



SPS STANDARD PRODUCTE SCHWANENMÜHLE



Isoflexx[®], Ultraflexx[®], CoppAl[®] and much more
All you need for installing switching cabinets

SPS

SPS Standard Produkte Schwanenmühle

Drawing on the expertise of the Schwanenmühle Group in the field of high-current technology, SPS offers a wide range of flexible and rigid connection options for switchgear construction.

The longstanding success and broad spectrum of the Isoflexx® product group ensure a perfect solution for any application, while the outstanding technical properties of the Ultraflexx® connectors continue to drive their ever-growing popularity. Many customers see these products as being among the most important innovations in the area of switchgear construction in recent years. The welded connections of the grounding braids ensure durable ground connections with minimum impedance. Together with copper and

CoppAl® bars, a full range of support insulators and the many possible combinations of different busbar supports permit the creation of busbar systems for any type of switch cabinet. The copper-clad aluminum CoppAl® bars combine the benefits of copper and aluminum, offering an attractively priced alternative to expensive copper bars. The program is rounded off by a range of tools and useful accessories.

SPS standard products comply with the relevant international standards and are subject to constant quality control. SPS standard products are part and parcel of quality switchgear production - developed in the heart of Germany for the world market.



CONTENTS

| | | |
|---|--|---------|
|  | Isoflex® | 4 - 9 |
|  | Ultraflex® | 10 - 12 |
|  | Grounding braids | 13 |
|  | Flat braids | 14 |
|  | CoppAl® | 15 - 17 |
|  | Copper bars | 18 |
|  | Expansion & braided connectors | 19 |
|  | Insulators | 20 - 23 |
|  | Busbar supports Bar connectors and bushings | 24 - 31 |
|  | Accessories and tools | 32 - 33 |
|  | Technical data & certificates | 34 - 41 |



OVERVIEW

ISOFLEXX® is an insulated laminated busbar of the highest technical standard. ISOFLEXX® sets a new benchmark in the area of flexible busbars with its highly developed and proven technology.

ISOFLEXX® - the busbar that can do MORE!
Because flexibility alone is not enough!

ISOFLEXX® is made up of several layered copper lamellas durably protected by special high-grade PVC insulation (ISOFLEXX® Classic) or environment-friendly halogen-free silicon insulation (ISOFLEXX® Premium). The loose arrangement of the lamellas in the insulation allows problem-free bending and twisting, and the fine lamination gives ISOFLEXX® its outstanding flexibility.

ISOFLEXX®, the innovative and cost-effective solution

- ✓ for all electrical connections in switch cabinets and low-voltage switchgear systems
- ✓ as a movable component inside solid busbar systems
- ✓ for connecting generators, transformers, switchgear systems and switching equipment
- ✓ as a connecting lead to machine switches, immersion baths, etc.
- ✓ as a riser in switching systems

The conductor material:

- Highly conductive Cu-ETP 99,9
- Tinned or bare copper lamellas
- From 0.5 mm (small cross-section) to 1.0 mm thickness
- Suitable for drilling and punching

The insulation:

- Resistant, with reinforced edges
- High operating voltage
- Homogeneous, stress-free insulation (no bursting at edges)
- Higher thermal short-circuit resistance than comparable bars or cables
- Different colors
- 3 different versions
 Isoflexx® Classic = PVC, self-extinguishing
 Isoflexx® Premium = silicon, halogen-free and self-extinguishing
 Isoflexx® Supreme = Santoprene, halogen-free
- Complies with RoHS Directive

ISOFLEXX®

- Environment-friendly

Easy to install thanks to:

- Maximum flexibility
- Bending with minimum radii
- Shorter connections, space-saving design
- Reliable operation thanks to high operating temperatures and high operating voltages
- Certified and monitored by UL/CSA

MADE IN GERMANY

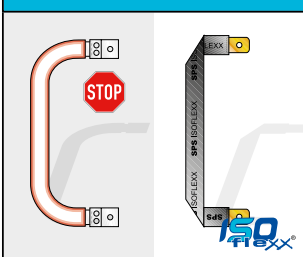
- ✓ ISOFLEXX® Classic
- ✓ ISOFLEXX® Premium
- ✓ ISOFLEXX® Supreme

ADVANTAGES

ISOFLEXX® –

advantages at a glance!

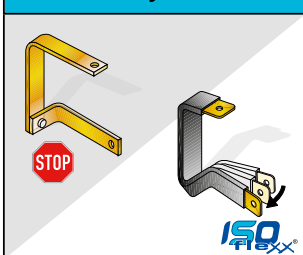
+ Saves space



Saves space

ISOFLEXX® possesses unusual flexibility and can even be folded. In addition, the resistance of the conductor cross-section is far lower than that of cable and therefore permits smaller bending radii. This saves time and enables you to work more effectively.

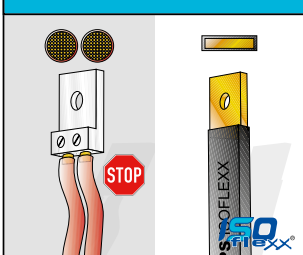
+ Flexibility



Flexibility

Due to the flexibility of ISOFLEXX®, the number of contact points is far lower than with conventional solid busbar systems. Moreover, the flexible design compensates for construction tolerances during installation, which means it is no longer necessary to perform any additional bending as would be the case with solid busbars. ISOFLEXX® greatly reduces installation time.

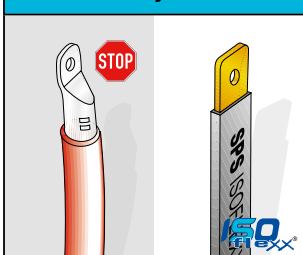
+ Material consumption



Material consumption

The smaller conductor cross-section of ISOFLEXX® compared to cables with the same ampacity reduces material usage. The simple and efficient design saves you time and money.

+ Reliability



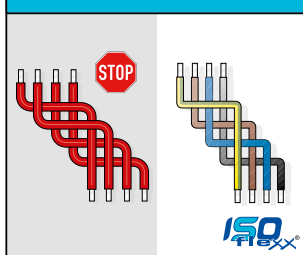
Reliability

ISOFLEXX® enhances the safety of your systems and installations:

- no cable lugs
- reinforced edges
- extreme heat resistance
- certified dielectric strength
- well-balanced insulation

Choose ISOFLEXX® for maximum reliability!

+ Everything in its place



Everything in its place

The special ISOFLEXX® production process allows the use of different colors for the insulation. You can choose from a range of standard colors (green/yellow, blue, brown, black) or specify colors according to your requirements. This means you can color-code different connections, making it easier for you to retain an overview of connections in the switchgear and other systems while making them safer at the same time.

ISOFLEXX® ensures everything is in plain sight.

ISOFLEXX® –

is customized to meet your specific needs:

- Cutting to length
- Bending
- Twisting
- Drilling of hole patterns
- Drilling of oblong holes
- Press-welding of connections
- Riveting of connections
- Imprinting of customer names and logos
- Full imprinting to customer specification
- Packaging to customer specification





Ampacity ISOFLExX®

Classic

| Ampacity for ΔT = 50 K | Dimensions ¹ Available in bare Cu (Cu) and tinned Cu (Sn) | Cross-section | | Cu - weight per 2 meters (standard length) [kg] | Ampacity Values acc. to DIN 43671 for bars in switchgear systems Heating ² of bar at an ambient temperature of 35°C | | | Thermal short- circuit strength at 1 second [kA] | Standard color: black - special colors as shown below | |
|---------------------------|--|--------------------|--------------------|--|--|----------------------|-----------------------|---|---|--|
| | | Cu | Sn | | to 65°C ΔT = 30 K | to 85°C ΔT = 50 K | to 105°C ΔT = 70 K | | | |
| | | [mm ²] | [mm ²] | | [A] | [A] | [A] | | | |
| > 125 A | 3 x 9 x 0,8 | x | x | 21,6 | 0,38 | 98 | 130 | 152 | 3 | |
| | 6 x 9 x 0,8 | x | x | 43,2 | 0,77 | 147 | 196 | 228 | 7 | |
| | 9 x 9 x 0,8 | x | x | 64,8 | 1,15 | 179 | 238 | 277 | 10 | |
| | 3 x 13 x 0,5 | x | x | 19,5 | 0,35 | 108 | 144 | 167 | 3 | |
| | 6 x 13 x 0,5 | x | x | 39,0 | 0,69 | 162 | 215 | 251 | 6 | |
| | 2 x 16 x 0,8 | x | x | 24,8 | 0,44 | 110 | 148 | 195 | 4 | |
| > 250 A | 4 x 16 x 0,8 | x | x | 49,6 | 0,88 | 201 | 267 | 312 | 8 | |
| | 6 x 16 x 0,8 | x | x | 74,4 | 1,32 | 252 | 335 | 391 | 11 | |
| | 2 x 20 x 1 | x | x | 40,0 | 0,71 | 188 | 250 | 291 | 6 | |
| | 3 x 20 x 1 | x | x | 60,0 | 1,07 | 237 | 315 | 367 | 9 | |
| | 4 x 20 x 1 | x | x | 80,0 | 1,42 | 278 | 370 | 431 | 12 | |
| | 2 x 24 x 1 | x | x | 48,0 | 0,85 | 201 | 267 | 312 | 7 | |
| > 400 A | 3 x 24 x 1 | x | x | 72,0 | 1,28 | 276 | 367 | 428 | 11 | |
| | 2 x 32 x 1 | x | x | 64,0 | 1,14 | 289 | 384 | 448 | 10 | |
| | 10 x 16 x 0,8 | x | x | 128 | 2,28 | 330 | 439 | 512 | 19 | |
| | 5 x 20 x 1 | x | x | 100 | 1,78 | 319 | 424 | 494 | 15 | |
| | 6 x 20 x 1 | x | x | 120 | 2,14 | 355 | 472 | 550 | 18 | |
| > 500 A | 4 x 24 x 1 | x | x | 96 | 1,71 | 322 | 428 | 499 | 15 | |
| | 5 x 24 x 1 | x | x | 120 | 2,14 | 369 | 491 | 572 | 18 | |
| | 3 x 32 x 1 | x | x | 96 | 1,71 | 359 | 477 | 556 | 15 | |
| > 630 A | 6 x 24 x 1 | x | x | 144 | 2,56 | 407 | 541 | 631 | 22 | |
| | 4 x 32 x 1 | x | x | 128 | 2,28 | 418 | 556 | 648 | 20 | |
| | 10 x 20 x 1 | x | x | 200 | 3,56 | 497 | 661 | 770 | 31 | |
| | 11 x 21 x 1 | x | x | 231 | 4,11 | 563 | 749 | 873 | 36 | |
| | 8 x 24 x 1 | x | x | 192 | 3,42 | 483 | 642 | 749 | 30 | |
| | 10 x 24 x 1 | x | x | 240 | 4,27 | 559 | 743 | 866 | 37 | |
| > 800 A | 5 x 32 x 1 | x | x | 160 | 2,85 | 477 | 634 | 739 | 25 | |
| | 6 x 32 x 1 | x | x | 192 | 3,42 | 526 | 700 | 815 | 30 | |
| | 5 x 40 x 1 | x | x | 200 | 3,56 | 573 | 762 | 888 | 31 | |
| | 8 x 32 x 1 | x | x | 256 | 4,56 | 623 | 829 | 966 | 39 | |
| > 1000 A | 10 x 32 x 1 | x | x | 320 | 5,70 | 721 | 959 | 1118 | 49 | |
| | 8 x 40 x 1 | x | x | 320 | 5,70 | 739 | 983 | 1145 | 49 | |
| | 5 x 50 x 1 | x | x | 250 | 4,45 | 697 | 927 | 1080 | 39 | |
| | 10 x 35 x 1 | x | x | 350 | 6,23 | 757 | 1007 | 1173 | 54 | |
| | 10 x 40 x 1 | x | x | 400 | 7,12 | 850 | 1131 | 1318 | 62 | |
| > 1250 A | 8 x 50 x 1 | x | x | 400 | 7,12 | 891 | 1185 | 1381 | 62 | |
| | 5 x 63 x 1 | x | x | 315 | 5,61 | 826 | 1099 | 1280 | 49 | |
| | 10 x 50 x 1 | x | x | 500 | 8,90 | 1020 | 1357 | 1581 | 77 | |
| | 6 x 63 x 1 | x | x | 378 | 6,73 | 942 | 1253 | 1460 | 58 | |
| | 8 x 63 x 1 | x | x | 504 | 8,97 | 1038 | 1361 | 1609 | 78 | |
| | 10 x 63 x 1 | x | x | 630 | 11,21 | 1180 | 1569 | 1829 | 97 | |
| > 1600 A | 4 x 80 x 1 | x | x | 320 | 5,70 | 954 | 1269 | 1479 | 49 | |
| | 5 x 80 x 1 | x | x | 400 | 7,12 | 1070 | 1423 | 1659 | 62 | |
| | 6 x 80 x 1 | x | x | 480 | 8,54 | 1156 | 1537 | 1792 | 74 | |
| | 8 x 80 x 1 | x | x | 640 | 11,39 | 1328 | 1766 | 2058 | 99 | |
| > 2000 A | 10 x 80 x 1 | x | x | 800 | 14,24 | 1500 | 1995 | 2325 | 123 | |
| | 5 x 100 x 1 | x | x | 500 | 8,90 | 1300 | 1729 | 2015 | 77 | |
| > 2500 A | 8 x 100 x 1 | x | x | 800 | 14,24 | 1606 | 2136 | 2489 | 123 | |
| | 10 x 100 x 1 | x | x | 1000 | 17,80 | 1810 | 2407 | 2806 | 154 | |
| | 12 x 100 x 1 | x | x | 1200 | 21,36 | 1974 | 2625 | 3059 | 185 | |

