	840 A	1510 A	-
50 x 10	1000 A	1770 A	-
60 x 10	1155 A	2015 A	-
80 x 10	1450 A	2470 A	-
100 x 10	1745 A	2900 A	-
120 x 10	2035 A	3350 A	-
160 x 10	2700 A	4350 A	-

All values in acc. with DIN 43671 by an ambient temperature of + 35 °C and a busbar temperature of + 75 °C.

Busbar supports

operating voltage 1 kV AC, temperature range - 40 °C up to + 130

°C



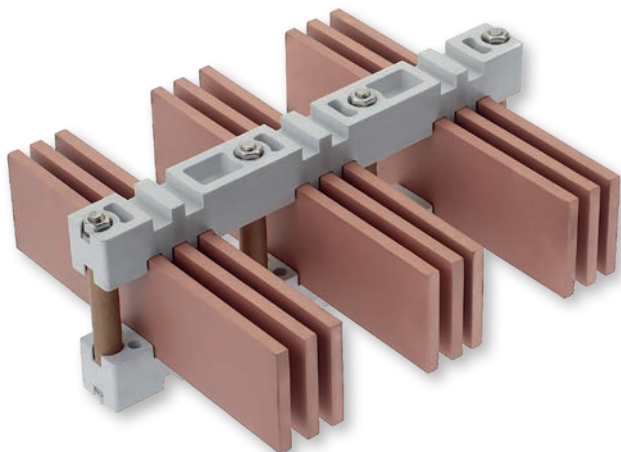
Part-No. 15646

Busbar supports, phasing-distance 125 mm

For three busbars with a thickness of 10 mm or two busbars with a thickness of 12,7 mm (1/2") per phase. The values for the short-circuit-strength and the necessary support distances are listed on page 131.

Part-No. 15639

Distance bushings length 1 m in paper laminate.



Current load

AC up to 60 Hz

E-Copper bars dimensions mm	continuously current load by no. of busbars		
	1	2	3
40 x 10	840 A	1510 A	2070 A
50 x 10	1000 A	1770 A	2390 A
60 x 10	1155 A	2015 A	2690 A
80 x 10	1450 A	2470 A	3265 A
100 x 10	1745 A	2900 A	3815 A
120 x 10	2035 A	3350 A	4375 A
160 x 10	2700 A	4350 A	5500 A

All values in acc. with DIN 43671 by an ambient temperature of + 35 °C and a busbar temperature of + 75 °C.

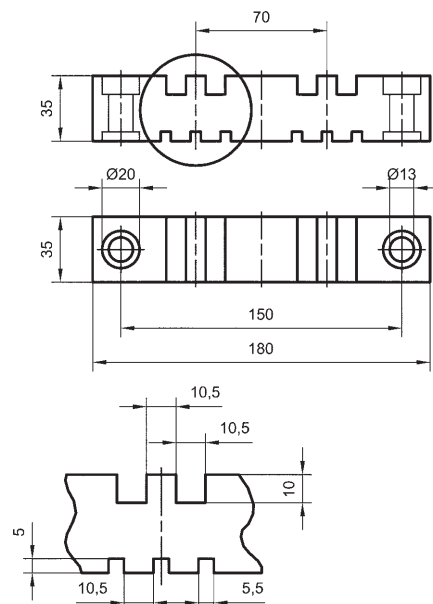
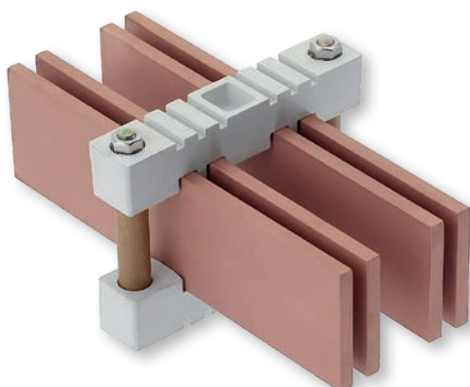
Part-No. 15647

Busbar supports, phasing-distance 70 mm for N + PE bars

Suitable for 2 busbars with a thickness of 10 mm or 3 busbars with a thickness of 5 mm per phase.

Part-No. 15539

Distance bushings length 1 m in paper laminate.



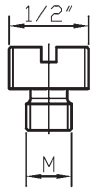
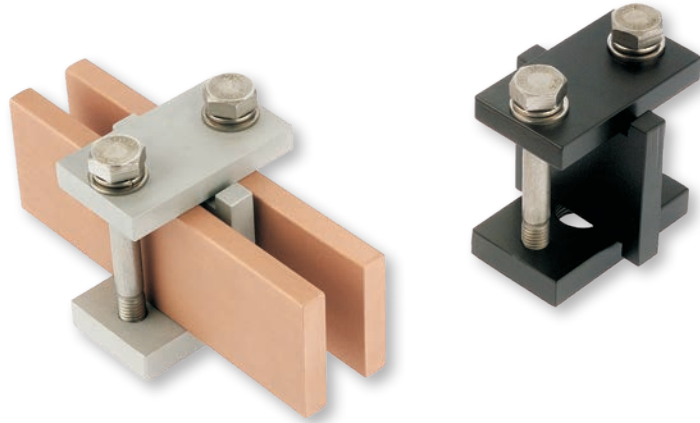
Busbar holders

**clamping version for vertical busbar guide
suitable for mounting on insulators**

Busbar holders for clamping one or two shorter busbars which should be firmly clamped in the holder in a vertical position.

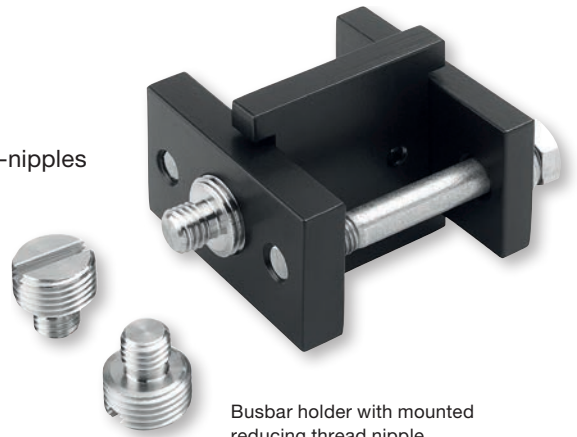
Type A: Suitable for aluminium-bars.
Material of the holder Al MgSi 1,0.
Fastening material stainless-steel

Type B: Suitable for copper-bars
or outdoor installations.
Material of the holder Al Mg Si 1,0 with coated
surface. Fastening material stainless-steel.

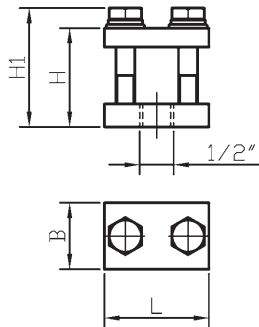


Deliverable threaded reducing-nipples
made out of stainless-steel:

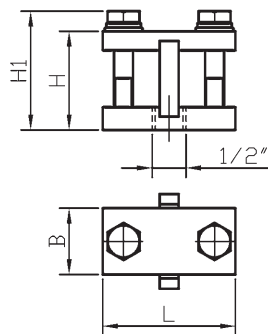
- Part-No.**
- 16020** M 8
- 16021** M 10
- 16022** M 12
- 16023** M 16



Busbar holder with mounted
reducing thread nipple



Part-No.		Technical data						
Type A	Type B	number	bar-width	thickness	L	dimensions ca. mm		
						B	H	H ₁
15900	15920	1	30	3 - 20	55	35	52	63
15901	15921	1	40	3 - 20	55	35	62	73
15902	15922	1	50	5 - 20	55	40	72	83
15903	15923	1	60	5 - 20	55	40	82	93
15904	15924	1	80	5 - 20	55	40	107	118
15905	15925	1	100	5 - 20	65	50	127	140
15906	15926	1	120	5 - 20	65	50	147	160



Part-No.		Technical data						
Type A	Type B	number	bar-width	thickness	L	dimensions ca. mm		
						B	H	H ₁
15910	15930	2	30	3 - 10	70	35	52	63
15911	15931	2	40	3 - 10	70	35	62	73
15912	15932	2	50	5 - 10	70	40	72	83
15913	15933	2	60	5 - 10	70	40	82	93
15914	15934	2	80	5 - 10	70	40	107	118
15915	15935	2	100	5 - 10	80	50	127	140
15916	15936	2	120	5 - 10	80	50	147	160

Note: Dimensions in the table for busbar thickness 10 mm. For thinner busbars the dimension L is reduced. The then valid dimensions are available on request when specifying the changed busbar thickness.

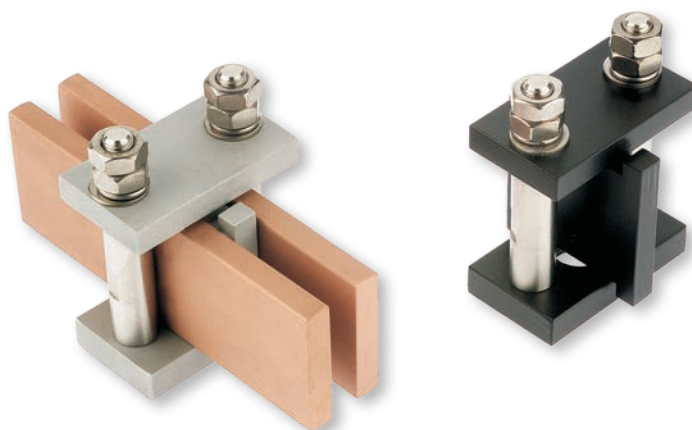
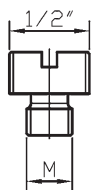
Busbar holders

sliding version for vertical busbar guide suitable for mounting on insulators

Busbar holders for clamping one or two longer busbars which, because of the heat expansion, must stand in a sliding vertical position in the holder. In this version, the upper clamping piece therefore does not rest on the busbar but on the bolt. Simple and time saving assembly option as the stud bolts can be screwed onto the insulator prior to assembly, making it possible to simply insert the busbar during assembly.

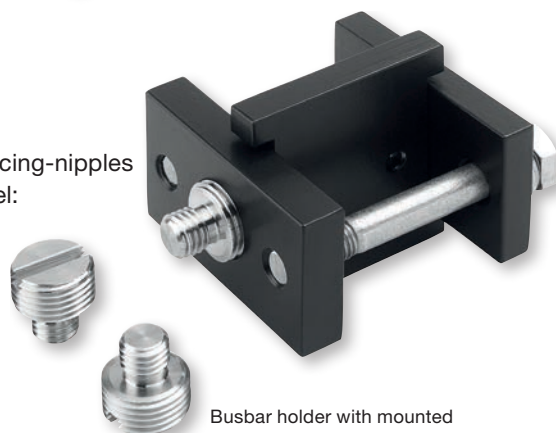
Type A: Suitable for aluminium-bars.
Material of the holder Al MgSi 1,0.
Fastening material stainless-steel.

Type B: Suitable for copper-bars
or outdoor installations.
Material of the holder Al MgSi 1,0
with coated surface.
Fastening material stainless-steel.

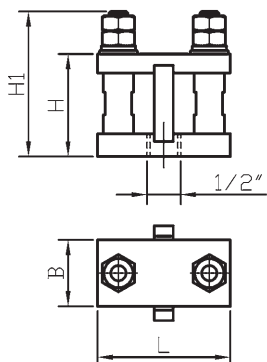
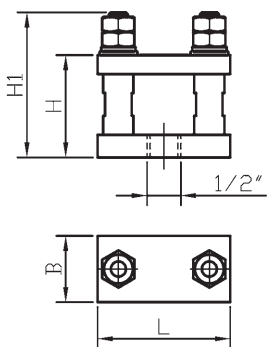


Deliverable threaded reducing-nipples
made out of stainless-steel:

- Part-No. 16020 M 8
- 16021 M 10
- 16022 M 12
- 16023 M 16



Busbar holder with mounted reducing thread nipple



Part-No.		Technical data						
Type A	Type B	number	bar-width	thickness	L	dimensions ca. mm		
						B	H	H ₁
16420	16540	1	30	3 - 20	70	35	54	77
16421	16541	1	40	3 - 20	70	35	64	87
16422	16542	1	50	5 - 20	70	40	74	97
16423	16543	1	60	5 - 20	70	40	84	107
16424	16544	1	80	5 - 20	70	40	109	132
16425	16545	1	100	5 - 20	80	50	129	157
16426	16546	1	120	5 - 20	80	50	149	177

Part-No.		Technical data						
Type A	Type B	number	bar-width	thickness	L	dimensions ca. mm		
						B	H	H ₁
16430	16550	2	30	3 - 10	70	35	54	77
16431	16551	2	40	3 - 10	70	35	64	87
16432	16552	2	50	5 - 10	70	40	74	97
16433	16553	2	60	5 - 10	70	40	84	107
16434	16554	2	80	5 - 10	70	40	109	132
16435	16555	2	100	5 - 10	80	50	129	157
16436	16556	2	120	5 - 10	80	50	149	177

Note: Dimensions in the table for busbar thickness 10 mm. For thinner busbars the dimension L is reduced. The then valid dimensions are available on request when specifying the changed busbar thickness.

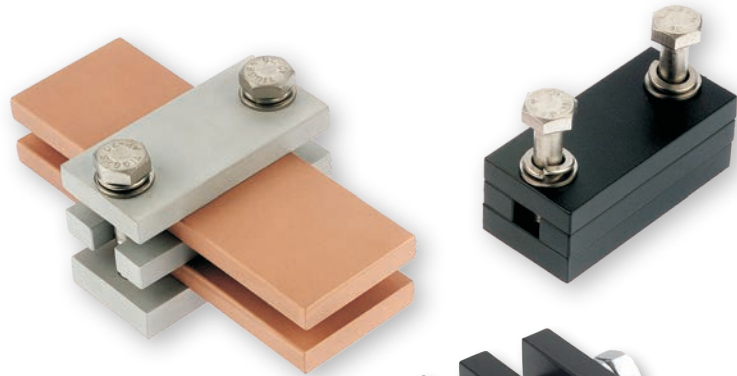
Busbar holders

**clamping version for horizontal busbar guide
suitable for mounting on insulators**

Busbar holders for clamping one or two shorter busbars which should be firmly clamped in the holder in a horizontal position.

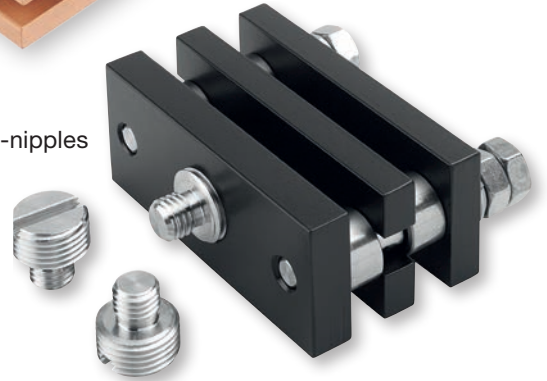
Type A: Suitable for aluminium-bars.
Material of the holder Al MgSi 1,0.
Fastening Material stainless-steel.

Type B: Suitable for copper-bars or outdoor installations.
Material of the holder Al MgSi 1,0 with coated surface.
Fastening material stainless-steel.

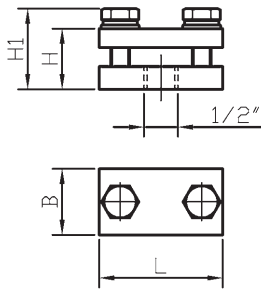
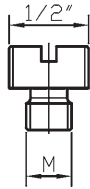


Deliverable threaded reducing-nipples made out of stainless-steel:

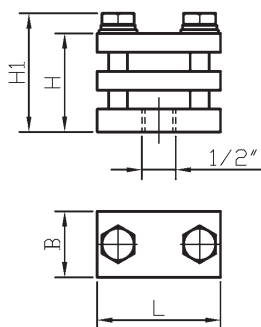
Part-No.	
16020	M 8
16021	M 10
16022	M 12
16023	M 16



Busbar holder with mounted reducing thread nipple



Part-No.		Technical data						
Type A	Type B	number	bar-width	thickness	L	dimensions ca. mm		
						B	H	H ₁
15960/5	15980/5	1	30	5	65	35	27	38
15960/10	15980/10	1	30	10	65	35	32	43
15961/5	15981/5	1	40	5	75	35	27	38
15961/10	15981/10	1	40	10	75	35	32	43
15962/5	15982/5	1	50	5	85	40	27	38
15962/10	15982/10	1	50	10	85	40	32	43
15963/5	15983/5	1	60	5	95	40	27	38
15963/10	15983/10	1	60	10	95	40	32	43
15964/5	15984/5	1	80	5	115	40	27	38
15964/10	15984/10	1	80	10	115	40	32	43
15965/5	15985/5	1	100	5	145	50	35	48
15965/10	15985/10	1	100	10	145	50	40	53
15966/10	15986/10	1	120	10	165	50	40	53



Part-No.		Technical data						
Type A	Type B	number	bar-width	thickness	L	dimensions ca. mm		
						B	H	H ₁
15970/5	15990/5	2	30	5	65	35	37	48
15970/10	15990/10	2	30	10	65	35	52	63
15971/5	15991/5	2	40	5	75	35	37	48
15971/10	15991/10	2	40	10	75	35	52	63
15972/5	15992/5	2	50	5	85	40	37	48
15972/10	15992/10	2	50	10	85	40	52	63
15973/5	15993/5	2	60	5	95	40	37	48
15973/10	15993/10	2	60	10	95	40	52	63
15974/5	15994/5	2	80	5	115	40	37	48
15974/10	15994/10	2	80	10	115	40	52	63
15975/5	15995/5	2	100	5	145	50	45	58
15975/10	15995/10	2	100	10	145	50	60	73
15976/10	15996/10	2	120	10	165	50	60	73

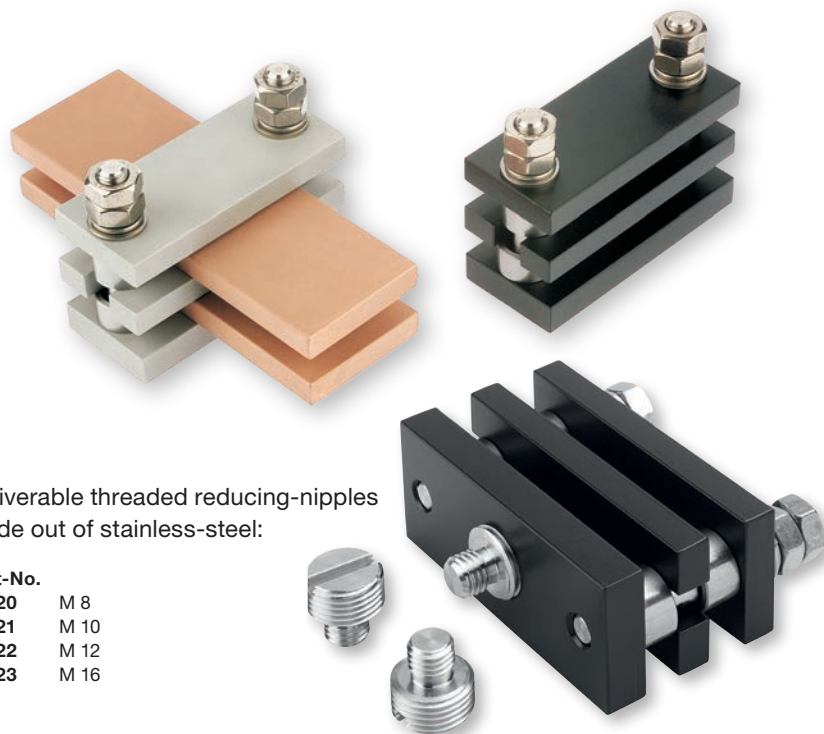
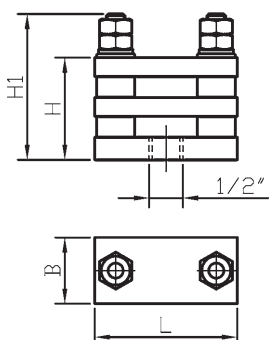
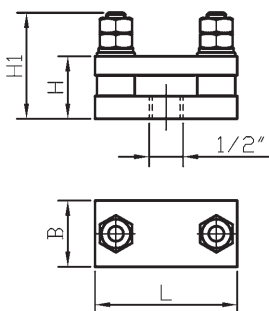
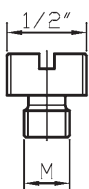
Busbar holders

sliding version for horizontal busbar guide
suitable for mounting on insulators

Busbar holders for clamping one or two longer busbars which, because of the heat expansion, must stand in a sliding horizontal position in the holder. In this version, the upper clamping piece therefore does not rest on the busbar but on the bolt. Simply and time saving assembly option as the stud bolts can be screwed onto the insulator, prior to assembly, making it possible to simply insert the busbar during assembly.

Type A: Suitable for aluminium-bars.
Material of the holder Al MgSi 1,0.
Fastening material stainless-steel.

Type B: Suitable for copper-bars or outdoor installations.
Material of the holder Al MgSi 1,0 with coated surface.
Fastening material stainless-steel.



Deliverable threaded reducing-nipples made out of stainless-steel:

- Part-No.**
- 16020** M 8
- 16021** M 10
- 16022** M 12
- 16023** M 16

Busbar holder with mounted reducing thread nipple

Part-No.		Technical data						
Type A	Type B	number	bar-width	thickness	L	dimensions ca. mm		
						B	H	H ₁
16470/5	16580/5	1	30	5	75	35	28	56
16470/10	16580/10	1	30	10	75	35	33	56
16471/5	16581/5	1	40	5	85	40	28	56
16471/10	16581/10	1	40	10	85	40	33	56
16472/5	16582/5	1	50	5	95	40	28	56
16472/10	16582/10	1	50	10	95	40	33	56
16473/5	16583/5	1	60	5	105	40	28	56
16473/10	16583/10	1	60	10	105	40	33	56
16474/5	16584/5	1	80	5	135	50	36	69
16474/10	16584/10	1	80	10	135	50	41	69
16475/5	16585/5	1	100	5	155	50	36	69
16475/10	16585/10	1	100	10	155	50	41	69
16476/10	16586/10	1	120	10	175	50	41	69

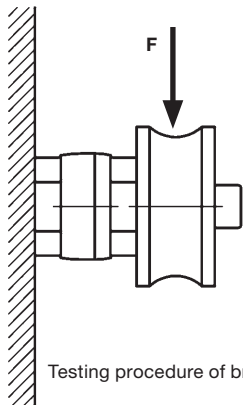
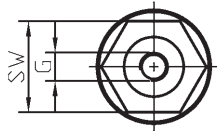
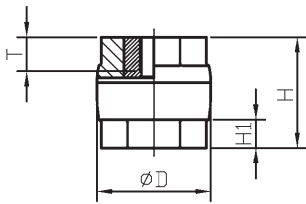
Part-No.		Technical data						
Type A	Type B	number	bar-width	thickness	L	dimensions ca. mm		
						B	H	H ₁
16480/5	16590/5	2	30	5	75	35	39	63
16480/10	16590/10	2	30	10	75	35	54	77
16481/5	16591/5	2	40	5	85	40	39	63
16481/10	16591/10	2	40	10	85	40	54	77
16482/5	16592/5	2	50	5	95	40	39	63
16482/10	16592/10	2	50	10	95	40	54	77
16483/5	16593/5	2	60	5	105	40	39	63
16483/10	16593/10	2	60	10	105	40	54	77
16484/5	16594/5	2	80	5	135	50	47	76
16484/10	16594/10	2	80	10	135	50	62	90
16485/5	16595/5	2	100	5	155	50	47	76
16485/10	16595/10	2	100	10	155	50	62	90
16486/10	16596/10	2	120	10	175	50	62	90

Standoff insulators

made out of polyester resin material

with double hexagon spanner flats and threaded steel inserts

Insulators made of glass-fibre reinforced polyester resin suitable for indoor applications. They are characterized by their assembly-friendly double hexagonal design. For this reason, both the upper and the lower part of the insulator have a hexagonal spanner flat, which are arranged offset to each other. It is therefore possible to install and remove the insulators quickly and safely, even in confined spaces. In terms of costs, this reduces the assembly effort to a minimum.



Testing procedure of breaking strength

Technical data of the material

• Density	DIN 53479	1,75 g/cm ³
• Flexural Resistance	DIN 53452/ISO R 178	120 N/mm ²
• Impact Resistance	DIN 53455/ISO R 527	70 N mm ²
• Impact Value	DIN 53453/ISO R179	45 KJm ²
• Long Term/ Operational Temperature	VDE 0304, Part 21/IEC 216	+ 130 °C
• Rod Behaviour	VDE 0304, Part 3	Step BH 2 ≤ 10
• Behaviour in case of Fire	UL 94	V-0
• Surface Resistance	DIN 53482	10 ¹³ Ω
• Throughout Resistance		
Dielectric	DIN 53482	10 ¹⁴ Ω . cm
• Loss Factor	DIN 53483	< 0,02 tan/50 Hz
• Deposit Tracking	DIN IEC 112/VDE 0303, Part 1	CT 600
• Water Absorption	DIN 53495	< 50 mg/1 d
• Colour	-	brown

The values in the table have been determined with our own standards based on DIN 53451 and combined with the standards for the respective materials for test purposes.

Part-No.	Technical data											
	dimensions ca. mm					T	H ₁	PS/kV	BWS/kV	F/kN	Z/kN	weight kg/% pcs.
	D	H	G	SW								
03068 S	30	30	M 6	24	8	9,5	5	0,75	3	6	5,70	
03069 S			M 8								5,40	
03070 S	30	40	M 6	24	10	10	5	1,00	4	8	7,30	
03071 S	35	30	M 6	30	8	10	5	0,75	4	7	6,50	
03072 S			M 8						5	8	6,10	
03073 S	40	40	M 8	32	12	10,5	5	1,00	6	11	13,00	
03074 S			M10		11						12,10	
03075 S			M12		10						11,20	
03080 S	40	50	M 8	32	12	10,5	10	1,50	5	11	16,50	
13080 S			M10		15						16,50	
03081 S			M12		13				7		13,80	
13081 S	40	60	M 8	32	12	11	10	1,50	4	11	16,90	
13082 S			M10		15						17,60	
03078 S	50	40	M10	41	11	13	5	1,00	8	13	16,50	
03079 S			M12		10				10		16,50	
13083 S	50	50	M12	41	13	13,5	10	1,50	8	13	20,00	
03084 S	50	60	M10	41	15	13,5	10	1,50	6	13	24,10	
03085 S			M12		18				7		24,70	
13084 S	60	60	M12	50	18	18,5	10	1,50	9	15	32,30	
13085 S			M16		17				12	17	32,80	

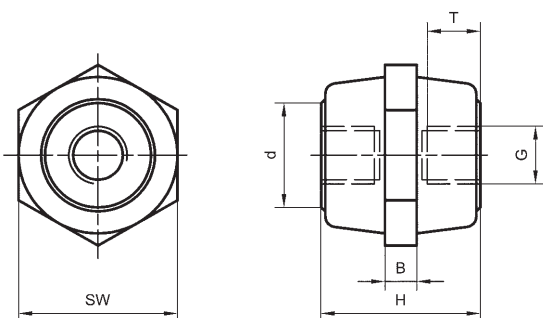
F = rated load on upper insulator edge PS = testing voltage
Z = tensile force BWS = operating voltage

Standoff insulators

made out of polyester resin material

with single hexagon spanner flat and threaded steel inserts

Standoff insulators manufactured out of a glass fibre reinforced polyester resin suitable for indoor applications. The characteristic of the material is in accordance with DIN Type 803. The compound is free of halogen with an excellent behaviour in case of fire (UL 94 V-0) and a very good strength of shape.