Standard length 2000 mm, available in lengths from 250 to 3000 mm on request / ¹ Other dimensions on request / ² Heating of busbar depends on: current strength, ambient temperature, heat dissipation, laying method, installation, application / Multiplication factor of 1.72 if 2 bars are used, multiplication factor of 2.25 if 3 bars are used in parallel arrangement based on DIN 43 671/Available in the color gray (standard) / The SPS product ranges are continuously extended - you can find more information on our website at: www.sps-standard.com

You can find accessories for ISOFLExX® on page 32/33 | You can find the technical data for ISOFLExX® Classic on page 35/36





Ampacity ISOFLExX®

Premium

| Ampacity for ΔT = 50 K | Dimensions ¹ | Available in bare Cu (Cu) and tinned Cu (Sn) | | Cross-section [mm ²] | Cu - weight per 2 meters (standard length) [kg] | Ampacity Values acc. to DIN 43671 for bars in switchgear systems Heating ² of bar at an ambient temperature of 35°C | | | Thermal short-circuit strength at 1 second [kA] |
|---------------------------|-------------------------|---|----|-------------------------------------|--|--|-----------------------------|------------------------------|--|
| | | Cu | Sn | | | to 65°C ΔT = 30 K [A] | to 85°C ΔT = 50 K [A] | to 105°C ΔT = 70 K [A] | |
| | | | | | | | | | |
| > 400 A | 5 x 20 x 1 | x | x | 100 | 1,78 | 319 | 424 | 565 | 26 |
| | 5 x 24 x 1 | x | x | 120 | 2,14 | 369 | 491 | 653 | 31 |
| > 630 A | 10 x 20 x 1 | x | x | 200 | 3,56 | 497 | 661 | 880 | 52 |
| | 10 x 24 x 1 | x | x | 240 | 4,27 | 559 | 743 | 989 | 62 |
| | 5 x 32 x 1 | x | x | 160 | 2,85 | 477 | 634 | 844 | 41 |
| > 800 A | 5 x 40 x 1 | x | x | 200 | 3,56 | 573 | 762 | 1014 | 52 |
| | 10 x 32 x 1 | x | x | 320 | 5,70 | 721 | 959 | 1276 | 83 |
| | 8 x 40 x 1 | x | x | 320 | 5,70 | 739 | 983 | 1308 | 83 |
| > 1000 A | 5 x 50 x 1 | x | x | 250 | 4,45 | 697 | 927 | 1234 | 65 |
| | 10 x 40 x 1 | x | x | 400 | 7,12 | 850 | 1131 | 1505 | 100 |
| | 8 x 50 x 1 | x | x | 400 | 7,12 | 891 | 1185 | 1577 | 100 |
| > 1250 A | 5 x 63 x 1 | x | | 315 | 5,61 | 826 | 1099 | 1462 | 82 |
| | 10 x 50 x 1 | x | x | 500 | 8,90 | 1020 | 1357 | 1805 | 130 |
| | 8 x 63 x 1 | x | | 504 | 8,97 | 1038 | 1361 | 1837 | 130 |
| > 1600 A | 10 x 63 x 1 | x | | 630 | 11,21 | 1180 | 1569 | 2089 | 160 |
| | 5 x 80 x 1 | x | x | 400 | 7,12 | 1070 | 1423 | 1894 | 100 |
| | 8 x 80 x 1 | x | x | 640 | 11,39 | 1328 | 1766 | 2351 | 166 |
| > 2000 A | 10 x 80 x 1 | x | x | 800 | 14,24 | 1500 | 1995 | 2655 | 208 |
| | 5 x 100 x 1 | x | x | 500 | 8,90 | 1300 | 1729 | 2301 | 130 |
| | 8 x 100 x 1 | x | x | 800 | 14,24 | 1606 | 2136 | 2843 | 208 |
| > 2500 A | 10 x 100 x 1 | x | x | 1000 | 17,80 | 1810 | 2407 | 3204 | 260 |
| | 8 x 120 x 1 | x | x | 960 | 17,09 | 1794 | 2386 | 3175 | 250 |
| > 2500 A | 12 x 100 x 1 | x | x | 1200 | 21,36 | 1974 | 2625 | 3494 | 310 |
| | 10 x 120 x 1 | x | x | 1200 | 21,36 | 2110 | 2806 | 3735 | 310 |

Supreme

| Ampacity for ΔT = 50 K | Dimensions ¹ | Available in bare Cu (Cu) and tinned Cu (Sn) | | Cross-section [mm ²] | Cu - weight per 2 meters (standard length) [kg] | Ampacity Values acc. to DIN 43671 for bars in switchgear systems Heating ² of bar at an ambient temperature of 35°C | | | Thermal short-circuit strength at 1 second [kA] |
|---------------------------|-------------------------|---|----|-------------------------------------|--|--|-----------------------------|------------------------------|--|
| | | Cu | Sn | | | to 65°C ΔT = 30 K [A] | to 85°C ΔT = 50 K [A] | to 105°C ΔT = 70 K [A] | |
| | | | | | | | | | |
| > 125 A | 3 x 9 x 0,8 | x | x | 21,6 | 0,38 | 98 | 130 | 173 | 5 |
| | 6 x 9 x 0,8 | x | x | 43,2 | 0,77 | 147 | 196 | 260 | 11 |
| | 9 x 9 x 0,8 | x | x | 64,8 | 1,15 | 179 | 238 | 317 | 16 |
| | 3 x 13 x 0,5 | x | x | 19,5 | 0,35 | 108 | 144 | 191 | 5 |
| | 6 x 13 x 0,5 | x | x | 39,0 | 0,69 | 162 | 215 | 287 | 10 |
| > 250 A | 4 x 16 x 0,8 | x | x | 49,6 | 0,88 | 201 | 267 | 356 | 12 |
| | 6 x 16 x 0,8 | x | x | 74,4 | 1,32 | 252 | 335 | 446 | 19 |
| | 2 x 20 x 1 | x | x | 40,0 | 0,71 | 188 | 250 | 333 | 10 |
| > 400 A | 3 x 20 x 1 | x | x | 60,0 | 1,07 | 237 | 315 | 419 | 15 |
| | 10 x 16 x 0,8 | x | x | 124 | 2,21 | 330 | 439 | 584 | 32 |
| | 5 x 20 x 1 | x | x | 100 | 1,78 | 319 | 424 | 565 | 26 |
| | 5 x 24 x 1 | x | x | 120 | 2,14 | 369 | 491 | 653 | 31 |
| | 3 x 32 x 1 | x | x | 96 | 1,71 | 359 | 477 | 635 | 25 |
| > 630 A | 11 x 21 x 1 | x | | 231 | 4,11 | 563 | 749 | 997 | 60 |
| | 10 x 24 x 1 | x | x | 240 | 4,27 | 559 | 743 | 989 | 62 |
| | 5 x 32 x 1 | x | x | 160 | 2,85 | 477 | 634 | 844 | 41 |
| | 6 x 32 x 1 | x | x | 192 | 3,42 | 526 | 700 | 931 | 50 |
| | 5 x 40 x 1 | x | x | 200 | 3,56 | 573 | 762 | 1014 | 52 |
| > 800 A | 8 x 32 x 1 | x | x | 256 | 4,56 | 623 | 829 | 1103 | 66 |
| | 10 x 32 x 1 | x | x | 320 | 5,70 | 721 | 959 | 1276 | 83 |
| | 8 x 40 x 1 | x | x | 320 | 5,70 | 739 | 983 | 1308 | 83 |
| > 1000 A | 5 x 50 x 1 | x | x | 250 | 4,45 | 697 | 927 | 1234 | 65 |
| | 10 x 35 x 1 | x | | 350 | 6,23 | 757 | 1007 | 1340 | 91 |
| > 1250 A | 10 x 40 x 1 | x | x | 400 | 7,12 | 850 | 1131 | 1505 | 100 |
| > 1250 A | 10 x 50 x 1 | x | x | 500 | 8,90 | 1020 | 1357 | 1805 | 130 |

Standard length 2000 mm, available in lengths from 250 to 3000 mm on request / ¹ Other dimensions on request / ² Heating of busbar depends on: current strength, ambient temperature, heat dissipation, laying method, installation, application / Multiplication factor of 1.72 if 2 bars are used, multiplication factor of 2.25 if 3 bars are used in parallel arrangement based on DIN 43 671 / Available in the color gray (standard) / The SPS product ranges are continuously extended - you can find more information on our website at: www.sps-standard.com

We can naturally also produce ISOFLExX® in different lengths and cross-sections to meet your specifications.