Technical data of the material

- Strength of shape ISO 75 > 250 °C
- Behaviour in case of fire UL 94 Class V-0 at 3,2 mm
- Density ISO 1183 1,75 g/cm³
- Special throughout resistance IEC 60093 10¹⁵ Ohm
- Dielectric strength IEC 60243 20 kV/mm
- Deposit tracking IEC 60112 CTI 600
- Colour brown
- Temperature range - 40 °C up to + 130 °C

Part-No.	Technical data												
	dimensions ca. mm					Md/Nm	F/kN	Z/kN	D/kN	BWS/kV	PWS/kV	weight	
	H	SW	G	T	d	B						kg/% pcs.	
06135	18	15	M 4	4,5	11	-	3,3	1,0	2	12	1,0	5	0,70
06138	20	20	M 5	5,5	14	5	5	1,3	3	20	1,0	5	1,20
06139	25	25	M 5	5,5	16	6	15	1,5	3	20	1,0	10	2,40
06140			M 6	8			15	1,5	5	35			2,40
06143	30	30	M 6	8	20	6	20	2,5	6	45	1,0	15	3,80
06144			M 8	10			40	3,0	12	60			5,40
06145			M10	11			50	4,0	12	60			6,60
06147	35	30	M 6	8	20	6	20	2,0	6	45	1,0	15	4,50
06148			M 8	10			40	3,5	12	60			6,00
06149			M10	11			50	4,0	16	75			7,00
06150	35	40	M 8	10	28	8	40	4,0	14	70	1,0	15	6,40
06151			M10	11			50	4,5	16	80			7,00
06152	40	30	M 6	8	20	6	20	1,5	6	45	2,0	20	5,00
06153			M 8	10			40	3,0	12	60			6,60
06154			M10	11			50	3,0	12	60			8,60
06156	40	40	M 8	10	28	8	50	5,0	14	90	2,0	20	10,00
06157			M10	14			90	8,0	20	100			12,20
06158			M12	12,5			100	9,0	22	120			13,50
06160	40	50	M 8	10	32	8	70	5,0	14	140	2,0	20	13,80
06161			M10	14			120	12,5	23	140			16,00
06162			M12	18			200	12,5	28	180			17,00
06165	50	40	M 8	10	28	10	50	5,0	14	90	3,0	25	12,00
06166			M10	14			90	5,0	20	100			14,00
06167			M12	18			100	6,0	22	120			16,00
06169	50	50	M 8	10	32	10	70	4,5	14	120	3,0	25	17,50
06170			M10	14			120	10,0	23	140			20,00
06171			M12	18			180	10,0	28	180			21,50
06172			M16	16			180	10,0	28	180			23,90
06174	60	40	M 8	10	28	8	50	4,0	14	90	3,0	25	14,00
06175			M10	14			90	6,0	20	100			16,00
06176			M12	18			120	6,0	20	100			18,00
06178	60	50	M10	14	32	10	120	9,0	23	140	3,0	25	23,00
06179			M12	18			200	11,0	28	180			25,00
06182	60	60	M12	18	40	12	200	12,0	28	220	3,0	25	33,00
06183			M16	21			300	15,0	32	240			35,00
06184			M20	22			300	16,0	37	240			38,60
06185	80	60	M10	14	40	12	200	11,0	32	220	3,0	25	41,00
06186			M12	18			300	15,0	37	240			43,00
06187			M16	21			300	15,0	37	240			45,00

Part-No. 06135 Cylindrical design without spanner flat

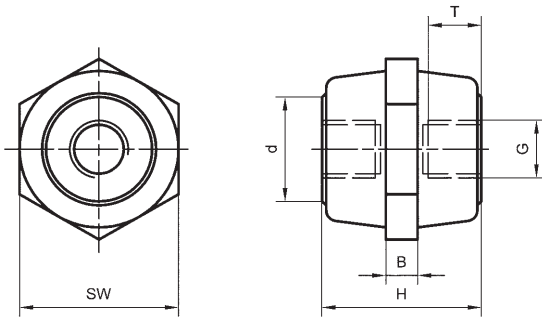
SW = wrench size
 T = usable thread depth
 F = rated load limit on upper insulator edge

PWS = testing voltage (AC)
 Z = tensile force
 D = compressive force

Md/Nm = permissible tightening torque
 BWS = operating voltage

Standoff insulators made out of Polyamide with single hexagon spanner flat and steel inserts

Standoff insulators manufactured out of reinforced, flame protected and heat stabilized Polyamide suitable for indoor applications. The compound is free of halogen and Phosphor. The material can be converted efficiently and is characterized by his excellent values for tensile strength (Z) and the rated load limit on the upper insulator edge (F). The differences to the design made out of glass fibre reinforced polyester resin are basically in the values for the behaviour in case of fire (class V2 to V-0) and the temperature range - 25 °C up to + 120 °C to - 40 °C up to + 130 °C.



Technical data of the material

- | | | |
|-----------------------------|------------------------|------------------------|
| • Behaviour in case of fire | UL 94 | Class V2 |
| • Density | ISO 1183 | 1,36 g/cm ³ |
| • Dielectric strength | IEC 60243-1 | 30 kV/mm |
| • Deposit tracking | IEC 60112 | CTI 475 |
| • Colour | nature | |
| • Temperature range | - 25 °C up to + 120 °C | |

Part-No.	Technical data												
	dimensions ca. mm						Md/Nm	F/kN	Z/kN	D/kN	BWS/kV	PWS/kV	weight kg/% pcs.
	H	SW	G	T	d	B							
06100	18	15	M 4	4,5	11	3	3,3	1,0	2	12	1,0	5	0,60
06102	25	25	M 5	5,5	16	6	15	2,0	3	20	1,0	10	2,00
06103			M 6	8			15	2,0	5	35			2,00
06105	30	30	M 6	8	20	6	20	3,0	6	45	1,0	15	3,00
06106			M 8	10			40	4,0	12	60			5,00
06107			M10	11			50	8,0	14	60			6,40
06109	35	30	M 6	8	20	6	20	5,0	6	45	1,0	15	5,00
06110			M 8	10			40	5,0	12	60			6,00
06111			M10	11			50	5,0	16	75			6,00
06112	35	40	M 8	10	28	8	40	4,0	14	70	1,0	15	6,50
06113			M10	11			50	4,5	16	80			6,70
06114	40	30	M 6	8	20	6	20	1,5	6	45	2,0	20	7,40
06114/8			M 8	10			40	5,0	12	60			7,80
06115	40	40	M 8	10	28	8	50	7,0	14	90	2,0	20	8,00
06116			M10	14			90	10,0	28	100			10,00
06117			M12	12,5			100	12,0	22	120			10,00
06120	50	40	M 8	10	28	10	50	5,0	14	90	3,0	25	10,00
06121			M10	14			90	5,0	20	100			12,00
06122			M12	18			100	6,0	22	120			14,00
06125	50	50	M10	14	38	10	120	10,0	23	140	3,0	25	18,00
06126			M12	18			160	14,0	28	180			19,50
06127			M16	16			200	18,0	29	180			21,10
06129	60	40	M 8	10	28	8	50	4,0	14	90	3,0	25	12,00
06130			M10	14			90	6,0	20	100			14,00
06131			M12	18			120	6,0	20	100			14,80

SW = wrench size
T = usable thread depth
F = rated load limit on upper insulator edge

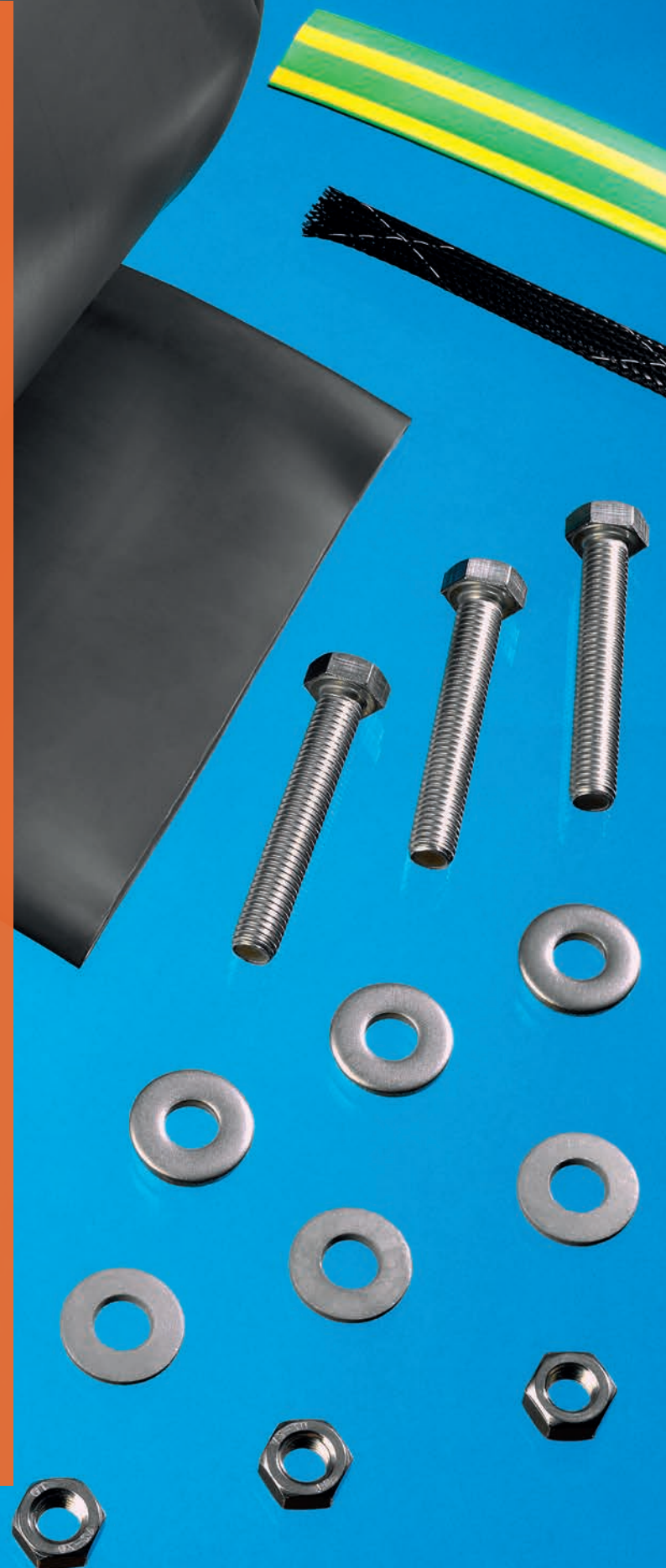
PWS = testing voltage (AC)
Z = tensile force
D = compressive force

Md/Nm = permissible tightening torque
BWS = operating voltage

Insulating hoses and mounting accessories

In addition to our flexible power connections, we also offer an extensive range of insulating hoses and other mounting accessories. This is however normally deliverable at short notice from our Remscheid warehouse:

- Different types of heat shrinkable tubing
- Flexible PVC-insulating hoses
- Highly flexible silicone insulating hoses
- Glass fibre hoses
- Fire protection hoses
- Heat resistant Therm-textile hoses
- Bi-metallic sheets, washers and cut offs
- Screwing material
- Contact grease and cleaning sprays



Heat shrinkable tubing

Material: irradiated cross-linked polyolefin

Colour: black



Construction and application

Extremely flexible thin walled heat shrinkable tubing. Flame retardant and self-extinguishing. Well suited as insulation material for cables, electrical wires or cable connectors. All tubing are marked with printed UL- and CSA-numbers and therefore well suited for export-orders which require a certificate about the UL/CSA-registration.

Part-No.	Technical data					
	before shrinking Inside-Ø		after total shrinking		quantity per spool	specification
	Inch	mm	Inside-Ø max. mm	wall-thickness min.		
30061	3/64	1,2	0,6	0,33	300 m	shrink-ratio: 2:1
30062	1/16	1,6	0,8	0,36	300 m	temperature resistance: - 55 °C up to + 125 °C
30063	3/32	2,4	1,2	0,44	150 m	min. shrink temperature: + 90 °C
30064	1/8	3,2	1,6	0,44	150 m	flame retardant/self-extinguishing
30065	3/16	4,8	2,4	0,44	60 m	dielectric strength: min. 19,7 kV/mm/ASTM D 876
30066	1/4	6,4	3,2	0,56	60 m	tensile strength min. 10,4 Mpa/UL 224
30067	3/8	9,5	4,8	0,56	60 m	breaking elasticity: min. 200 %/UL 224
30068	1/2	12,7	6,4	0,56	60 m	specification: UL and CSA
30069	3/4	19,1	9,5	0,69	60 m	standard colour: black, other colours on request
30070	1	25,4	12,7	0,77	60 m	RoHs and Reach conform
30072	1 1/2	38,1	19,1	0,87	60 m	
30073	2	50,8	25,4	0,97	60 m	

Heat shrinkable tubing

Material: irradiated cross-linked polyolefin

Colour: transparent



Construction and application

Flexible thin walled heat shrinkable tubing with a good mechanical and chemical stability. Don't tear also when shrinking the material about objects with sharp edges. The material offer so multifarious possibilities for application in the industry as well as military field. Suitable for the insulation of busbars, cables, connectors or other power leading parts.

Part-No.	Technical data					
	before shrinking Inside-Ø		after total shrinking		quantity per spool	specification
	Inch	mm	Inside-Ø max. mm	wall-thickness min.		
30080	3/64	1,2	0,6	0,34	300 m	shrink-ratio: 2:1
30081	1/16	1,6	0,8	0,36	300 m	temperature resistance: - 55 °C up to + 135 °C
30082	3/32	2,4	1,2	0,44	150 m	min. shrink temperature: + 110 °C
30083	1/8	3,2	1,6	0,44	150 m	not self-extinguishing
30084	3/16	4,8	2,4	0,44	60 m	dielectric strength: min. 19,7 kV/mm/ASTM D 876
30085	1/4	6,4	3,2	0,56	60 m	tensile strength: min. 10,4 Mpa/ASTM D 638
30086	3/8	9,5	4,8	0,56	60 m	breaking elasticity: min. 200 %/ASTM D 638
30087	1/2	12,7	6,4	0,56	60 m	specification: MIL und VG
30088	3/4	19,1	9,5	0,70	60 m	standard colour: transparent
30089	1	25,4	12,7	0,76	60 m	RoHs and Reach conform
30090	1 1/2	38,1	19,1	0,87	60 m	
30091	2	50,8	25,4	0,96	60 m	
30092	3	76,2	38,1	1,00	60 m	
30093	4	101,6	50,8	1,18	30 m	

Heat shrinkable tubing

Material: irradiated cross-linked polyolefin

Colour: black



Construction and application

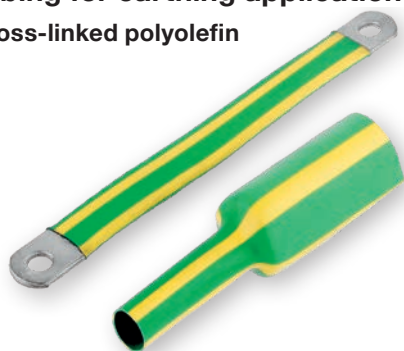
Flexible thin walled heat shrinkable tubing with a good mechanical and chemical stability. Don't tear also when shrinking the material about objects with sharp edges. Easy to mark by printing the outside of the tubing. Therefore multifarious applications are given e.g. insulation of busbars, cables, connectors etc.

Part-No.	Technical data					
	before shrinking Inside-Ø		after total shrinking		quantity per spool	specification
	Inch	mm	Inside-Ø max. mm	wall-thickness min.		
30100	3/64	1,2	0,6	0,40	300 m	shrink-ratio: 2:1
30101	1/16	1,6	0,8	0,40	300 m	temperature resistance: - 55 °C up to + 135 °C
30102	3/32	2,4	1,2	0,50	150 m	min. shrink temperature: + 120 °C
30103	1/8	3,2	1,6	0,50	150 m	flame retardant/self-extinguishing
30104	3/16	4,8	2,4	0,50	60 m	dielectric strength: ca. 20 kV/mm/VDE 0303 Part 2
30105	1/4	6,4	3,2	0,60	60 m	tensile strength: ca. 10,3 MPa/IEC 60684-2
30106	3/8	9,5	4,8	0,60	60 m	breaking elasticity: 200 % / IEC 60684-2
30107	1/2	12,7	6,4	0,60	60 m	specification: UL
30108	3/4	19,1	9,5	0,80	60 m	standard colour: black, other colours on request
30109	1	25,4	12,7	0,90	60 m	RoHs and Reach conform
30110	1 1/2	38,1	19,1	1,00	60 m	
30111	2	50,8	25,4	1,10	60 m	
30112	3	76,2	38,1	1,30	60 m	
30113	4	101,6	50,8	1,40	30 m	

Heat shrinkable tubing for earthing applications

Material: irradiated cross-linked polyolefin

Colour: yellow/green



Construction and application

Flexible thin walled heat shrinkable tubing, flame retardant and self-extinguishing. Well suited for a marking of earthing connections. Caused by the special production process (dual-colour-extrusion) it is guaranteed that the material either doesn't fade nor it is possible to rub off the colour.

Part-No.	Technical data					
	before shrinking Inside-Ø		after total shrinking		quantity per spool	specification
	Inch	mm	Inside-Ø max. mm	wall-thickness min.		
30182	3/64	1,2	0,6	0,41	300 m	shrink-ratio: 2:1
30183	1/16	1,6	0,8	0,43	300 m	temperature resistance: - 55 °C up to + 135 °C
30184	3/32	2,4	1,2	0,51	150 m	min. shrink temperature: + 90 °C
30185	1/8	3,2	1,6	0,69	150 m	flame retardant/self-extinguishing
30186	3/16	4,8	2,4	0,84	60 m	dielectric strength: min. 19,7 kV/ASTM D 876
30187	¼	6,4	3,2	0,90	60 m	tensile strength: min. 10,4 MPa/ASTM D 638
30188	3/8	9,5	4,8	1,00	60 m	breaking elasticity: min. 200 %/ASTM D 638
30189	1/2	12,7	6,4	1,20	60 m	specification: MIL, CSA and UL
30190	3/4	19,1	9,5	1,40	60 m	standard colour: yellow/green
30191	1	25,4	12,7	1,80	60 m	RoHs and Reach conform
30192	1 1/2	38,1	19,1	2,40	60 m	
30193	2	50,8	25,4	2,40	60 m	

Heat shrinkable tubing

Material: irradiated cross-linked polyolefin
colour: black



Construction and application

Flexible thin walled heat shrinkable tubing with high shrink-ratio (4:1) and less longitudinal change (max. 5%). Well suited for repair works, because only 5 dimensions are needed to cover a wide diameter range. Delivery in cut length of 0,9/1,2 m. The tubes are RoHs and Reach conform.

Part-No.	Technical data					
	before shrinking Inside-Ø		after total shrinking		cut- length	specification
	Inch	mm	Inside-Ø max. mm	wall-thickness min.		
13060	1	25,4	6,6	1,52	1,2 m	shrink-ratio: 4:1
13061	1 1/2	38,1	9,5	1,52	1,2 m	temperature resistance: - 55 °C up to + 135 °C
13062	2	50,8	12,7	1,52	1,2 m	min. shrink temperature: + 90 °C
13063	3	76,2	19,1	1,52	0,9 m	flame retardant/self-extinguishing
13064	4	101,6	25,4	1,52	0,9 m	dielectric strength: min. 19,7 kV/mm/ASTM D 876
						tensile strength: 10,4 MPa/ASTM D 638
						breaking elasticity: min. 200 %/ASTM D 638
						specification: UL and CSA
						standard colour: black

Heat shrinkable tubing

Material: irradiated cross-linked polyolefin
With and without adhesive, colour: black



Construction and application

Flexible medium walled heat shrinkable tubing as desired with or without adhesive. Well suited for protecting and insulating of components inside of low voltage or outdoor applications. The adhesive melts when shrinking the tube, so that the components are protected against moisture. Delivery in cut length of 1,2 m. Type A: without glue inside, Type B: with glue inside

Part-No.		Technical data					
Type A	Type B	before shrin- king Inside-Ø	nafter total shrinking		cut- length	specification	
		mm	Inside-Ø max. mm	wall-thickness min.			
13066	13068	10,2	3,8	2,0	1,2 m	shrink-ratio: ca. 3:1	
30122	15821	19,1	5,6	2,0	1,2 m	temperature resistance - 55 °C up to + 110 °C	
15803	15823	27,9	10,2	2,4	1,2 m	min. shrink temperature: + 120 °C	
15804	13069	33,0	10,2	2,4	1,2 m	not self-extinguishing	
30128	15824	38,1	12,7	2,4	1,2 m	dielectric strength: min. 20 kV/mm/IEC 60684-2	
30129	15825	43,2	12,7	2,5	1,2 m	tensile strength: min. 14,5 MPa/IEC 60684-2	
15806	15826	52,1	18,1	2,5	1,2 m	breaking elasticity: 550 %/IEC 60684-2	
15808	15828	69,9	25,4	2,5	1,2 m	specification: -	
15809	15829	90,0	30,0	2,5	1,2 m	standard colour: black	

Heat shrinkable tubing
 colour: black, with adhesive



Construction and application

Flexible heat shrinkable tubing. The adhesive melts when shrinking the tube, so that components are protected against moisture. Delivery in cut length of 1,2 m. The tubes are RoHs and Reach conform.

Part-No.	Technical data				
	before shrinking Inside-Ø	after total shrinking		cut-length	specification
Type A	mm	Inside-Ø max. mm	wall-thickness min.		
30195	3	1,0	1,00	1,2 m	shrink-ratio: 3:1
30196	4,8	1,5	1,00	1,2 m	temperature resistance: - 55 °C up to + 110 °C
30197	6	2,0	1,00	1,2 m	min. shrink temperature: + 90°
30198	9	3,0	1,50	1,2 m	flame retardant
30199	12	4,0	1,80	1,2 m	dielectric: ca. 20 kV/mm/VDE 0303 Part 2
30200	19	6,0	1,80	1,2 m	tensile strength: ca.12,4 MPa/ASTM D 638
30201	24	8,0	2,50	1,2 m	breaking elasticity: ca. 450 %/ASTM D 638
30202	39	13,0	2,50	1,2 m	standard colour: black specification: -

Heat shrinkable tubing for customized applications

Range of applications

In addition to the standard heat shrinkable tubing listed in this catalogue, we also supply special versions tailored to the application, e.g. particularly chemically or heat resistant heat shrinkable tubing, based on silicone or PTFE materials. In the field of thick-walled heat shrinkable tubing, e.g. for the insulation of medium-voltage busbars or pipes, we can also offer suitable materials as well as ready-insulated components.

Examples of customizing:



Busbar/pipe insulated with thicker walled heat shrinkable tubing, e.g. for medium-voltage applications

Flexible connectors insulated with glass silk and PTFE shrinkable tubing.

PVC-insulating hoses

colour: grey

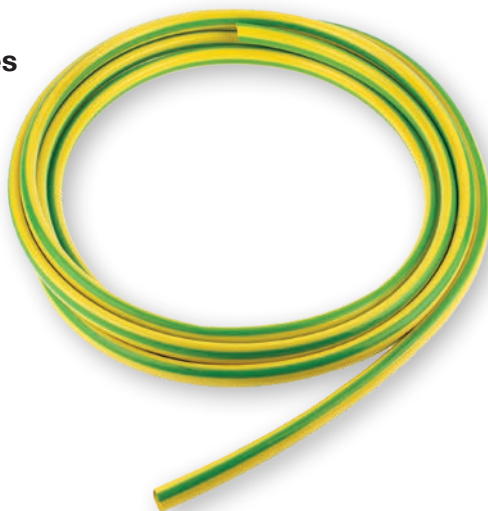


Part-No.	Technical data			Part-No.	Technical data		
	dimensions ca. mm				dimensions ca. mm		
	Inside-Ø	wall-thickness	length of the rolls		Inside-Ø	wall-thickness	length of the rolls
54158	14	1,2	100 m	54190	35	1,2	25 m
54162	16	1,2	100 m	54192	40	1,2	25 m
54164	18	1,2	100 m	54194	45	1,2	25 m
54166	22	1,2	50 m	54195	50	1,2	25 m
54172	24	1,2	50 m	54196	55	1,2	25 m
54176	26	1,2	50 m	54198	60	1,2	25 m
54178	28	1,2	50 m	54199	65	1,2	25 m
54182	30	1,2	25 m	54200	70	1,2	25 m
				54202	75	1,2	25 m
				54204	80	1,2	25 m
				54206	85	1,2	25 m
				54208	90	1,2	25 m
				54210	95	1,2	25 m
				54211	100	1,2	25 m

Remark: Temperature resistant - 20 °C up to + 90 °C, dielectric strength 20 kV/mm, Shore hardness A 74 +/- 3, cadmium-free, RoHs and Reach conform

PVC-insulating hoses

colour: green/yellow



Part-No.	Technical data			Part-No.	Technical data		
	dimensions ca. mm				dimensions ca. mm		
	Inside-Ø	wall-thickness	length of the rolls		Inside-Ø	wall-thickness	length of the rolls
13095	2	0,4	50 m	13100	12	0,8	25 m
13096	4	0,5	50 m	13101	14	0,8	25 m
13097	6	0,6	25 m	13118	16	0,8	25 m
13098	8	0,6	25 m	13119	20	0,8	25 m
13099	10	0,7	25 m				

Remark: Temperature resistant - 20 °C up to + 90 °C, dielectric strength 20 kV/mm, Shore hardness A 90 +/- 5, cadmium-free, RoHs and Reach conform

Silicone insulating hoses

colour: nature



Part-No.	Technical data			Part-No.	Technical data		
	dimensions ca. mm				dimensions ca. mm		
	Inside-Ø	wall-thickness	length of the rolls		Inside-Ø	wall-thickness	length of the rolls
15890	2	0,4	100 m	13106	24	1,0	25 m
15891	3	0,4	100 m	13107	26	1,0	25 m
15892	4	0,5	100 m	13108	28	1,0	25 m
15893	5	0,6	50 m	13109	30	1,0	25 m
15894	6	0,6	50 m	13110	35	1,0	25 m
15895	7	0,7	50 m	13111	40	1,0	25 m
15896	8	0,7	50 m	13112	45	1,0	25 m
15897	10	0,7	25 m	13113	50	1,0	25 m
15898	12	0,8	25 m	13114	55	1,0	25 m
13102	14	0,8	25 m	13115	60	1,0	25 m
13103	16	1,0	25 m	13116	65	1,0	25 m
13104	18	1,0	25 m	13117	70	1,0	25 m
13105	20	1,0	25 m				

Remark: Temperature resistant - 50° up to up to 180 °C, dielectric strength 20 kV/mm, Shore hardness A 60 +/- 5.