+49 (0) 63 33/60 29-0

+49 (0) 63 33/60 29-29



www.sps-standard.com

info@sp-standard.com

ULTRAFLEXX®

Ultraflexx® flexible connectors are highly flexible connectors made from flat copper braid and absorb oscillations and switching vibrations in all directions.

Unlike generally available press-welded components, our press-welded connectors are press-welded across their full connection cross-section and can be machined like one solid end piece.

Our full-surface welded connections have the following advantages:

- No additional transition resistances, hence lower power loss and reduced voltage loss
- No corrosion and therefore no deterioration of connection resistances over time

Ultraflexx® braided connectors are highly flexible connectors that are quickly and easily mounted ready for use.

Technical information:

- Current range up to 700 A
- Outstanding electrical contact transition
- Superb long-term mechanical characteristics

Insulation:

- Halogen-free insulation
- Wall thickness: 0.8 ±0.3 mm (other wall thicknesses on request)
- Insulation: black (other colors on request)
- Operating temperatures: -55° C to +125° C
- Flame retardant to UL224-VW1
- Operating voltage: max. 1000 VAC - 1500 VDC
- Dielectric strength: 20kV/mm

Braided material:

- High-grade electrolytic copper with outstanding conductivity
- Individual wire diameter of 0.15mm for maximum flexibility
- Vibration-proof due to press-welded connection leads
- Minimum transition resistance due to press-welded connection leads

The best alternative to customized cables

We supply a wide range of different lengths and cross-sections to meet customer specifications and designed for specific applications. Our manufacturing processes uses only the very best electrolytic copper to ensure optimum conductivity. Outstanding product quality - easy to use and made in Germany.

Ultraflexx® - optimized and highly flexible use of space

Extremely wide range of cross-sections, can be adapted to different isolator sizes with fuse links - and installed as connectors between many different types of switch cabinet modules and units.



ULTRAFLEXX®

Ultraflexx® is available in the following cross-sections:

| Cross-section | Length ¹ | Weight | Ampacity | | |
|--------------------|---------------------|--------|----------------------|----------------------|-----------------------|
| | | | to 65°C ΔT = 30 K | to 85°C ΔT = 50 K | to 105°C ΔT = 30 K |
| [mm ²] | [mm] | [kg/m] | [A] | [A] | [A] |
| 25 | 150-1000 | 0,25 | 120 | 160 | 185 |
| 50 | 150-1000 | 0,51 | 200 | 270 | 315 |
| 100 | 150-1000 | 1,02 | 320 | 425 | 500 |
| 120 | 150-1000 | 1,22 | 355 | 470 | 555 |
| 240 | 150-1000 | 2,44 | 560 | 745 | 870 |

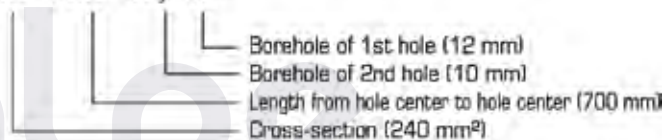
Values acc. to DIN 43671 for bars in switchgear systems
Heating² of bar at an ambient temperature of 35°C

¹Lengths from 150mm to 1000mm in 50mm increments - other lengths on request; the length is defined as the hole center spacing.

²Heating of busbar depends on: current strength, ambient temperature, heat dissipation, laying method, installation, application

Multiplication factor of 1.72 when using 2 Ultraflexx®, multiplication factor of 2.25 when using 3 Ultraflexx® in parallel arrangement.

Ultraflexx® nomenclature: UFL 240 - 700 - 10/12



You can find the technical data for Ultraflexx® on page 37



ULTRAFLEXX®

The following photos show the universal applications of Ultraflexx®

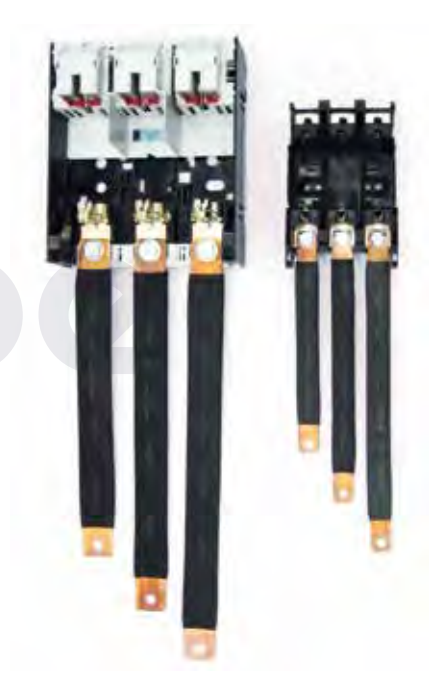


Ultraflexx® for the flexible bridging of bar and power switch

Application photos top and bottom: Kautz company, Trier - 4000A switch connection to busbar system



Ultraflexx® prepared for connection of a safety load-break switch



GROUNDING BRAIDS

The MBS grounding braids from SPS are a one-of-a-kind in the market, as the connections of the braids are press-welded in a special process. The braids are made of highly flexible flat material (Cu-ETP bare or tinned).

SPS grounding braids have the following advantages:

- Low heating in the event of a short circuit: welding of the connections ensures minimum transition resistance and means there is no need for contact sleeves with increased resistance.

- Long-term stability: the welded design guarantees consistent resistance, and there is no aging due to corrosion as is the case with contact sleeves.
- High operating reliability: the welded connections can withstand extremely high short-circuit currents with high limit temperatures. No softening of the connections can occur as is the case with soldered connections.

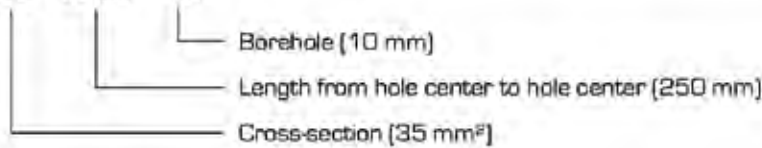
MBS grounding braids, bare and tinned copper

| Cross-section [mm ²] | Length ¹ [mm] | Weight [kg/m] | max. current load [A] |
|----------------------------------|--------------------------|---------------|-----------------------|
| 6 | 100 - 500 | 0,06 | 50 |
| 10 | 100 - 500 | 0,10 | 80 |
| 16 | 100 - 500 | 0,16 | 120 |
| 25 | 100 - 500 | 0,26 | 150 |
| 30 | 100 - 500 | 0,31 | 180 |
| 35 | 100 - 500 | 0,37 | 195 |
| 50 | 100 - 500 | 0,53 | 250 |

¹Lengths from 100mm to 500mm in 50mm increments - other lengths on request; length is defined as hole center distance.

Ultraflexx[®] nomenclature:

MBS - 35 - 250 - 10



INFOBOX

In modern switchgear systems with devices like programmable logic controllers or field bus connections, high-frequency grounding is of paramount importance. It is not only ohmic DC resistance that plays a role but also the impedance, which increases with increasing frequency.

The key factor here is the conductor shape, the overall length and the connection technology. The flat braided materials also used to make grounding braids have an impedance that is many times lower than that of comparable round grounding cables and are for this reason alone far more suitable for high-

frequency grounding. They also possess an ideally low transition resistance, something that can only be achieved by welding. The SPS grounding braids are also highly suitable for ensuring the electromagnetic compatibility of different system components and equipment. Electromagnetic interference is generally of high frequency, and the low inductance of the grounding connection is of particular importance when working with higher frequencies. As a rule, this means these connections should be as short as possible. However, the shape of the ground connector (flat and thin) plays a more important role in determining inductance in the higher frequency range. The SPS grounding braids perfectly meet this requirement.



+49 (0) 63 33/60 29-0
+49 (0) 63 33/60 29-29

www.sps-standard.com
info@sp-standard.com



FLAT COPPER BRAIDS

Bare and tinned flat copper braids

SPS also produces flat braids in any desired length for special applications.

These braids are cut to length according to customer specifications. Tinned copper sleeves are available

to ensure good connections. These sleeves are pushed onto the braids and pressed in place.

SPS supplies tinned and bare flat braids in different cross-sections up to 95 mm².



| Type | Cross-section [mm ²] | Braid width [mm] | Braid thickness [mm] | Max. ampacity [A] | Copper weight per meter [kg] |
|---------|----------------------------------|------------------|----------------------|-------------------|------------------------------|
| FGKB 10 | 10 | 13 | 1,0 | 80 | 0,10 |
| FGKB 16 | 16 | 15 | 1,5 | 120 | 0,16 |
| FGKB 25 | 25 | 23 | 1,5 | 150 | 0,25 |
| FGKB 30 | 30 | 23 | 2,0 | 180 | 0,30 |
| FGKB 35 | 35 | 23 | 2,5 | 195 | 0,35 |
| FGKB 50 | 50 | 28 | 3,0 | 250 | 0,50 |
| FGKB 70 | 70 | 30 | 3,5 | 290 | 0,70 |
| FGKB 95 | 95 | 40 | 4,0 | 340 | 0,95 |
| FGKV 10 | 10 | 13 | 1,0 | 80 | 0,10 |
| FGKV 16 | 16 | 15 | 1,5 | 120 | 0,16 |
| FGKV 25 | 25 | 23 | 1,5 | 150 | 0,25 |
| FGKV 30 | 30 | 23 | 2,0 | 180 | 0,30 |
| FGKV 35 | 35 | 23 | 2,5 | 195 | 0,35 |
| FGKV 50 | 50 | 28 | 3,0 | 250 | 0,50 |
| FGKV 70 | 70 | 30 | 3,5 | 290 | 0,70 |
| FGKV 95 | 95 | 40 | 4,0 | 340 | 0,95 |

FGKB = bare copper FGKV = tinned copper
The key parameter is the cross-section; width and thickness may vary

Sleeves for flat braids

| Type | Material | Width A [mm] | Length B [mm] | Wall thickness [mm] |
|--------|---------------|--------------|---------------|---------------------|
| HFG 16 | copper tinned | 16 | 15 | 1 |
| HFG 25 | copper tinned | 22 | 25 | 1 |
| HFG 50 | copper tinned | 30 | 30 | 1 |



COPPAl[®]

- the composite busbars with aluminum core and copper cladding
- the alternative to copper bars



Busbars made of CoppAl[®] have a number of advantages compared to conventional copper bars as the benefits of copper and aluminum are combined in one bar.

Advantages:

- Improved heat dissipation due to larger surface area
- Contact surfaces of the electrical conductor are made of copper (low contact resistance)
- Thermal short-circuit strength is similar to that of copper, as the current flows via the outer skin of the conductor during transient processes (skin effect)
- Cost reduction due to lower material costs
- Lower price fluctuations due to lower copper content
- Lower weight
- Easy handling
- Lower transport workload and costs

CoppAl[®] is a bi-metal composite material for use as an electrical connection in switch cabinets, switchgear systems and distributors. The copper cladding encases and is inseparably joined with the aluminum core. This permits the optimum combination of the positive properties of highly conductive copper and the low weight of aluminum. Processing (drilling, bending, punching, cutting ...) is comparable with that of copper bars.

Simply use CoppAl[®] in place of conventional copper bars and see the advantages for yourself!

CoppAl[®] is available in similar dimensions to copper bars.

CoppAl[®] bars are the cost-effective alternative to copper bars, as they are cheaper for the same ampacity values.

FAQ on CoppAl®

What are the main advantages of CoppAl® compared to solid copper bars?

- CoppAl® bars with the same ampacity are cheaper and lighter. This makes itself particularly noticeable with large cross-sections.

How can I machine CoppAl® bars (drilling, bending, punching etc. ...)?

- You can machine CoppAl® bars in the same way as conventional copper bars. Bending of more than 90° is also no problem. A bending mandrel does not damage either the copper cladding or the aluminum core.

Must I expect increased corrosion with CoppAl® under normal conditions (e.g. in switchgear systems) or do I need to apply additional corrosion protection?

- No, there is no increased corrosion under normal conditions of the kind prevailing in electrical operating rooms.

Can CoppAl® be used in environments with increased corrosion risk?

- Outside electrical operating rooms, in environments with increased humidity and in the presence of electrolytes (e.g. sea air), you must expect increased corrosion on the cutting edges and in the area of the boreholes. We therefore recommend additional corrosion protection (e.g. paint coat, grease, acid-free vaseline) in case of doubt.

Is CoppAl® compatible with galvanized screws or stainless steel screws?

- Yes, galvanized or stainless steel screws can be used without any problem under normal conditions.

What support spacing should I choose for short-circuit resistant installation of CoppAl®?

- In most cases, you can use the same support spacing as with copper bars.

Are there special supports for CoppAl® bars?

- You can use most commercially available supports. If you decide in favor of CoppAl®, you should, however, bear in mind that you need an approx. 20% larger cross-section compared to copper bars for the same nominal current.

How could the thermal and dynamic short-circuit characteristics of CoppAl® be described?

- The thermal characteristics are similar to those of copper bars. The dynamic properties are between those of copper and aluminum bars.

In which DIN standard can I find more details on CoppAl® bars?

- DIN 43 670, Part 2 (aluminum busbars, copper cladding) applies to CoppAl® busbars.



COPPAl®

CoppAl® - as light as aluminum, as conductive as copper

Ampacity

Values acc. to DIN 43670P2 for bars in switchgear systems
Heating² of bar at an ambient temperature of 35°C

| Dimensions ¹ [mm] | Cross-section [mm ²] | Weight [kg/m] | to 65°C ΔT = 30 K [A] | to 85°C ΔT = 50 K [A] | to 105°C ΔT = 70 K [A] | Thermal short circuit strength at 1 second [kA] |
|---------------------------------|-------------------------------------|------------------|-----------------------------|-----------------------------|------------------------------|---|
| 20 x 5 | 100 | 0,363 | 237 | 315 | 370 | 11 |
| 20 x 10 | 200 | 0,726 | 367 | 488 | 573 | 22 |
| 30 x 5 | 150 | 0,545 | 327 | 435 | 510 | 17 |
| 30 x 10 | 300 | 1,089 | 494 | 657 | 771 | 33 |
| 40 x 5 | 200 | 0,726 | 416 | 553 | 649 | 22 |
| 40 x 10 | 400 | 1,452 | 617 | 821 | 963 | 44 |
| 40 x 12 | 480 | 1,742 | 690 | 918 | 1076 | 53 |
| 50 x 5 | 250 | 0,908 | 504 | 670 | 786 | 28 |
| 50 x 10 | 500 | 1,815 | 737 | 980 | 1150 | 55 |
| 50 x 12 | 600 | 2,178 | 825 | 1097 | 1287 | 66 |
| 60 x 5 | 300 | 1,170 | 592 | 787 | 924 | 33 |
| 60 x 10 | 600 | 2,178 | 854 | 1136 | 1332 | 66 |
| 60 x 12 | 720 | 2,614 | 955 | 1270 | 1490 | 79 |
| 80 x 5 | 400 | 1,452 | 763 | 1015 | 1190 | 44 |
| 80 x 10 | 800 | 2,904 | 1081 | 1438 | 1686 | 88 |
| 100 x 10 | 1000 | 3,630 | 1304 | 1734 | 2034 | 110 |
| 100 x 12 | 1200 | 4,356 | 1460 | 1942 | 2278 | 132 |
| 120 x 10 | 1200 | 4,356 | 1523 | 2026 | 2376 | 132 |
| 120 x 12 | 1440 | 5,227 | 1705 | 2268 | 2660 | 158 |
| 140 x 10 | 1400 | 5,516 | 1738 | 2312 | 2711 | 154 |
| 140 x 12 | 1680 | 6,619 | 1945 | 2587 | 3034 | 185 |
| 160 x 10 | 1600 | 6,304 | 1947 | 2590 | 3037 | 176 |
| 160 x 12 | 1920 | 7,565 | 2180 | 2899 | 3401 | 211 |
| 200 x 10 | 2000 | 7,880 | 2361 | 3140 | 3683 | 220 |
| 200 x 12 | 2400 | 9,456 | 2645 | 3518 | 4126 | 264 |

¹Other dimensions on request
Bar length: 4m

You can find the technical data for CoppAl® on page 39-41



+49 (0) 63 33/60 29-0

+49 (0) 63 33/60 29-29



www.sps-standard.com

info@sps-standard.com



COPPER BARS



SPS offers a range of standard solid copper bars in the standard length of 4 m.

The bars are also holed, bent or cut to length on request, and you can also find a range of different insulators and busbar supports from page 20 onwards.

Hole size, number and arrangement in accordance with your specifications.

- Copper bars, flat and solid
- Standard length: 4000 mm [tolerance: -0, +200mm]
- Material: Cu-ETP F25 bare¹ - Cu-ETP F20 and F30 on request

- Structural strength: approx. 250 N/mm²
- Electrical conductivity: 57 S x m/mm² acc. to DIN EN 13601 (DIN 46433; DIN 40500)

| Bar dimensions | | | | |
|------------------|------------|----------------|----------------------------------|----------------------|
| Type | Width [mm] | Thickness [mm] | Cross-section [mm ²] | Weight / 4m bar [kg] |
| SCCU 20x5x4000 | 20 | 5 | 100 | 3,56 |
| SCCU 30x5x4000 | 30 | 5 | 150 | 5,34 |
| SCCU 40x5x4000 | 40 | 5 | 200 | 7,12 |
| SCCU 50x5x4000 | 50 | 5 | 250 | 8,90 |
| SCCU 60x5x4000 | 60 | 5 | 300 | 10,68 |
| SCCU 80x5x4000 | 80 | 5 | 400 | 14,24 |
| SCCU 100x5x4000 | 100 | 5 | 500 | 17,80 |
| | | | | |
| SCCU 20x10x4000 | 20 | 10 | 200 | 7,12 |
| SCCU 30x10x4000 | 30 | 10 | 300 | 10,68 |
| SCCU 40x10x4000 | 40 | 10 | 400 | 14,24 |
| SCCU 50x10x4000 | 50 | 10 | 500 | 17,80 |
| SCCU 60x10x4000 | 60 | 10 | 600 | 21,36 |
| SCCU 80x10x4000 | 80 | 10 | 800 | 28,48 |
| SCCU 100x10x4000 | 100 | 10 | 1000 | 35,60 |

¹ Other versions and surfaces on request

INFOBOX

The DIN standards DIN 43670 and DIN 43671 outline the ampacity for conductors made of aluminum and copper under various conditions in tabular form. Correction factors take account of deviating conditions. These factors are listed for:

- Conductivity-dependent load changes
- Different temperatures
- Different bar orientation and routing
- Geometry-based change for AC applications
- Height changes

DIN 43670 lists the values for aluminum busbars, and Part 2 of this standard specifies the continuous ampacity values for copper-clad busbars made of aluminum. DIN 43671 lists the corresponding values for copper busbars.

Expansion connectors are standardized in DIN 46276. This standard describes expansion connectors made of both copper and aluminum.



+49 (0) 63 33/60 29-0
+49 (0) 63 33/60 29-29

www.sps-standard.com
info@sp-standard.com



EXPANSION AND BRAIDED CONNECTORS

SPS has chosen the most commonly used types from the wide variety of customized expansion and braided connectors. These standard expansion flexibles are manufactured in line with DIN 43670 and DIN 43671 and are available in copper and aluminum.

Copper expansion connectors are made of copper lamellas which are 0.2 mm thick and press-welded at the ends.

Aluminum connectors are made of lamellas which are 0.3mm thick and MIG-welded with solid connections.

Cu expansion connectors:

| Type | Width [mm] | Nominal current (65° C bar temperature / 35°C ambient temperature) [A] | Weight / unit [kg] |
|------------------------|------------|--|--------------------|
| DBCUC 38/5/60/220/S | 38 | 490 | 0,67 |
| DBCUC 48/5/60/220/S | 48 | 590 | 0,83 |
| DBCUC 38/10/60/250/S | 38 | 720 | 1,25 |
| DBCUC 48/10/60/250/S | 48 | 860 | 1,50 |
| DBCUC 58/10/80/310/S | 58 | 990 | 2,17 |
| DBCUC 78/10/80/310/S | 78 | 1240 | 2,83 |
| DBCUC 98/10/60/350/S | 98 | 1490 | 3,75 |
| DBCUC 118/10/100/350/S | 118 | 1710 | 4,67 |



Al expansion connectors:

| Type | Width [mm] | Nominal current (65° C bar temperature / 35°C ambient temperature) [A] | Weight / unit [kg] |
|-----------------------|------------|--|--------------------|
| DBAL 40/5/60/250/S | 40 | 380 | 0,33 |
| DBAL 40/5/80/310/S | 40 | 380 | 0,42 |
| DBAL 40/10/80/310/S | 40 | 560 | 0,58 |
| DBAL 50/10/80/310/S | 50 | 670 | 0,67 |
| DBAL 60/10/80/310/S | 60 | 770 | 0,83 |
| DBAL 80/10/100/350/S | 80 | 980 | 1,08 |
| DBAL 100/10/100/350/S | 100 | 1190 | 1,33 |



Cu braided connectors:

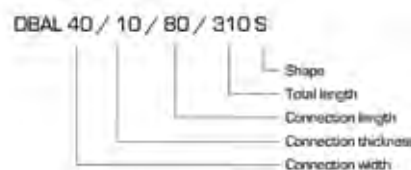
| Type | Width [mm] | Nominal current (65° C bar temperature / 35°C ambient temperature) [A] | Weight / unit [kg] |
|-----------------------|------------|--|--------------------|
| LICUC 120/40/60/220 | 40 | 370 | 0,42 |
| LICUC 240/40/60/220 | 40 | 580 | 0,67 |
| LICUC 360/50/60/250 | 50 | 700 | 1,08 |
| LICUC 480/50/60/250 | 50 | 850 | 1,40 |
| LICUC 600/60/80/310 | 60 | 990 | 2,08 |
| LICUC 720/80/80/310 | 80 | 1180 | 2,50 |
| LICUC 960/100/100/350 | 100 | 1490 | 3,67 |



Nomencl. for Cu expansion connectors:



Nomencl. for Al expansion connectors:



Nomencl. for braided connectors:





INSULATORS

SPS keeps a stock of selected insulators for different applications and requirements. All insulators are silicon-free, halogen-free and self-extinguishing in line with UL 94 VO. Different colors (red, black and white) have been chosen to make it easier to distinguish between the specific properties.