Glass fibre hoses

In addition to the shrink, PVC and silicone hoses listed above, we also supply protective hoses made of glass fibre or ready-assembled cables and connections fitted with these according to the customers requirements and tailored to the respective application. If, for example, higher temperature resistance is required, such as in glass melting plants or similar applications, hoses made of glass fibre materials can be used. For electrical insulation or tightness to the conductor silicone hoses can be placed underneath and then glass fibre hoses can be placed over it for additional heat protection. We use the following materials as standard:

Glass fibre hoses, black, made of E-glass with impregnation



Glass fibre hoses, raw white without impregnation



Black glass fibre hose out of E-glass with impregnation

- Temperature resistant up to + 300 °C
- Stronger non-stretchable material
- Cut-resistance due to impregnation (hardly frayed or not at all after cutting and also offers mechanical abrasion protection).
- Deliverable diameters from 4 mm up to 65 mm

Raw white glass fibre hose out of E-glass without impregnation

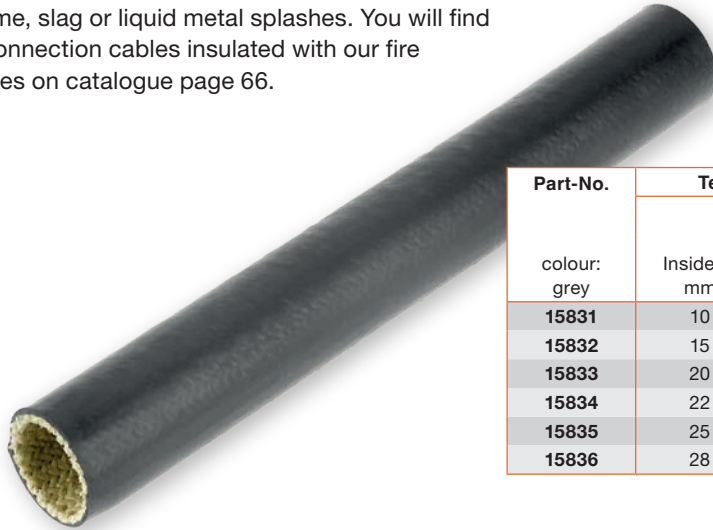
- Temperature resistant up to + 450 °C
- Soft and stretchable material
- Assembly by sliding on, whereby the material is compressed and the wall thickness can vary depending on the diameter range
- Deliverable diameters from approx. 10 up to 100 mm

For applications with even higher temperature ranges or higher mechanical requirements, we recommend our fire protection hoses according to the following catalogue page 120.

Fire protection hoses

Construction and application

Our fire protection hoses consist out of a tightly woven inner hose made of thermal textile with an outer silicone coating. They can withstand extreme thermal loads and are very well suited as cover hoses for protecting cables and lines as well as hydraulic and cooling water hoses, e.g. in the steel-, foundry- and glass industry. They protect cables and hoses from radiant heat direct flame, slag or liquid metal splashes. You will find ready-made connection cables insulated with our fire protection hoses on catalogue page 66.



Technical data

- Temperature resistance:
Inner core: continuously up to + 800 °C, shortly up to + 1100 °C
Silicone cover: continuously up to + 300 °C, shortly up to + 500 °C
- Flame retardant, self-extinguishing
- Dielectric strength: min. 12 kV
- Free of halogene and REACH-conform
- Approvals:
Railway approval EN 45545-2-2016-02-R22/R23-H23
Type approval German Lloyd

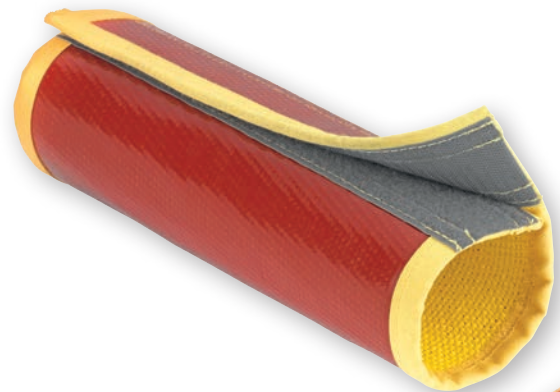
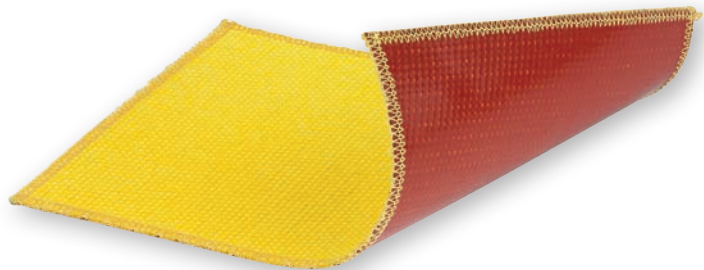
Part-No.	Technical data		Part-No.	Technical data	
	dimensions			dimensions	
colour: grey	Inside-Ø mm	length of the rolls	colour: grey	Inside-Ø mm	length of the rolls
15831	10	25 m	15837	30	25 m
15832	15	25 m	15838	32	25 m
15833	20	25 m	15839	35	25 m
15834	22	25 m	15840	40	25 m
15835	25	25 m	15841	50	25 m
15836	28	25 m	15842	60	25 m

Fire protection hoses in extra heavy design

Construction and application

In addition to the fire protection hoses offered above in rolls, we also supply extra heavy fire protection hoses for the protection of air and water cooled high current cables, hose lines etc. made of a particularly stable, heavy thermal textile with a thicker silicone coating. This material has been specially designed for robust use in foundries and steel-works as protection against slag and liquid metal splashes.

It is available in lengths according to customer requirements with diameter ranges also above 250 mm, e.g. as retrofit cover hoses for our water cooled high-current cables for electric arc and ladle furnaces according to catalogue pages 88 and 89. The material is durable and robust as well as flame retardant and self-extinguishing. The inner core has a permanent temperature resistance up to + 700 °C and the outer silicone cover up to + 250 °C. The material is Reach-conform and harmless to health. It can be supplied as a sewn tube or with a Velcro fastener. Versions with press studs or swivel fasteners are also conceivable too.



Bimetallic sheets and bimetallic washers

Bimetallic sheets

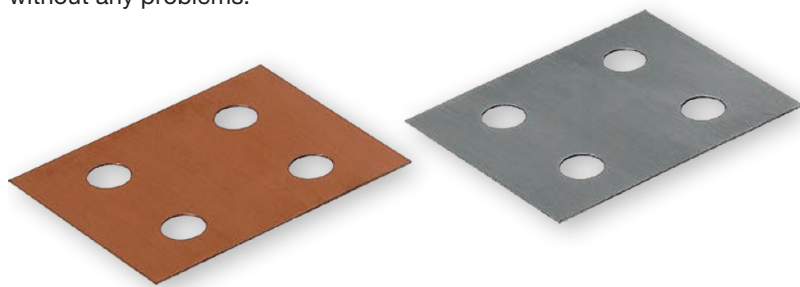
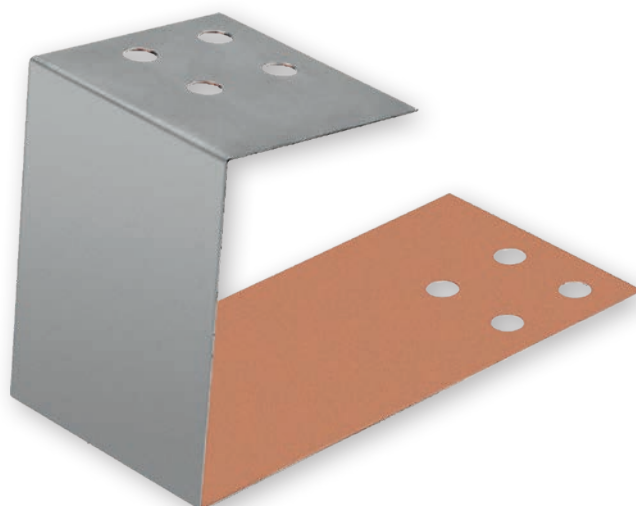
Bimetallic sheets consist of copper clad aluminium sheets in a 70/30 ratio (70 % aluminium and 30 % copper). Since the joint between the two metals is located inside the sheets air and moisture cannot enter. With this material, as an intermediate layer, a contact safe and corrosion-protected connection of copper and aluminium is possible. In addition to the bimetallic sheets and washers, we also supply cut offs with and without holes suitable for your applications.



Part-No.	Technical data				weight kg/pcs.
	dimensions mm			thickness	
	length	width			
02670	2000	500	1		4,70
02671			1,5		7,00
02672			2		9,35

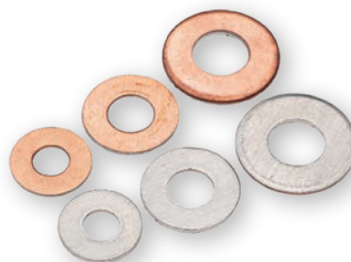
Cuttings from bimetallic sheets

We manufacture finished sheet metal parts from our bimetallic sheets with a sheet thickness of 1/1,5 or 2 mm according to customer requirements. Regardless of whether with or without holes or in edged design, the most diverse components are possible. We also produce small series or individual parts without any problems.



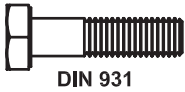
Bimetallic washers

Part-No.	Technical data				weight kg/% pcs.
	dimensions mm				
	for threat	outside- M	hole- Ø	S	
13295	3	8	3,5	1	0,02
13296	4	10	4,5	1	0,03
13297	5	12	5,5	1	0,05
02675	6	15	6,5	1	0,07
02676	8	18	8,5	1	0,09
02677	10	22	10,5	1,5	0,18
02678	12	25	13	2	0,68
02679	12	28	13	2	0,44
02680	16	35	17	2	0,86



Hexagon head screws DIN 931/DIN 933

Material: stainless-steel A2



DIN 931



DIN 933

Bolt length mm	Part-No. of the screws						
	M5	M6	M8	M10	M12	M16	M20
30	53101	53140	-	-	-	-	-
35	53102	53141	53180	-	-	-	-
40	53103	53142	53181	53220	-	-	-
45	53104	53143	53182	53221	53260	-	-
50	53105	53144	53183	53222	53261	-	-
55	-	53145	53184	53223	53262	53301	-
60	-	53146	53185	53224	53263	53302	-
65	-	-	53186	53225	53264	53303	53341
70	-	-	53187	53226	53265	53304	53342
80	-	-	53188	53227	53266	53305	53343
90	-	-	53189	53228	53267	53306	53344
100	-	-	53190	53229	53268	53307	53345
110	-	-	-	-	53269	53308	53346
120	-	-	-	-	53270	53309	53347

Remark: When ordering, please indicate the desired DIN. If a version is desired in A4 stainless-steel, please indicate A4 in the order.

Threaded Rods

Material: stainless-steel A2/A4 or brass

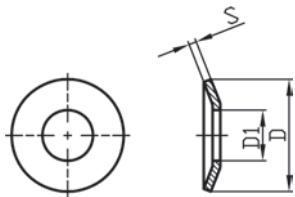


Part-No.			Technical data	
Material: A2	Material: A4	Material: brass	dimensions mm	
			Thread	Rod length
17980	18030	18080	M 3	1 m
17985	18035	18085	M 4	1 m
17990	18040	18090	M 5	1 m
17995	18045	18095	M 6	1 m
18000	18050	18100	M 8	1 m
18005	18055	18105	M10	1 m
18010	18060	18110	M12	1 m
18015	18065	18115	M16	1 m
18020	18070	18120	M20	1 m

Clamping discs, DIN 6796

Material: spring steel

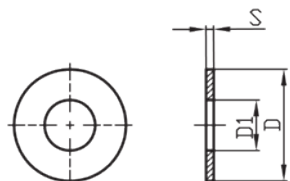
Surface: ZN 12 M + Passivation



Part-No.	Technical data				
	dimensions mm				package unit/pcs.
for bolt	D ₁	D	S		
18350	M 3	3,2	7	0,5	1000
18355	M 4	4,3	9	0,8	1000
18360	M 5	5,3	11	1	1000
18365	M 6	6,4	14	1,2	1000
18370	M 8	8,4	18	2	500
18375	M10	10,5	23	2	100
18380	M12	13	29	2,5	100
18390	M16	17	39	3,5	100
18395	M20	21	52	5,5	100

Discs DIN 7349

Material: stainless-steel A2

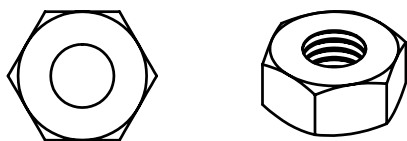


Part-No.	Technical data				
	dimensions mm				package unit/pcs.
for bolt	D ₁	D	S		
18400	M 3	3,2	9	1	500
18402	M 4	4,2	12	1,6	500
18404	M 5	5,3	15	2	500
18406	M 6	6,4	17	3	500
18408	M 8	8,4	21	4	500
18410	M10	10,5	25	4	200
18412	M12	13,0	30	6	100
18414	M16	17,0	40	6	100
18416	M18	19,0	44	8	50
18418	M20	21,0	44	8	50

Note: If desired available in stainless-steel A4 too

Hexagon nuts DIN 934

Material: stainless-steel A2



Part-No.	Technical data	
	thread	package unit/pcs.
18150	M 3	500
18155	M 4	500
18160	M 5	500
18165	M 6	100
18170	M 8	100
18175	M10	100
18180	M12	100
18185	M16	100
18190	M20	100

Note: If desired, also available in stainless-steel A4.

Washers

Material: stainless-steel A2



Part-No. DIN 125	Part-No. DIN 9021	Technical data			
		for bolt	outside-Ø		package unit/pcs.
			DIN 125	DIN 9021	
18200	18241	M 3	7	9	500
18205	18242	M 4	9	12	500
18210	18243	M 5	10	15	500
18215	18244	M 6	12,5	18	500
18220	18245	M 8	17	25	500
18225	18246	M10	21	30	100
18230	18247	M12	24	40	100
18235	18248	M16	30	50	100
18240	18249	M20	37	60	100

Note: If desired, also available in stainless-steel A4.

Spring washers DIN 127 B

Material: stainless-steel A2



Part-No.	Technical data		
	for bolt	hole-Ø mm	package unit/pcs.
18250	M 3	3,1	500
18255	M 4	4,1	500
18260	M 5	5,1	500
18265	M 6	6,1	500
18270	M 8	8,2	100
18275	M10	10,2	100
18280	M12	12,2	100
18285	M16	16,2	100
18290	M20	20,2	50

Note: If desired, also available in stainless-steel A4.