The **red supporting insulators** are made of glass fiber-reinforced polyester of high mechanical stability and with an operating temperature of max. 130°C. The threaded inserts on both sides are made of zinc plated steel. A hex for fixing with a standard OE spanner is integrated in the center of the insulator. The operating voltage is highly dependent on the insulator height and it is only with large heights this voltage reaches high values that correspond to the phase voltage of 400 VAC. Otherwise, supporting structures can be realized between bars in a phase, bars with ground potential or for control switching systems easily and at low cost.



The **black insulators** are made of glass fiber-reinforced polyamide 6.6 with an operating voltage of 1000 V and an operating temperature of max. 130°C. Up to a diameter of 25mm, the black insulators consist of a round body with a cast-on hex on one side. The round body is replaced by a six-point star via this hex. The threaded inserts are made of brass, while threaded bolts are made of galvanized and passivated steel. The various types are listed in the table below.

| Insulator type | Diameter [mm] | Threaded insert | Threaded rod |
|----------------|---------------|-----------------|--------------|
| 1 | 25 (round) | 2x (brass) | - |
| 2 | 35 (star) | 2x (brass) | - |
| 3 | 25 (round) | 1x (brass) | 1x (steel*) |
| 4 | 35 (star) | 1x (brass) | 1x (steel*) |

* galvanized



The **white spacer insulators** serve to support cover plates and protective devices and are therefore only available in the thread sizes M4 and M5.

The body consists of a continuous hex with a wrench width of 12 mm. These insulators are designed for low smoke emissions and are flame retardant, the glass fiber-reinforced polyamide is designed for 140°C. The spacer insulators are available in two types (2 x threaded insert / 1 x bolt, 1 x threaded insert) in heights from 20 - 60 mm.



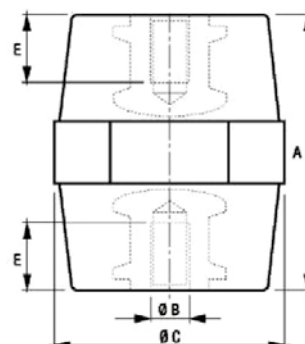


INSULATORS



| Designation | Flexural-strength [kN] | Tensile strength [kN] | Test voltage DC [V=] | Test voltage AC [V~] | Torque [Nm] | A x C x B [mm] | E [mm] |
|-------------|------------------------|-----------------------|----------------------|----------------------|-------------|----------------|--------|
| ISO 20M4 | 2 | 3 | 900 | 750 | 3 | 20 x 19 x 4 | 6 |
| ISO 20M6 | 2 | 4 | 900 | 750 | 6 | 20 x 19 x 6 | 6 |
| ISO 25M5 | 2 | 6 | 1200 | 1000 | 6 | 25 x 22 x 5 | 6 |
| ISO 25M6 | 2 | 6 | 1200 | 1000 | 6 | 25 x 22 x 6 | 6 |
| ISO 30M6 | 3 | 6 | 1500 | 1200 | 10 | 30 x 30 x 6 | 9 |
| ISO 30M8 | 3 | 6 | 1500 | 1200 | 25 | 30 x 30 x 8 | 9 |
| ISO 35M6 | 5 | 9 | 1600 | 1400 | 10 | 35 x 32 x 6 | 10 |
| ISO 35M8 | 5 | 9 | 1600 | 1400 | 25 | 35 x 32 x 8 | 10 |
| ISO 35M10 | 5 | 9 | 1600 | 1400 | 50 | 35 x 32 x 10 | 10 |
| ISO 40M6 | 9 | 11 | 1900 | 1600 | 10 | 40 x 41 x 6 | 10 |
| ISO 40M8 | 9 | 11 | 1900 | 1600 | 25 | 40 x 41 x 8 | 10 |
| ISO 40M10 | 9 | 11 | 1900 | 1600 | 50 | 40 x 41 x 10 | 10 |
| ISO 45M8 | 10 | 15 | 2100 | 1800 | 25 | 45 x 46 x 8 | 13 |
| ISO 45M10 | 10 | 15 | 2100 | 1800 | 50 | 45 x 46 x 10 | 13 |
| ISO 50M6 | 6 | 10 | 2400 | 2000 | 10 | 50 x 36 x 6 | 13 |
| ISO 50M8 | 6 | 10 | 2400 | 2000 | 25 | 50 x 36 x 8 | 15 |
| ISO 50M8 | 11 | 18 | 2400 | 2000 | 25 | 50 x 50 x 8 | 13 |
| ISO 50M10 | 11 | 18 | 2400 | 2000 | 50 | 50 x 36 x 10 | 13 |
| ISO 50M10 | 11 | 18 | 2400 | 2000 | 50 | 50 x 50 x 10 | 13 |
| ISO 50M12 | 11 | 18 | 2400 | 2000 | 85 | 50 x 50 x 12 | 13 |
| ISO 60M8 | 11 | 22 | 2800 | 2400 | 25 | 60 x 55 x 8 | 15 |
| ISO 60M10 | 11 | 22 | 2800 | 2400 | 50 | 60 x 55 x 10 | 18 |
| ISO 60M12 | 11 | 22 | 2800 | 2400 | 85 | 60 x 55 x 12 | 18 |
| ISO 70M12 | 12 | 25 | 3600 | 3000 | 85 | 70 x 60 x 12 | 18 |
| ISO 70M16 | 12 | 25 | 3600 | 3000 | 200 | 70 x 60 x 16 | 24 |
| ISO 80M12 | 16 | 31 | 4200 | 3500 | 85 | 80 x 65 x 12 | 18 |
| ISO 80M16 | 16 | 31 | 4200 | 3500 | 200 | 80 x 65 x 16 | 24 |
| ISO 100M12 | 15 | 36 | 6000 | 5000 | 85 | 100 x 65 x 12 | 18 |
| ISO 100M16 | 15 | 36 | 6000 | 5000 | 200 | 100 x 65 x 16 | 24 |

- Operating temperature: -40° C to +130° C
- Self-extinguishing in line with UL 94 VO
- Halogen-free
- Silicon-free
- UL - E111031
- QMF22 Component - Plastics
- Color: red [RAL 3002]



+49 (0) 63 33/60 29-0
+49 (0) 63 33/60 29-29



www.sps-standard.com
info@sps-standard.com



INSULATORS

| Designation | Height (H) [mm] | Width (W) [mm] | Thread (M) | Thread depth (D) [mm] | Type |
|-------------|-----------------|----------------|------------|-----------------------|------|
| B1 25M6 | 25 | 25 | M6 | 7 | 1 |
| B1 30M6 | 30 | 25 | M6 | 7 | 1 |
| B1 30M8 | 30 | 25 | M8 | 9 | 1 |
| B1 35M6 | 35 | 25 | M6 | 7 | 1 |
| B1 35M8 | 35 | 25 | M8 | 10 | 1 |
| B2 35M6 | 35 | 35 | M6 | 7 | 2 |
| B2 35M8 | 35 | 35 | M8 | 9 | 2 |
| B2 35M10 | 35 | 35 | M10 | 10 | 2 |
| B2 40M6 | 40 | 35 | M6 | 7 | 2 |
| B2 40M8 | 40 | 35 | M8 | 9 | 2 |
| B2 40M10 | 40 | 35 | M10 | 10 | 2 |
| B2 45M6 | 45 | 35 | M6 | 7 | 2 |
| B2 45M8 | 45 | 35 | M8 | 9 | 2 |
| B2 45M10 | 45 | 35 | M10 | 10 | 2 |
| B2 50M6 | 50 | 35 | M6 | 7 | 2 |
| B2 50M8 | 50 | 35 | M8 | 9 | 2 |
| B2 50M10 | 50 | 35 | M10 | 10 | 2 |



Type 1



Type 2

| Designation | Height (H) [mm] | Width (W) [mm] | Thread (M) | Thread depth (D) [mm] | Length (L) [mm] | Type |
|-------------|-----------------|----------------|------------|-----------------------|-----------------|------|
| B3 25M6 | 25 | 25 | M6 | 7 | 20 | 3 |
| B3 25M8 | 25 | 25 | M8 | 9 | 20 | 3 |
| B3 30M6 | 30 | 25 | M6 | 7 | 20 | 3 |
| B3 30M8 | 30 | 25 | M8 | 9 | 20 | 3 |
| B3 35M6 | 35 | 25 | M6 | 7 | 20 | 3 |
| B3 35M8 | 35 | 25 | M8 | 9 | 20 | 3 |
| B4 35M6 | 35 | 35 | M6 | 7 | 20 | 4 |
| B4 35M8 | 35 | 35 | M8 | 9 | 20 | 4 |
| B4 35M10 | 35 | 35 | M10 | 10 | 34 | 4 |
| B4 40M6 | 40 | 35 | M6 | 7 | 20 | 4 |
| B4 40M8 | 40 | 35 | M8 | 9 | 20 | 4 |
| B4 40M10 | 40 | 35 | M10 | 10 | 34 | 4 |
| B4 45M6 | 45 | 35 | M6 | 7 | 20 | 4 |
| B4 45M8 | 45 | 35 | M8 | 9 | 20 | 4 |
| B4 45M10 | 45 | 35 | M10 | 10 | 34 | 4 |
| B4 50M6 | 50 | 35 | M6 | 7 | 20 | 4 |
| B4 50M8 | 50 | 35 | M8 | 9 | 20 | 4 |
| B4 50M10 | 50 | 35 | M10 | 10 | 34 | 4 |

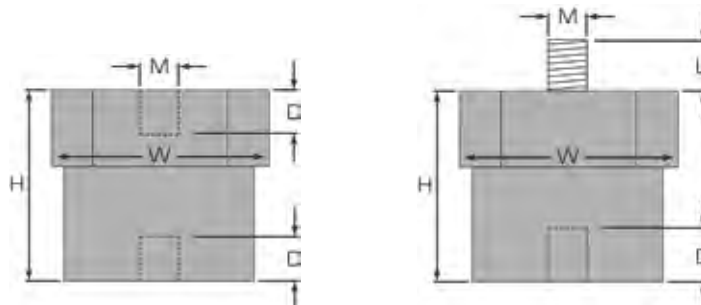


Type 3



Type 4

- Material: polyamide 6.6, glass fiber-reinforced
- Temperature: 130°C continuous load
- Halogen-free
- Self-extinguishing in line with UL 94 V0
- Color: black
- Female thread: brass
- Male thread: steel, galvanized



INSULATORS

| Designation | Height (H) [mm] | Width (W) [mm] | Thread (M) | Thread depth (D) [mm] | Length (L) [mm] | Type |
|-------------|-----------------|----------------|------------|-----------------------|-----------------|------|
| W2 20M4 | 20 | 12 | M4 | 5 | - | 1 |
| W2 20M5 | 20 | 12 | M5 | 5 | - | 1 |
| W2 25M4 | 25 | 12 | M4 | 5 | - | 1 |
| W2 25M5 | 25 | 12 | M5 | 5 | - | 1 |
| W2 30M4 | 30 | 12 | M4 | 5 | - | 1 |
| W2 30M5 | 30 | 12 | M5 | 5 | - | 1 |
| W2 40M5 | 40 | 12 | M5 | 5 | - | 1 |
| W2 50M5 | 50 | 12 | M5 | 5 | - | 1 |
| W2 60M5 | 60 | 12 | M5 | 5 | - | 1 |
| W1 20M4 | 20 | 12 | M4 | 5 | 16 | 2 |
| W1 20M5 | 20 | 12 | M5 | 5 | 14 | 2 |
| W1 25M4 | 25 | 12 | M4 | 5 | 16 | 2 |
| W1 25M5 | 25 | 12 | M5 | 5 | 14 | 2 |
| W1 30M4 | 30 | 12 | M4 | 5 | 16 | 2 |
| W1 30M5 | 30 | 12 | M5 | 5 | 14 | 2 |
| W1 40M5 | 40 | 12 | M5 | 5 | 14 | 2 |
| W1 50M5 | 50 | 12 | M5 | 5 | 14 | 2 |
| W1 60M5 | 60 | 12 | M5 | 5 | 14 | 2 |

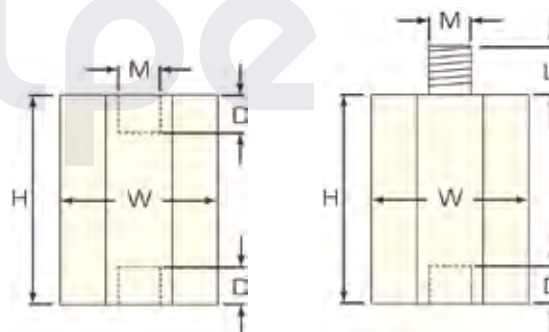


Type 1



Type 2

- Material: polyamide 6, glass fiber-reinforced
- Temperature: 140°C continuous load
- Halogen-free
- Self-extinguishing in line with UL 94 V0
- Color: white
- Female thread: brass
- Male thread: steel, tinned

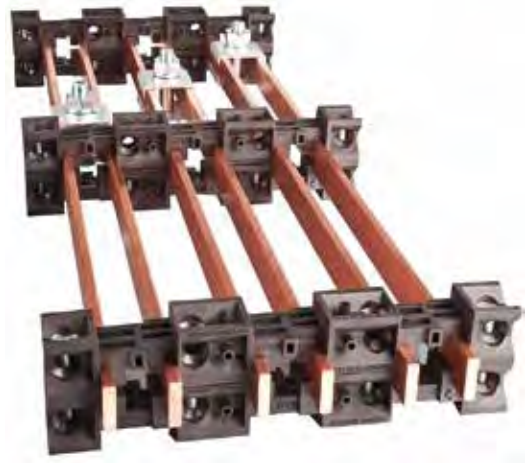




GENIFLEX® BUSBAR SUPPORTS

The universal suitability of the busbar supports for different bar formats greatly reduces stocking needs.

The 3-fold support SH3 has a phase center spacing of 60 mm and can therefore be used for all operating equipment, such as NH isolators or power switches with 60 mm phase spacing.



| Type | SH1 | SH3 |
|-----------------------|--------|--------|
| No. of poles | 1-pole | 3-pole |
| Phase center distance | - | 60 mm |





SH 1



SH 3

Technical Data

Bar sizes and arrangement options

| Horizontal | 12 x 5 | 20 x 5 | 30 x 5 | | |
|---|---------|------------|-------------|----------|----------|
|  | 12 x 10 | 20 x 10 | 30 x 10 | | |
| | 12 x 10 | 20 x 10 | 30 x 10 | | |
| Vertical | | 20 x 5 | 30 x 5* | | |
|  | | 2 x 20 x 5 | 2 x 30 x 5* | | |
| | | 20 x 10 | 30 x 10* | 40 x 10* | 50 x 10* |

* Bar arrangement with adapter and spacer sleeves



+49 (0) 63 33/60 29-0



+49 (0) 63 33/60 29-29



www.sps-standard.com



info@sp-standard.com



GENIFLEX® BUSBAR SUPPORTS



INFOBOX

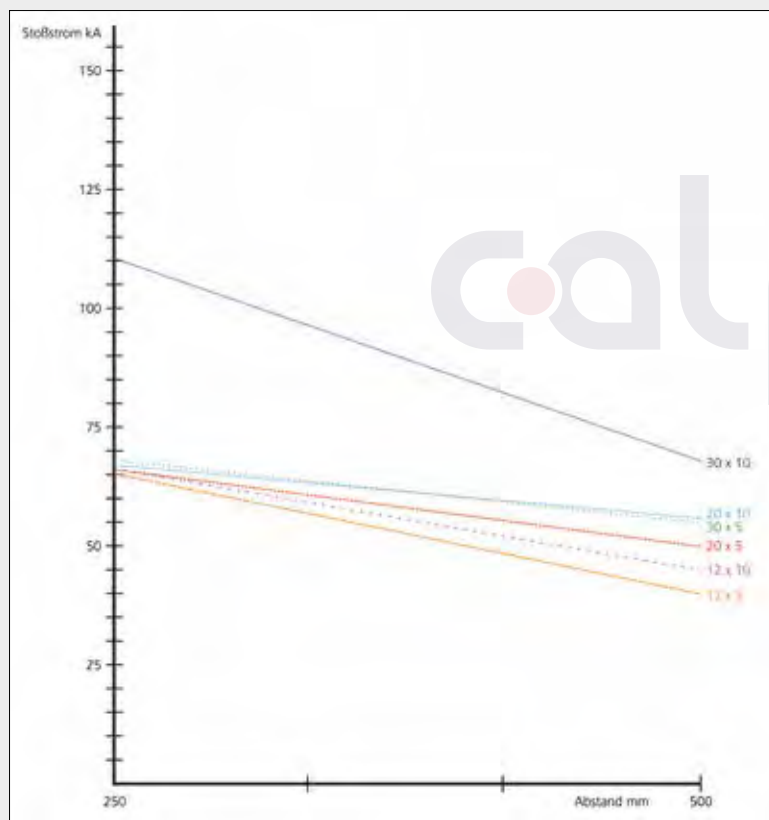
Short-Circuit current

When it comes to short-circuit current, a distinction is made between surge current and continuous short-circuit current. It is the continuous short-circuit current that is responsible for heating the conductor. It is proportional to the current square I^2 and the duration of the short circuit t .

The surge current generates the maximum force that is exercised on the current-carrying conductors and therefore on the

supports. The spacing between two neighboring supports can be changed to absorb the forces of the maximum expected surge current. This dependence for supports SH1 and SH3 is shown in the diagram. With a given current, this permits calculation of the maximum admissible spacing between the busbar supports for different bar formats. The maximum spacing differs between busbar supports.

Surge current



For more information please use the QR-Code or visit www.sps-standard.com

Example:

With a Cu bar measuring 30x10 mm and a support spacing of 250 mm, the maximum short-circuit current is 110 kA



+49 (0) 63 33/60 29-0



+49 (0) 63 33/60 29-29



www.sps-standard.com



info@sp-standard.com



SHS BUSBAR SUPPORTS

For upright busbar mounting, 3-pole and 4-pole for 10 mm bars.

The busbar supports are used to create a 3 or 4-pole busbar system with conductor heights from 30 – 100 mm. The bar can have both individual conductors and double conductors per phase. Different phase center spacings permit adaptation of the busbar system to different room dimensions or concepts with different short-circuit strengths. The nominal operating voltage according to IEC 61439 is 1000VAC or 1500VDC.

The data on short-circuit current is listed under the link in the info box on page 25.

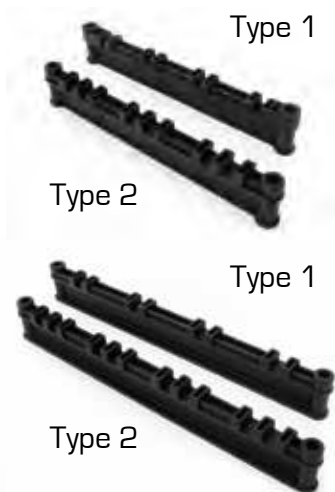
The busbar supports are made of glass fiber-reinforced polyamide 6.6 and are self-extinguishing

in line with UL 94 V0. The material permits a maximum bar temperature of 120°C and is halogen-free. The top and bottom sections of a support are identical, thereby ruling out the problem of interchanging. The two support sections are connected to each other via threaded rods or threaded bolts. The spacing of the support sections is defined by so-called spacers to suit the bar height.

5 supports are required for laying within a switch cabinet. This is why the busbar supports are available in packs of 10, equivalent to 5 supports.

The length of the required threaded rods depends on the bar height plus the length for securing of the support on the base structure.

| Designation | No. of poles | Conductor width [mm] | Phase center spacing [mm] | No. of bars [Type] |
|----------------|--------------|----------------------|---------------------------|--------------------|
| SHS 3-10-82-2 | 3 | 10 | 82 | 2 |
| SHS 3-10-110-1 | 3 | 10 | 110 | 1 |
| SHS 3-10-110-2 | 3 | 10 | 110 | 2 |
| SHS 4-10-60-1 | 4 | 10 | 60 | 1 |
| SHS 4-10-65-1 | 4 | 10 | 65 | 1 |
| SHS 4-10-65-2 | 4 | 10 | 65 | 2 |
| SHS 4-10-82-1 | 4 | 10 | 82 | 1 |
| SHS 4-10-82-2 | 4 | 10 | 82 | 2 |



Spacer

| Designation | Spacer height |
|-------------|---------------|
| SH-SP5 | 5 mm |
| SH-SP25 | 25 mm |
| SH-SP50 | 50 mm |

| Conductor height [mm] | Min. length of threaded rod [mm] | Spacers per threaded rod |
|-----------------------|----------------------------------|---------------------------|
| 30 | 120 | 1 x SH-SP5 |
| 40 | 130 | 3 x SH-SP5 |
| 50 | 140 | 1 x SH-SP25 |
| 60 | 150 | 1 x SH-SP25 + 2 x SH-SP5 |
| 80 | 170 | 1 x SH-SP5 + 1 x SH-SP50 |
| 100 | 190 | 1 x SH-SP25 + 1 x SH-SP50 |



Mounting example with spacer:



Please note that spacers, threaded rods, nuts and washers all need to be additionally ordered!



+49 (0) 63 33/60 29-0
+49 (0) 63 33/60 29-29

www.sps-standard.com
info@sp-standard.com



SHL BUSBAR SUPPORTS

For horizontal bar arrangement, 3-pole and 4-pole for 10 mm bars.