Serrated washers DIN 6798

Material: bronze

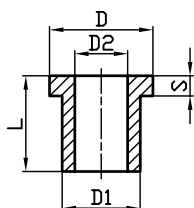


Part-No.	Technical data		
	for bolt	hole-Ø mm	package unit/pcs.
18300	M 3	3,2	500
18305	M 4	4,3	500
18310	M 5	5,3	500
18315	M 6	6,4	500
18320	M 8	8,4	500
18325	M10	10,5	100
18330	M12	12,5	100
18335	M16	18,5	100

Note: If desired, also available in stainless-steel A4.

Insulating grommets

Material: epoxy glass hard resin



Part-No.	Technical data					
	for bolt	L	D	dimensions mm		
				D ₁	D ₂	S
53450	M 8	32	20	14	9	4
53455	M10	32	23	16	11	4
53460	M12	34	25	18	13	6
53465	M16	32	32	22	17	6
53470	M20	38	38	27	21	8

Note: These insulating grommets are used for insulating fastening bolts from the tank or other metal parts, e.g. for contact block fastening. The material epoxy glass hart resin is well suited in terms of temperature resistance as well as its resistance to pressure as, e.g. in the use of electroplating plants.

Cup wing nuts and bolts



Part-No.	Technical data				
	dimensions ca. mm				weight kg/% pcs.
	thread	wing-Ø	cup-Ø	Material	
cup wing nuts					
17780	M 8	40	40	A4 stainless steel	3,90
17785	M 10	50	40	A4 stainless steel	6,50
17790	M 12	65	50	A4 stainless steel	11,50
53500	M 8	40	35	brass	5,00
53505	M 10	40	35	brass	5,10
cup wing bolts					
17815	M 8 x 35	40	40	A4 stainless steel	5,10
17820	M 10 x 35	50	40	A4 stainless steel	8,00
17825	M 12 x 35	65	40	A4 stainless steel	10,80
53485	M 10 x 25	45	40	brass	15,50

Note: Also suitable as clamping elements for electroplating racks or anodes.

High temperature resistant copper paste and cleaning sprays



Part-No.	Product name	content	description
Pastes			
02770	Copper paste	1 kg	Electrically conductive soft smooth assembly paste based on semi-synthetic basis oil and particularly pure copper powder with very small particle size. Good adhesion to all metals, vapour and water resistant, non-drip, temperature stable (temperature range – 30 °C up to + 1100 °C), corrosion-protective and well-sealing. Particularly suitable for connections and soiling that are subject to high thermal stress or corrosive influences.
Cleaning sprays			
11260	Spray Contactclean	400 ml	Eliminates oxide and sulphide build up on metal contact surfaces of all types and builds a long lasting lubrication and corrosion protection.
11262	Spray Spray wash	400 ml	Removes contamination and grease as well as oxid layers produced by using the Contactclean spray. Good wash and flow properties allow contamination to be simply rinsed away.
11264	Degreaser spay	400 ml	Ensures safe and quick removal of grease and oil, wax and other heavy soiling. Also has a moisture and water displacing effect.

Technical appendix

Selecting an safety instructions by using our current transmission elements

General advice

The measurements and technical information written in this catalogue have been determined with greatest care and updated continuously in our documentation. We reserve us the right to make technical as well as changes of measurements, colours or formats after print. Our information especially the values for possible current loads are not binding, they are only approximate values under optimized conditions. The relation between conductor cross-section and current load fixed in national or international regulations are not cancelled through our information. Also it is necessary to pay attention to the following facts. Only the values in our written order confirmations are binding for us.

Demands to current transfer elements

All components for current transfer must be selected under the condition that by using the components in accordance with the regulations or requirements no unacceptable risk are created for life and health of persons as well as a damaging of objects. To guarantee these demands it is absolutely necessary to check and analyze possible risks, source of errors and rest risks even when planning or designing plants or products. All components for current transfer must be so calculated that they are sufficient dimensioned for all possible load (current as well as voltage) which can be occurred inside of the planed application. Particularly by existing limit conditions it is necessary to take the values of the current rates or voltages fixed in national or international regulations into consideration.

Values of influence

Following some short examinations of the fundamental facts, which have an influence of the construction of current transfer components. Please notice that it is important to consider and observe all facts together and not separately.

Selecting information

The fundamental facts for selecting the right current transfer components are the operating conditions and the outer influences. Operating conditions are the height of voltage and current, kinds of laying, the number of cables, the cooling possibilities, the safety devices etc. Outer influences are the ambient temperature, the existence of corrosive or other chemical substances, mechanical stress or special requirements concerning of the installation situation, the existence and influence of steam, moisture or radiation (e.g. sunlight). All these facts must be taken into account when constructing or designing solutions for current transfer applications.

Voltage

It is necessary to protect and insulate the flexible cables and current transfer components in coordination with the existing voltage of the application. The operation voltage of cables is defined in Volt by the values U_0/U . It is the voltage which determines the construction and the electrical test procedures of the cables. Here is

U_0 = Value of the permissible voltage between an external conductor and earth
 U = Value of the permissible voltage between two external conductors of multicore or a system of single core cables.

According to the regulations of the VDE 0298 part 3 the operating voltage of the cables must be identical with the operating voltage of the whole system, when working with AC-voltage. This regulation is binding for the value U_0 as well as for the value U . When working in a system with DC-voltage it is acc. to the VDE allowed to calculate with a maximum value of one and a half of the operating voltage of the cables. But we recommend to exceed the value not more than 10 % continuously.

Current load

The cross-section of a conductor should be so selected that its allowed current-load and the permissible maximum continuous load of the application should be identical or greater. Additionally you have to take the permissible heat resistance of the used insulation material and the possible voltage drops into your account. Some fundamental facts which have influence of the dimensioning of electrical conductors are therefore:

- Kind of laying and number of the conductors
- Voltage drop and electrical losses
- Ambient temperature
- Insulation material and thermal stress
- Cooling possibilities
- Frequency of the current (when > 50 Hz)
- Consequences of electrical waves etc.

Such influences must be compensated by the consideration of necessary reducing factors. Additionally all thermal influences must be taken into account, so that it is not possible to hinder a thermal radiation and a danger of fire is excluded.

Mechanical stress

Also it is necessary to calculate the risk of a possible mechanical stress. Fundamental values can be created by a tensile-, pressure-, torsion- and bending stress or other facts created by the handling, transport or installation. Electrical elements which are particularly subjects of mechanical stress or flexible components which have to realize movements must be selected very carefully and well suited to the application. With pleasure our employees assist your efforts in finding optimized solutions.

Coordination of components to the different applications

When selecting flexible cables or components it is necessary to pay attention to the application, the installation, the ambient conditions and to all risks arising out of these facts. So a consideration of the following facts is important too:

- Avoidance of a possible mechanical or electrical influence between bordered power systems
- Thermal radiation as well as chemical or physical influences of the conductor, the insulation or other bordered materials
- Examination of possible influences or reactions between bordered materials and the conductor with his insulation
- Examination of the fixing and the fixing materials concerning possible damages e.g. caused by the dynamic strength in case of short circuit situations.

Service and maintenance

Electrical equipment requires continuous control, maintenance and servicing. The intervals and activities to be carried out depend on the individual conditions of use and the applicable legal regulations. Pay particular attention to soiling and damaged components. For the execution of screw connections, we recommend that the guidelines for DIN 43673 part 1 busbars, busbar drill holes and – screw connections be taken into account (see also our information on catalogue pages 132 and 133). When screwing copper to aluminium components, bimetallic material should be used as an intermediate layer (see also our information on catalogue page 121).

Table of the current-load for non-insulated copper braids or round stranded copper cables

Technical data							
cross-section mm ²	current-load	cross-section mm ²	current-load	cross-section mm ²	current-load	cross-section mm ²	current-load
1	18 A	10	85 A	95	360 A	400	950 A
1,5	21 A	16	120 A	120	420 A	500	1100 A
2,5	30 A	25	150 A	150	480 A	625	1300 A
4	40 A	35	195 A	185	570 A	750	1450 A
6	55 A	50	250 A	240	670 A	850	1550 A
8	70 A	70	300 A	300	780 A	1000	1800 A

Remark: All information about current-load are approximate values in consideration of the cables heat for single laying of air cooled cables and ambient temperature + 35 °C and a conductor heat of circa + 70 °C. The temperature of the conductor is in dependent on the ambient temperature, the installation, the cooling etc. so that our information only approximate values under optimized conditions.

Conversion table for usual US-American and British units of measurement

AWG-No.	30	29	28	27	26	25	24	23	22	21	20	19
cross-section mm ²	0,0503	0,0646	0,0804	0,0102	0,128	0,163	0,205	0,259		0,412	0,519	0,653
comparable metric cross-section mm ²	0,005	-	-	0,1	0,14	-	0,2	0,25		-	0,5	-

AWG-No.	18	17	16	15	14	13	12	11	10	9	8	7
cross-section mm ²	0,823	1,04	1,31	1,65	2,08	2,63	3,31	4,15	5,27	6,6	8,35	10,6
comparable metric cross-section mm ²	0,75	1	-	1,5	-	2,5	-	-	-	-	-	10

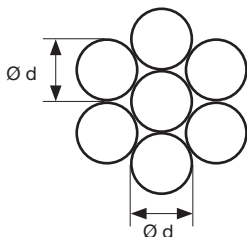
AWG-No.	6	5	4	3	2	1	0	2/0	3/0	4/0
cross-section mm ²	13,3	16,8	21,2	26,7	33,6	42,4	53,4	67,5	85,0	107,2
comparable metric cross-section mm ²	-	16	-	0,1	35	-	50	70	95	120

MCM	250	300	350	400	500	600	750	1000
cross-section mm ²	127	152	178	203	254	304	380	507
comparable metric cross-section mm ²	120	150	185	200	240	300	400	500

Remark: The units of measurement in the United States are written in AWG-No. (AWG = American Wire Gauge). These numbers are identical with the British B&S-No. (BS = Brown & Sharp). The units of measurement for the bigger conductor cross-sections are made in MCM (circular Mils). 1 MCM = 1000 circ. Mils = 0,5067 mm².

Formular for the identification of the conductor cross-section of flexible braids, wires and cables

$$F = \frac{d^2 \times \pi}{4} \times n$$



F = conductor cross-section in mm²

d = diameter of the wire

π = 3,14

n = number of the wires

Current carrying capacity of insulated cables

The current carrying capacity of insulated cables essentially depends on the type of cable insulating material, operating mode installations and environmental conditions.

Detailed information are available in VDE 0298 part 4 "Application of cables and cords in power installations".

The following you find an excerpt from the standard on common cable types. The current load data are given at an ambient temperature of + 30 °C and also apply to ready-assembled cables for which the cable lugs/connectors have been properly crimped in accordance with the applicable regulations.

Additionally the respective installation method must be taken into account. Further information, e.g. about accumulation, load at other ambient temperatures, types of installation etc. can be found in the VDE 0298 part 4. The following table only provides guidelines for the load values and refers to the following criteria:

Group 1:

Cables and lines up to a nominal voltage 1 kV and heat resistant cables acc. to VDE 0298 part 4 table 11, column 2. Air-cooled single core cables, rubber insulated, PVC-insulated, heat resistant, **e.g. like our Lify-cables according to catalogue page 24.**

Group 2:

Cables and lines to a nominal voltage of 1 kV and heat resistant cables acc. to VDE 0298 part 4 table 11 column 5. Multi-core cables (except for home or handheld devices) laid on or of free areas, rubber insulated, PVC-insulated, heat resistant.

Group 3:

Cables and lines to a nominal voltage up from 0,6/1 kV acc. to VDE 0298 part 4 table 15 column 2. Special rubber insulated cables 0,6/1 kV and 1,8/3 kV freely laid in air, **e.g. our extremely flexible silicone insulated cables according to catalogue pages 21 and 22.**

Group 4:

Cables and lines to a nominal voltage up from 3,6/6 kV acc. to VDE 0298 part 4 table 15 column 3. Special rubber insulated cables freely laid in air, **e.g. our extremely flexible silicone insulated cables according to catalogue page 23.**

Nominal cross-section mm ²	Current-load in Amperes			
	Group 1	Group 2	Group 3	Group 4
0,75	15	12	-	-
1	19	15	-	-
1,5	24	18	30	32
2,5	32	26	41	43
4	42	34	55	56
6	54	44	70	71
10	73	61	98	99
16	98	82	132	133
25	129	108	176	174
35	158	135	218	215
50	198	168	276	270
70	245	207	347	338
95	292	250	416	403
120	344	292	488	473
150	391	335	566	546
185	448	382	644	622
240	528	453	775	-
300	608	523	898	-
400	726	-	-	-
500	830	-	-	-

Remark: The values were taken from the VDE 0298 part 4 status June 2013 and are only valid under the conditions listed in the VDE.

Table for the current load of copper busbars

acc. to DIN 43671

width x thickness mm	material	continuous current in A															
		AC up to 60 Hz								DC/AC up to 16 2/3 Hz							
		painted				bare				painted				bare			
		number of busbars				number of busbars				number of busbars				number of busbars			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
I	II	III	II II	I	II	III	II II	I	II	III	IIII	I	II	III	IIII		
12 x 2		123	202	228		108	182	216		123	202	233		108	182	220	
15 x 2		148	240	261		128	212	247		148	240	267		128	212	252	
15 x 3		187	316	381		162	282	361		187	316	387		162	282	365	
20 x 2		189	302	313		162	264	298		189	302	321		162	266	303	
20 x 3		237	394	454		204	348	431		237	394	463		204	348	437	
20 x 5		319	560	728		274	500	690		320	562	729		274	502	687	
20 x 10		497	924	1320		427	825	1180		499	932	1300		428	832	1210	
25 x 3		287	470	525		245	412	498		287	470	536		245	414	506	
25 x 5		384	662	869		327	586	795		384	664	841		327	590	794	
30 x 3		337	544	593		285	476	564		337	546	608		286	478	575	
30 x 5		447	760	944		379	672	896		448	766	950		380	676	897	
30 x 10		676	1200	1670		573	1060	1480		683	1230	1630		579	1080	1520	
40 x 3	E-Cu F30/ Cu-ETP 4/4 hard	435	692	725		366	600	690		436	696	748		367	604	708	
40 x 5		573	952	1140		482	836	1090		576	966	1160		484	848	1100	
40 x 10		850	1470	2000	2580	715	1290	1770	2280	865	1530	2000		728	1350	1880	
50 x 5		697	1140	1330	2010	583	994	1260	1920	703	1170	1370		588	1020	1300	
50 x 10		1020	1720	2320	2950	852	1510	2040	2600	1050	1830	2360		875	1610	2220	
60 x 5		826	1330	1510	2310	688	1150	1440	2210	836	1370	1580	2060	696	1190	1500	1970
60 x 10		1180	1960	2610	3290	985	1720	2300	2900	1230	2130	2720	3580	1020	1870	2570	3390
80 x 5		1070	1680	1830	2830	885	1450	1750	2720	1090	1770	1990	2570	902	1530	1890	2460
80 x 10		1500	2410	3170	3930	1240	2110	2790	3450	1590	2730	3420	4490	1310	2380	3240	4280
100 x 5		1300	2010	2150	3300	1080	1730	2050	3190	1340	2160	2380	3080	1110	1810	2270	2960
100 x 10		1810	2850	3720	4530	1490	2480	3260	3980	1940	3310	4100	5310	1600	2890	3900	5150
120 x 10		2110	3280	4270	5130	1740	2860	3740	4500	2300	3900	4780	6260	1890	3390	4560	6010
160 x 10		2700	4130	5360	6320	2220	3590	4680	5530	3010	5060	6130	8010	2470	4400	5860	7110
200 x 10		3290	4970	6430	7490	2690	4310	5610	6540	3720	6220	7460	9730	3040	5390	7150	9390

Remark: Continuous currents for busbars Cu-ETP/E-Cu according to the DIN regulations for rectangular bars in interior systems at + 35 °C air temperature and + 65 °C bar temperature and vertical position, bar packages with spaces like the bar thickness respectively minimum 50 mm by laying of

4 busbars or when working with AC-current with a main distance of > 0,8 x main conductor distance (measured middle to middle of the bars). Values for a changed ambient temperature and reducing factors for changed applications are contained in the DIN 43671.

Material indications for copper busbars

indication	tensile strength min. N/mm ²	conductivity by + 20 °C in Siemens	specific resistance by + 20 °C $\frac{\Omega \times \text{mm}^2}{\text{m}}$	density kg/dm ³	
E-Cu F20	Cu-ETP soft	200	57	0,01754	8,9
E-Cu F25	Cu-ETP half hard	250	56	0,01786	8,9
E-Cu F30	Cu-ETP 4/4 hard	300	56	0,01786	8,9
E-Cu F37	Cu-ETP very hard	360	55	0,01818	8,9

Table for the current load of aluminium busbars

acc. to DIN 43670

width x thickness mm	material	continuous current in A															
		AC up to 60 Hz								DC/AC up to 16 2/3 Hz							
		painted				bare				painted				bare			
		number of busbars				number of busbars				number of busbars				number of busbars			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
I	II	III	II II	I	II	III	II II	I	II	III	IIII	I	II	III	IIII		
12 x 2	E-Al F13	97	160	178		84	142	168		97	160	183		84	142	171	
15 x 2		118	190	204		100	166	193		118	190	210		100	166	197	
15 x 3		148	252	300		126	222	283		148	252	305		126	222	286	
20 x 2		150	240	245		127	206	232		150	240	252		127	206	237	
20 x 3		188	312	357		159	272	337		188	312	364		159	272	342	
20 x 5		254	446	570		214	392	537		254	446	576		214	392	539	
20 x 10		393	730	1060		331	643	942		393	733	1020		331	646	943	
25 x 3		228	372	412		190	322	390		228	372	422		191	322	396	
25 x 5		305	526	656		255	460	619		305	528	663		255	460	622	
30 x 3		267	432	465		222	372	441		268	432	477		222	372	449	
30 x 5		356	606	739		295	526	699		356	608	749		296	528	703	
30 x 10		536	956	1340		445	832	1200		538	964	1280		447	839	1180	
40 x 3		E-Al-F10	346	550	569		285	470	540		346	552	586		285	470	552
40 x 5	456		762	898		376	658	851		457	766	915		376	662	862	
40 x 10	677		1180	1650	2190	557	1030	1460	1900	682	1200	1570		561	1040	1460	
50 x 5		556	916	1050	1580	455	786	995	1520	558	924	1080		456	794	1020	
50 x 10		815	1400	1940	2540	667	1210	1710	2210	824	1440	1850		674	1250	1730	
60 x 5		655	1070	1190	1820	533	910	1130	1750	658	1080	1240	1610	536	924	1170	1530
60 x 10		951	1610	2200	2870	774	1390	1940	2480	966	1680	2130	2810	787	1450	2000	2650
80 x 5		851	1360	1460	2250	688	1150	1400	2180	858	1390	1550	2010	694	1180	1470	1920
80 x 10		1220	2000	2660	3460	983	1720	2380	2990	1250	2150	2670	3520	1010	1840	2520	3340
100 x 5		1050	1650	1730	2660	846	1390	1660	2580	1060	1710	1870	2420	858	1450	1780	2320
100 x 10		1480	2390	3110	4020	1190	2050	2790	3470	1540	2630	3230	4250	1240	2250	3060	4050
100 x 15		1800	2910	3730	4490	1450	2500	3220	3880	1930	3380	4330	5710	1560	2900	4070	5400
120 x 10		1730	2750	3540	4560	1390	2360	3200	3930	1830	3090	3770	4940	1460	2650	3580	4730
120 x 15		E-Al F6,5	2090	3320	4240	5040	1680	2850	3650	4350	2280	3950	5020	6610	1830	3390	4740
160 x 10	2220		3470	4390	5610	1780	2960	4000	4820	2380	4010	4820	6300	1900	3420	4590	6060
160 x 15	2670		4140	5230	6120	2130	3540	4510	5270	2960	5090	6370	8380	2370	4360	6040	8000
200 x 10		2710	4180	5230	6660	2160	3560	4790	5710	2960	4940	5880	7680	2350	4210	5620	7400
200 x 15		3230	4950	6240	7190	2580	4230	5370	6190	3660	6250	7740	10160	2920	5350	7370	9750

Remark: Continuous currents for aluminium busbars according to the DIN regulations for rectangular bars in interior systems at + 35 °C air temperature and + 65 °C bar temperature and vertical bar position, bar packages with spaces like the bar thickness respectively minimum 50 mm

by laying of 4 busbars or when working with AC-current with a main distance of > 0,8 x main conductor distance (measured middle to middle of the bars). Values for a changed ambient temperature and reducing factors for changed applications are contained in the DIN 43670.

Material indications for aluminium busbars

indication		tensile strength min. N/mm ²	conductivity by + 20 °C in Siemens	specific r esistance bei + 20 °C $\frac{\Omega \times \text{mm}^2}{\text{m}}$	density kg/dm ³
E-Al F6,5/7	EN-AW 1350 A	65/70	34 - 35	0,0278	2,7
E-Al F8	EN-AW 1350 A	80	34 - 35	0,0286	2,7
E-Al F10	EN-AW 1350 A	100	33 - 34	0,0286	2,7

Comparison table of the new material indications acc. to DIN EN 13599 - 13602 and following to the older indications to DIN 1751/1791 resp. DIN 40500

material indication			
DIN EN 13599 - 13602		DIN 1751: 1973 - 06, DIN 1791: 1973 - 06, DIN 40500: 1980 - 04 ^a	
symbol	material-number	symbol	material-number
Cu-ETP1	CW003A	-	-
Cu-ETP	CW004A	E-Cu58	2.0065
Cu-FRHC	CW005A	E-Cu58	2.0065
Cu-OF	CW008A	OF-Cu	2.0040
CuAg0,10	CW013A	CuAg0,1	2.1203
CuAg0,10P	CW016A	CuAg0,1P	2.1191
CuAg0,10(OF)	CW019A	-	-
Cu-PHC	CW020A	SE-Cu ^b	2.0070 ^b
Cu-HCP	CW021A	SE-Cu ^c	2.0070 ^c

• With regard to the non-listed materials in our table, contained in the older norms take a look at DIN EN 1652:1998-03. An overall view about materials and products is contained in DIN V 17900:1999-03.

• If the conductivity is min. 58 m/Ω x m² and the content of copper has a min. value of 99,95 % by using of P for deoxidation.

• If content of copper has a min. value of 99,95 % by using P for deoxidation.

Table for the weight of copper busbars

width mm	weight per meter in kg/thickness mm									
	2	3	4	5	6	8	10	15	20	25
10	0,180	0,270	0,360	0,450	0,540	0,720	0,890	-	-	-
12	0,220	0,320	0,430	0,540	0,640	0,860	1,070	-	-	-
14	0,250	0,380	0,500	0,630	0,750	1,000	1,250	-	-	-
15	0,270	0,400	0,540	0,670	0,810	1,070	1,340	2,020	-	-
20	0,360	0,540	0,720	0,890	1,070	1,430	1,780	2,700	3,600	-
25	0,450	0,670	0,890	1,120	1,340	1,780	2,230	3,370	4,500	5,560
30	0,540	0,800	1,070	1,330	1,610	2,140	2,670	4,050	5,400	6,700
35	0,630	0,930	1,250	1,560	1,870	2,500	3,120	4,720	6,300	7,850
40	0,710	1,070	1,430	1,780	2,140	2,850	3,560	5,400	7,200	8,960
45	0,800	1,200	1,610	2,000	2,410	3,210	4,000	6,080	8,100	10,090
50	0,890	1,340	1,780	2,220	2,670	3,560	4,450	6,750	9,000	11,200
60	1,070	1,600	2,140	2,670	3,210	4,280	5,340	8,100	10,800	13,500
70	1,250	1,870	2,500	3,110	3,740	4,980	6,230	9,450	12,600	15,700
80	1,430	2,140	2,850	3,560	4,280	5,690	7,120	10,800	14,400	17,920
90	1,600	2,410	3,210	4,000	4,810	6,400	8,010	12,150	16,200	20,160
100	1,780	2,670	3,560	4,450	5,340	7,190	8,900	13,500	18,000	22,300
110	1,960	2,940	3,920	4,900	5,880	7,840	9,800	14,850	19,800	24,640
120	2,130	3,200	4,270	5,240	6,400	8,550	10,680	16,200	21,600	26,900
130	2,310	3,490	4,630	5,780	6,940	9,250	11,570	17,550	23,400	29,920
140	2,490	3,740	4,980	6,220	7,470	9,960	12,460	18,900	25,200	31,360
150	2,670	4,000	5,340	6,670	8,010	10,460	13,350	20,250	27,000	33,600
160	2,850	4,270	5,700	7,120	8,550	11,740	14,400	21,600	28,800	35,800
200	3,560	5,240	7,120	8,900	10,640	14,380	17,800	27,000	36,000	44,800

Screwing of flexible braided and laminated power connectors with busbars

Basics

For the screw connection of flexible braided connectors with solderless pressed connection surfaces as well as our laminated connectors out of copper or aluminium foils with solid busbars or connection pieces made out of solid materials, we recommend to use the DIN 43673 part 1 "busbar holes and screw connections for busbars with rectangular cross-section" as a basis. This standard specifies the screw material to be used and the procedure according to the surfaces, to be screwed, the number of the position and diameter of the holes.

Design of the screw connections

As a general rule, magnetisable screws and accessories may only be used in AC and three-phase systems up to a current of 6300 A. For applications above 6300 A, non-magnetisable screws and equipment made of A2 or A4 stainless steel must be used. When using steel screws, a suitable surface protection/coating must be used. The following screwing elements can be used:

Screws acc. to DIN 931 or 933 in the strength class 8.8 or higher resp. stainless steel A2/A4, nuts according to DIN 934 in the strength class 8 or higher resp. stainless steel A2/A4, corrosion-protected clamping washers or washers according to DIN 7349 in addition to the clamping washers for threads from M12 and generally for screw connections of aluminium rails/components. A2/A4 stainless steel pressure plates can also be used for large surfaces. It should be noted that only clamping discs are able to compensate for setting and thus maintain the necessary contact pressure for reliable contacting. Spring washers e.g. according to DIN 127/128 or similar designs, do not fulfil this task and are therefore not permissible and should not be used. The use of stable washers according to DIN 7349 with a large diameter as described on catalogue page 122 is important too. They ensure better pressure distribution and generation of the contact areas/points/lines that are important for current transfer. DIN generally prescribes this for aluminium rails/components or for screw sizes M12 and larger. However, we recommend using this washers also when working with smaller screw diameters if possible, as this is advantageous for the current transmission. For larger contact surfaces we recommend the use of stainless steel A2/A4 pressure plates. From an electrical point of view, the lower the electrical resistance during installation, the longer the electrical functional integrity of the connection and the lower the electrical losses. Improperly performed screw connections can lead to inadmissible heating or even failure of the contact screw connection due to insufficient contacting.

Screwing of copper with aluminium components

When screwing copper to aluminium components in free-air-systems and in all indoor applications may come into contact with moisture, bi-metallic sheets must be provided in addition to the planned bolted connections. This is to prevent corrosion resulting from the electrotechnical voltage series (see also catalogue page 121).

Mounting recommendation

Thoroughly degrease, clean and slightly roughen the contact surfaces before screwing (e.g. with Polinox-polishing fleece)

ATTENTION

In the case of working with uncoated aluminium components the contact surfaces should be coated with a very thin layer of alkali-free grease (e.g. neutral Vaseline) immediately after cleaning and degreasing in order to counteract renewed oxidation of the contact surface.

Place a clamping disc and, if necessary, a DIN 7349 washer under the bolt head and the nut. Apply a thin layer of lubricant or MoS₂-assembly paste to the threads and head rests of the screws to minimize friction in the thread and thus ensure the required contact pressure.