The busbar supports are used to create a 3 or 4-pole busbar system with the conductor dimensions 20/25/30 x 10mm and 20/25 x 5 mm. The nominal operating voltage according to IEC 61439 is 1000VAC or 1500VDC.

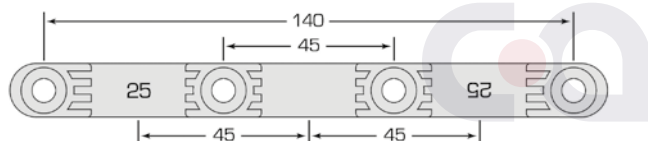
The data on short-circuit current is listed under the link in the info box on page 25.

The busbar supports are made of glass fiber-reinforced polyamide 6.6 and are self-extinguishing in line with UL 94 V0. The material permits a maximum bar temperature of 120°C and is halogen-free. Each support consists of 3 molded parts that can be used to create various conductor widths and thicknesses. The support sections are joined using screws.

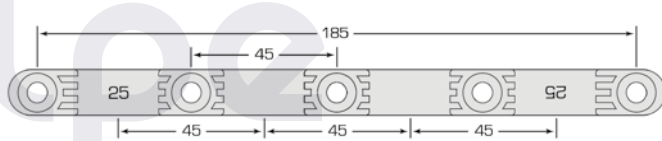
| Designation | No. of poles | Conductor width [mm] | Spacing phase center/phase c. [mm] |
|-------------|--------------|----------------------|------------------------------------|
| SHL3 | 3 | 20, 25, 30 | 45 |
| SHL4 | 4 | 20, 25, 30 | 45 |

3 and 4-pole busbar supports are suitable for the following bar sizes:

30 x 10, 25 x 10, 20 x 10, 25 x 5 and 20 x 5



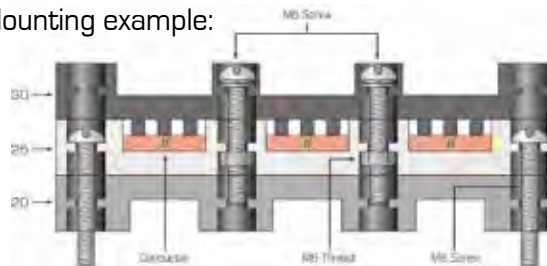
SHL 3



SHL 4

| Type | Dimensions | | | |
|------|------------|-----------|------------------|----------------------|
| | Length [L] | Width [B] | Total height [H] | Width of groove [B1] |
| SHL3 | 158 | 14 | 54 | 20,25,30 |
| SHL4 | 203 | 14 | 54 | 20,25,30 |

Mounting example:



For mounting use M6 Screws.



SHK FLAT BUSBAR SUPPORTS

Flat horizontal bar arrangement for bar widths of 3, 5, 6, 8 and 10 mm.

The innovative design allows the use of 5 different bar thicknesses with one bar support. Combination of individual supports permits the creation of 3, 4 and 5-pole systems. The bar width can be varied between 25 and 80 mm without the need to use additional adapter pieces. The nominal operating voltage according to IEC 61439 is 1000VAC or 1500VDC. The all-round character of the supports paves the way for an easy-to-install, lightweight and cost-effective solution for the creation of a bar system.

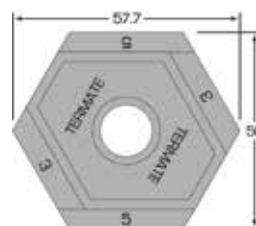
The busbar supports are made of glass fiber-reinforced polyamide 6.6 and are self-extinguishing in line with UL 94 V0. The material permits a maximum bar temperature of 120°C and is halogen-free. A support consists of an upper and lower section. The two support sections are connected by a threaded bolt which simultaneously secures them on the base structure. The spacings of the support sections can be chosen in line with the short-circuit strength. The data on short-circuit current is listed under the link in the info box on page 25.



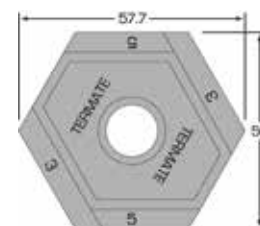
The desired conductor thickness can be achieved by coordinating the positions of the top and bottom sections relative to one another. The diagram shows you how to do this:



Dimensions:



top section SHK-O



bottom section SHK-U



| Conductor thickness: | 3 mm | 5 mm | 6 mm | 8 mm | 10 mm |
|-------------------------|------|------|------|------|-------|
| Position of top section | 0 mm | 5 mm | 3 mm | 5 mm | 5 mm |
| Pos. of bottom section | 3 mm | 0 mm | 3 mm | 3 mm | 5 mm |



+49 (0) 63 33/60 29-0
+49 (0) 63 33/60 29-29

www.sps-standard.com
info@sp-standard.com



VMS BUSBAR SUPPORTS

For upright bar arrangement, for 10 mm bars with 2 or 3 conductors per phase.

The busbar supports are used to create a 2, 3, 4 or 5-pole busbar system with conductor heights from 30 - 120 mm and bar thickness of 10 mm. The bar system can have double or triple conductors per phase or just one conductor per phase. Different phase center spacings permit adaptation of the busbar system to different room dimensions or concepts with different short-circuit strengths. The nominal operating voltage according to IEC 61439 is 1000VAC or 1500VDC.

The busbar supports are made of glass fiber-reinforced polyamide 6.6 and are self-extinguishing in line with UL 94 V0. The material permits a maximum bar temperature of 120°C and is halogen-free. The top and bottom sections of a support

are identical, thereby ruling out the problem of interchanging. The two support sections are connected to each other via threaded rods. The spacing of the holder sections adapts automatically to the bar height.

The phase center spacings can be extended using spacers from 110 mm to 130 mm to ensure clear spacing between neighboring phases. In addition, the larger structure of the individual supports permits any desired phase spacing dimension above 130 mm. This means that correspondingly high short-circuit currents can be absorbed. The data on short-circuit current is listed under the link in the info box on page 25.

The length of the required threaded rods depends on the bar height plus the length for securing of the support on the base structure.

Mounting example:



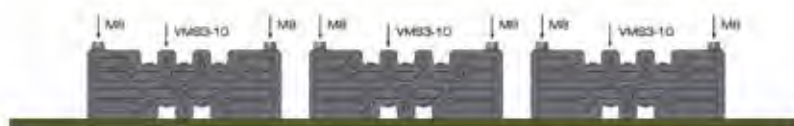
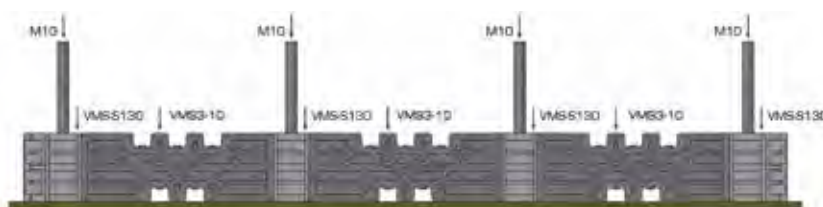
VMS3-10



Spacer for 110 mm phase centers
VMS-S110



Spacer for 130 mm phase centers
VMS-S130



LOW-VOLTAGE BUSBARS PLUGS

NS250 and NS400

The **NS250 and NS400 busbars plugs** are designed to serve as screwless, removable connectors for the contacting of 5mm and 10mm copper and CoppAl® bars.

The spring contacts are made from a high-strength and highly conductive silver-plated

copper alloy. The surrounding casing is made from glass fiber-reinforced polyamide 6.6 with its known outstanding properties.

For the purpose of conductor contacting, the plug connector can be used with a max. temperature of 105°C and complies with IEC 61439.

| Type | Current ¹ [A] | Conductor size [mm] | Certified current peak [kA] | Breakdown voltage [kV] |
|----------|-----------------------------|------------------------|--------------------------------|---------------------------|
| NS250-5 | 250 | 5 | 30 | 8 |
| NS250-10 | 250 | 10 | 30 | 8 |
| NS400-5 | 400 | 5 | 40 | 8 |
| NS400-10 | 400 | 10 | 40 | 8 |

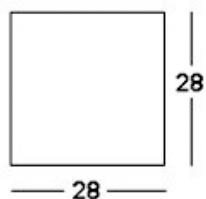
¹ The aforementioned current was tested with an increase of 30 k above the ambient temperature of 35° C in accordance with IEC 61439.

Both connectors have the same outer dimensions and are suitable for the same mounting parameters:

- Total length: 112mm
- Connector insert length after mounting: 80mm
- Connector width: 48mm
- Thickness of mounting plate: 1.5 - 3 mm

We recommend the use of contact grease for plug connections.

N.B. Plug connectors may only be connected and disconnected in no-load state!



Recommended cutout for the plug connectors





BUSHING INSULATOR

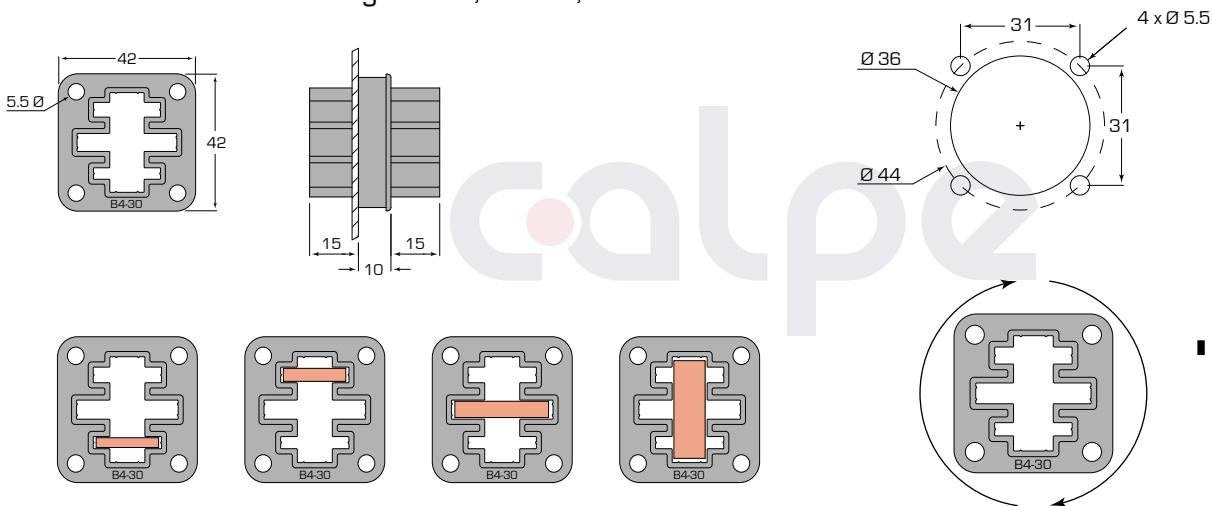


Each B4 bushing insulator is used to route bars in 4 formats through casing walls, switchgear sections and mounting plates.

B4-30 can be used for bars up to 30x10mm and B4-50 for bars of sizes up to 50x10mm. The B4-30 and B4-50 bushings can route bars both upright and horizontally, and can also be twisted into any angle position. This is what sets the B4-30 and B4-50 apart from similar bushing insulators.