Do not apply assembly paste to the contact surfaces. First tighten all screws only hand-tight, then tighten them crosswise in one step with a tightening torque according to table 3 of DIN 43679 part 1. We recommend the use of a torque spanner for this purpose. Tighten all screws after a few minutes again to compensate for settling.

Recommended nominal tightening torques

The recommended tightening torques according to DIN 43673 part 1 table 3 are as follows

		indoor (1)	indoor and outdoor (2)
Lubricant for thread and screw head		oil or grease	on Mo S ₂ -base
Recommended tightening torque in Nm	M4	1,5	2
	M5	2,5	3
	M6	4,5	5,5
	M8	10	15
	M10	20	30
	M12	40	60
	M16	80	120

(1) For screws with strength 8.8 or higher in indoor applications when using clamping discs according to DIN 6796

(2) In indoor or outdoor applications when using screws of stainless steel A2/A4 or steel 8.8 or higher in combination with clamping discs according to DIN 6796 and discs according to DIN 7349.

For further information please take a look into the DIN 43673 part 1.

Screw locks

Depending on the intended use and the requirements of the screw connection, suitable screw locks may also be useful or necessary. We are happy to advise you on your applications.

Maintenance of screw connections

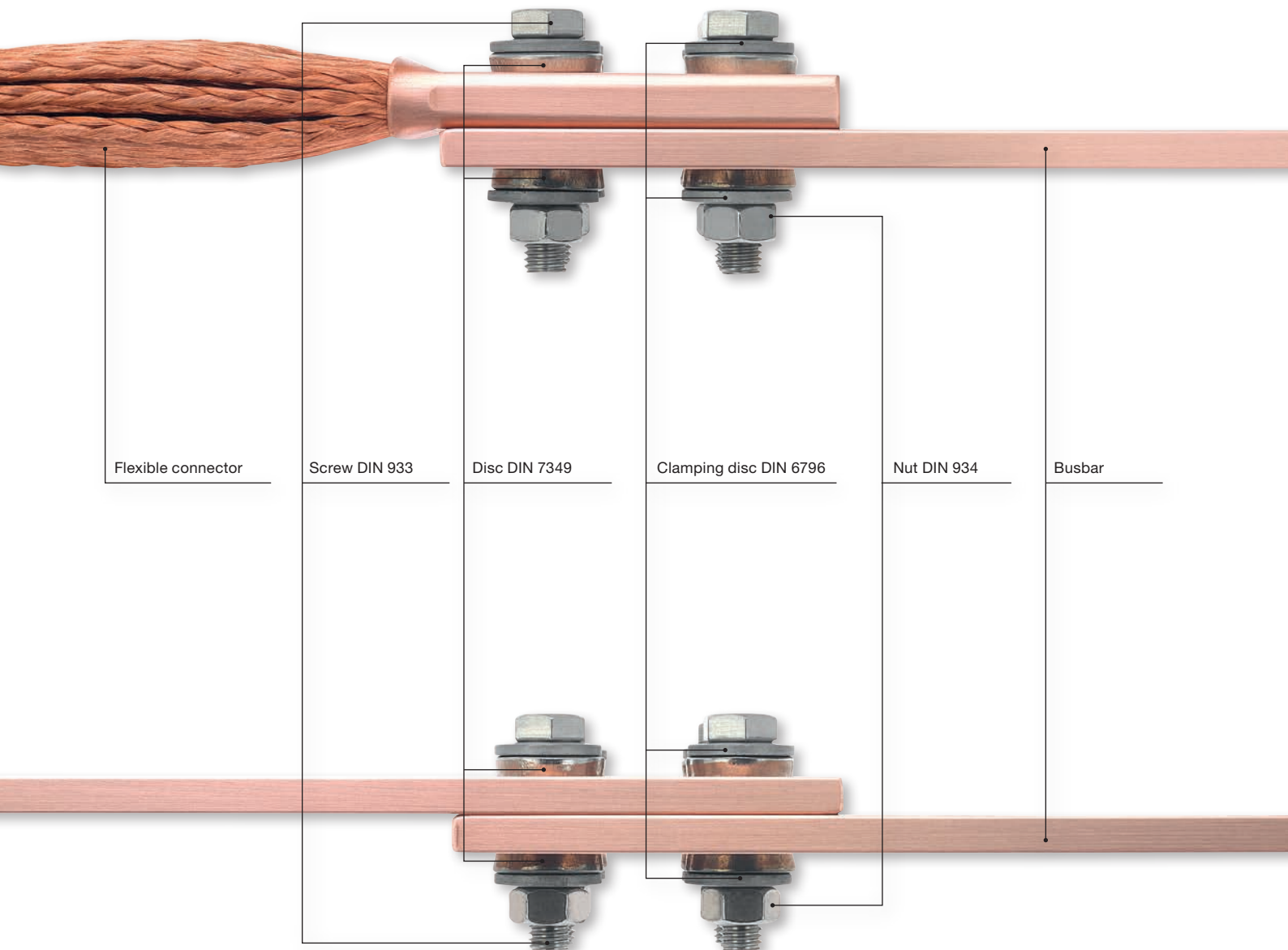
Electrical equipment requires continuous control, maintenance and servicing. So also screw connections which serve the transmission of current. The intervals and activities to be carried out depend on the individual conditions of use and the applicable legal regulations. Pay particular attention to soiling and damaged components. These are to be removed and the screws must then retightened.

Screwing of busbars

When installing busbars without flexible connections, proceed in the same way as in these installation instruction.

Mounting examples

Screwing connection of flexible connectors with busbars



Screwing connection of two busbars

Please fill in this page and fax it to the following fax-no: +49.2191.9352150

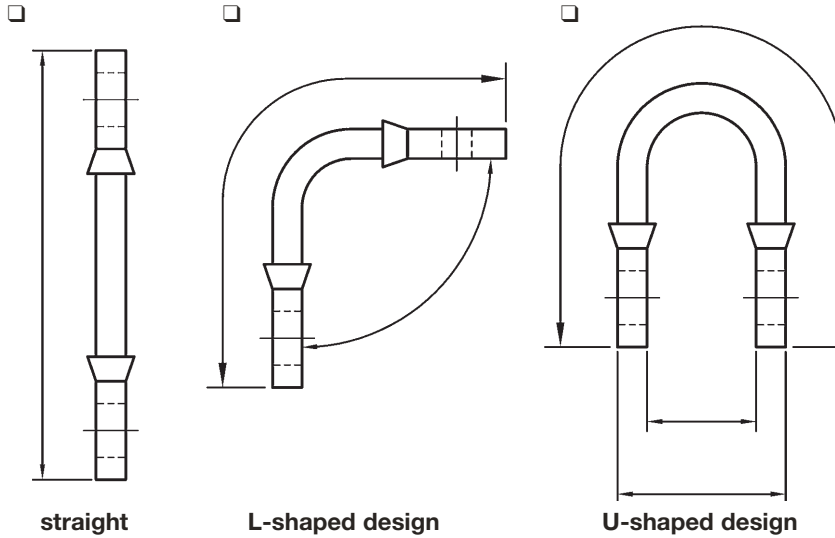
Customer / Company Address:

E-Mail:
 Phone:
 Fax:

Contact person:

- Inquiry
- Order

Necessary order information!



No. of pieces:
 Cross-section:
 Current-load:
 Remarks:

Design:

- E-copper braid
- E-copper foils
- Uncoated
- Tinned

Contact areas:

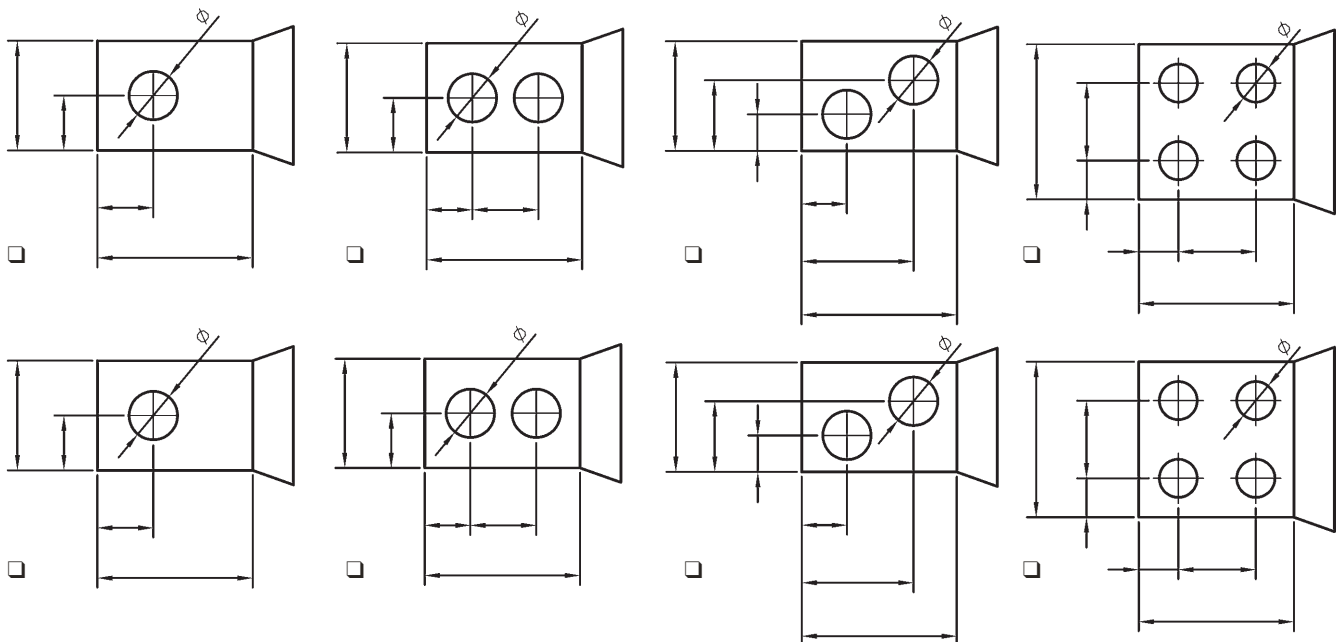
- Uncoated
- Tinned
- Nickel plated
- Silvered

Insulation

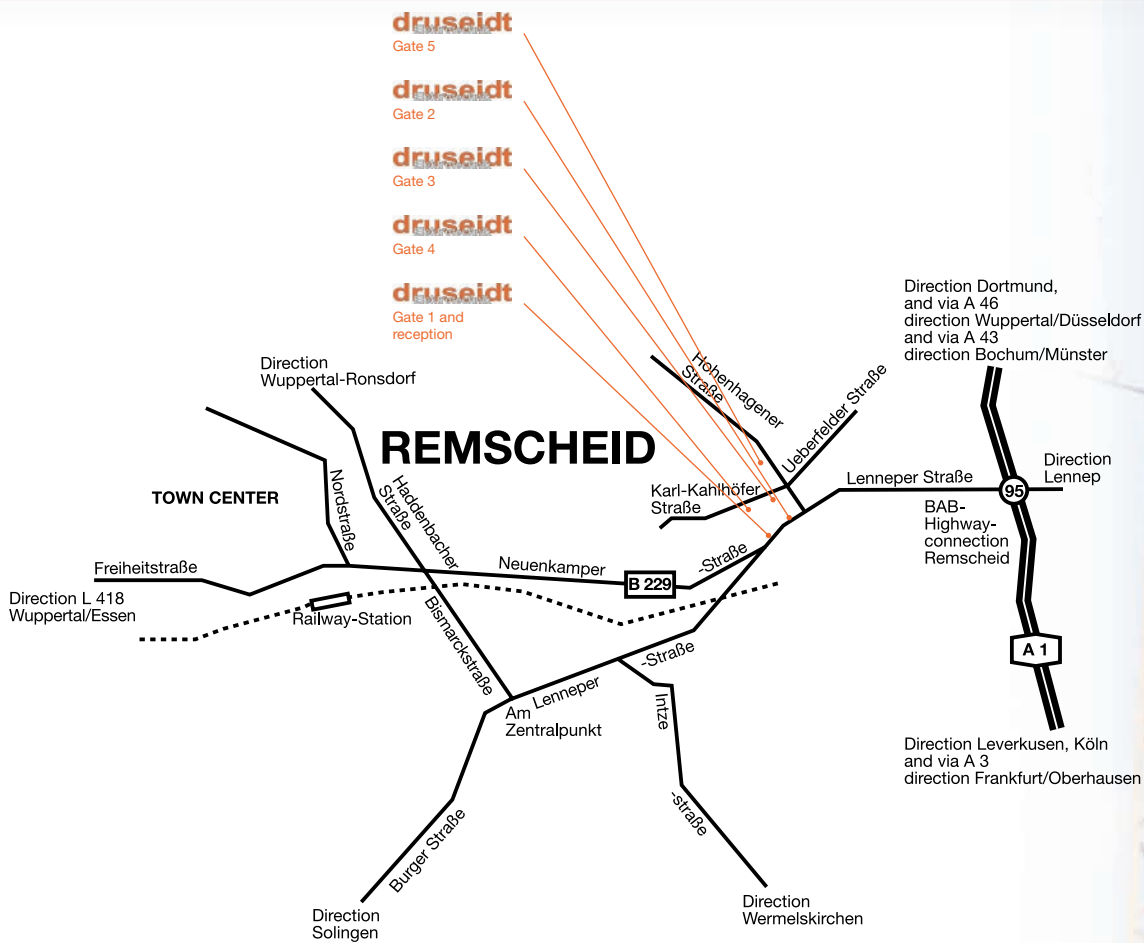
- non insulated
- PVC sleeve
- Silicone sleeve
- others:

Drilling:

- undrilled
- drilling acc. sketch



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Please order also our detailed catalogues to the following subjects:

- 1 Professional installation- and electrical connection technique for craft, industry and high current application
- 3 Main catalogue for contact systems and accessories for electroplating and anodizing equipments
- 4 Busbars, non-ferrous metal working and accessories