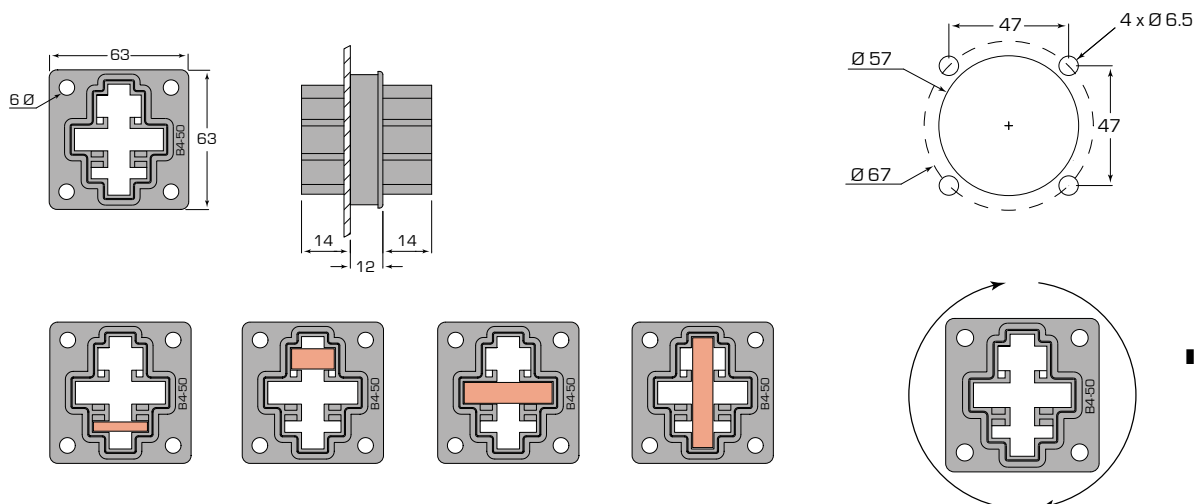
- Material: polyamide 6.6, glass fiber-reinforced
- Temperature: 145° C
- Halogen-free
- Self-extinguishing in line with UL 94 V0
- Color: black

B4-30 for bars measuring 20 x 3, 20 x 4, 30 x 5 and 30 x 10



■ rotate as required to suit application - either horizontal or vertical

B4-50 for bars measuring 25 x 5, 20 x 10, 40 x 10 and 50 x 10



■ rotate as required to suit application - either horizontal or vertical

ACCESSORIES AND TOOLS

Flat connector clamps



for the connection of ISOFLExX® to flat bars lengthwise or at an angle of 90° without drilling

| Article nr. | Type | Conn. widths [mm x mm] | Outer dim. [mm x mm] | Clamp width [mm] | No. in pack |
|-------------|---------------|------------------------|----------------------|------------------|-------------|
| 90010200 | FAK 16 x 16 | 16 x 16 | 35 x 35 | 20 | 9 |
| 90010310 | FAK 16 x 32 | 16 x 32 | 35 x 52 | 20 | 9 |
| 90010210 | FAK 20 x 20 | 20 x 20 | 40 x 40 | 20 | 9 |
| 90010320 | FAK 20 x 40 | 20 x 40 | 40 x 60 | 20 | 6 |
| 90010220 | FAK 25 x 25 | 25 x 25 | 45 x 45 | 20 | 9 |
| 90010330 | FAK 25 x 50 | 25 x 50 | 45 x 70 | 20 | 6 |
| 90010230 | FAK 32 x 32 | 32 x 32 | 52 x 50 | 20 | 6 |
| 90010340 | FAK 32 x 63 | 32 x 63 | 52 x 82 | 20 | 6 |
| 90010240 | FAK 40 x 40 | 40 x 40 | 60 x 60 | 20 | 3 |
| 90010350 | FAK 40 x 63 | 40 x 63 | 60 x 82 | 32 | 3 |
| 90010360 | FAK 40 x 80 | 40 x 80 | 70 x 110 | 35 | 3 |
| 90010250 | FAK 50 x 50 | 50 x 50 | 70 x 70 | 20 | 3 |
| 90010370 | FAK 50 x 80 | 50 x 80 | 80 x 110 | 35 | 3 |
| 90010380 | FAK 50 x 100 | 50 x 100 | 80 x 130 | 35 | 3 |
| 90010260 | FAK 60 x 63 | 60 x 63 | 80 x 82 | 32 | 3 |
| 90010280 | FAK 80 x 80 | 80 x 80 | 120 x 120 | 35 | 3 |
| 90010300 | FAK 100 x 100 | 100 x 100 | 140 x 140 | 35 | 3 |

Pressure plates



for the connection of ISOFLExX® to flat bars, including fastening material; plates made of 5 mm thick steel with DIN hole

| Article nr. | Type | Dimensions [mm] | No. of boreholes | With screws | No. in pack |
|-------------|---------|-----------------|------------------|-------------|-------------|
| 90080300 | DP 32/1 | 32 x 30 | 1 | M 8 x 40 | 3 |
| 90080310 | DP 40/1 | 40 x 40 | 1 | M 10 x 40 | 3 |
| 90080330 | DP 50/1 | 50 x 50 | 1 | M 10 x 40 | 3 |
| 90080320 | DP 40/2 | 40 x 80 | 2 | M 12 x 40 | 3 |
| 90080340 | DP 40/2 | 50 x 80 | 2 | M 12 x 40 | 3 |

Plastic support



Plastic support for the mounting of ISOFLExX® on DIN 35 mm profile bars; made of halogen-free, self-extinguishing, glass fiber-reinforced polyamide; alternatively suitable for fixing with cable ties

| Article nr. | Type | Description | No. in pack |
|-------------|--------|------------------------------------|-------------|
| 90080400 | KSH 50 | complete | 4 |
| 90080410 | KSH 51 | bottom section for cable ties only | 12 |

High-current clamps



for clamp connections of ISOFLExX® to flat bars lengthwise without drilling; clamp width 40 mm; made of stainless steel, with high bending strength, perfect for constant contact pressure across the entire surface

| Article nr. | Type | Description | No. in pack |
|-------------|----------|-------------|--------------------|
| 90010600 | HSSK 80 | 80 | 1 clamp connection |
| 90010610 | HSSK 100 | 100 | 1 clamp connection |
| 90010620 | HSSK 120 | 120 | 1 clamp connection |

ACCESSORIES AND TOOLS

Conductor connection clamps for the mounting of round connectors or ISOFLEXX® on flat bars with a thickness of 5 mm without drilling



| Article nr. | Type | Connection [mm²] | Can be used up to max. [A] | Clamping space [mm] | No. in pack |
|-------------|-----------|------------------|----------------------------|---------------------|-------------|
| 90010410 | LASK 16/5 | 1,5 - 16 | 180 | 7,5 x 7,5 | 20 |
| 90010440 | LASK 35/5 | 4 - 35 | 270 | 10,5 x 11 | 10 |
| 90010470 | LASK 70/5 | 16 - 70 | 400 | 14 x 14 | 5 |

Drilling templates

for problem-free drilling of ISOFLEXX®, matched to the relevant bar width, with different drill bits



| Article nr. | Type | Bar width [mm] | Boehole [mm] | No. in pack |
|-------------|-------|----------------|--------------|-------------|
| 90080100 | BL 16 | 16 mm | 6 / 8 | 1 |
| 90080110 | BL 20 | 20 mm | 8 / 10 / 12 | 1 |
| 90080120 | BL 24 | 24 mm | 8 / 10 / 12 | 1 |
| 90080130 | BL 32 | 32 mm | 10 / 12 | 1 |

Bending tool

for manual bending of ISOFLEXX® and flat Cu bars; angle stop steplessly adjustable from 0 - 120°; maximum bending performance: solid Cu bars, 100 x 12 mm; made of breakproof spherical cast metal



| Article nr. | Type | Packaging dimensions [mm] | Weight [kg] | No. in pack |
|-------------|----------|---------------------------|-------------|-------------|
| 90090100 | BV - 100 | 780 x 280 x 290 | ca. 24 | 1 |

Twisting tool

for manual twisting of ISOFLEXX® using the bending tool BV-100 or another suitable holding device



| Article nr. | Type | Packaging dimensions [mm] | Weight [kg] | No. in pack |
|-------------|------|---------------------------|-------------|-------------|
| 90090110 | VD | 480 x 80 x 40 | ca. 1,6 | 1 |

Our accessories are naturally also available with different dimensions on request.



CERTIFICATES

All SPS products represent the latest state of the technical art. They are optimized in line with technical advances and the ongoing definition of standards.

All SPS products comply with the legal stipulations and technical guidelines within the European Union and are CE labeled in line with the valid regulations. This process is monitored and imple-

mented on a continuous basis by our CE Officer. We will be happy to send you the underlying declarations of conformity on request.

SPS is certified in accordance with ISO 9001:2008 and is subject to quality monitoring and auditing by BVQI (Bureau Veritas). In addition, parts of our production process are audited by UL (Underwriters Laboratories).

Norms and standards

- DIN ISO 9001:2008
- DIN VEN 50525
- Underwriters Laboratories (UL)
- Canadian Standards Association (CSA)
- Rohs
- CE



+49 (0) 63 33/60 29-0



+49 (0) 63 33/60 29-29



www.sps-standard.com



info@sp-standard.com



TECHNICAL DATA ISOFLEXX®

| Product group | ISOFLEXX® Classic | ISOFLEXX® Premium | ISOFLEXX® Supreme |
|----------------------------|---|---|---|
| Conductor | | | |
| Material | E-Cu bare E-Cu tinned | E-Cu bare E-Cu tinned | E-Cu bare E-Cu tinned |
| Lamella thickness | 0.5 mm with width 13 mm 0,8 mm with width 9 mm/ 16 mm 1 mm from width 20 mm | 1 mm | 0.5 mm with width 13 mm 0,8 mm with width 9 mm/ 16 mm 1 mm from width 20 mm |
| Structural strength | 180-220 MPa (F20) | 180-220 MPa (F20) | 180-220 MPa (F20) |
| Electr. Conductivity | 57 S x m/mm ² | 57 S x m/mm ² | 57 S x m/mm ² |
| Insulation | | | |
| Material | High-grade special PVC blend Plasticizer, non-migrating. Compatible with construction materials like polycarbonate, polymethylmethacrylate etc. | High-grade silicon, halogen-free Homogeneous, extruded profile | High-grade Santoprene, halogen-free Homogeneous, extruded profile |
| Flammability | UL 94 V0 | UL 94 V0 | UL 94 HB |
| Color | Black, brown, blue, yellow/green Other colors on request | Gray, brown Other colors on request | Black Other colors on request |
| Thickness | ≥ 1 mm | ≥ 2 mm | ≥ 1 mm |
| Dielectric strength | 20 kV/mm | 16 kV/mm | 30 kV/mm |
| Expansion | 370% | 180% | 540% |
| Operating temperature | -30°C / +105°C | -40°C / +190°C | -40°C / +135°C |
| Operating voltage | 1000 VAC/ 1500 VDC (UL 600 VAC/ 750 VDC) | 1000 VAC/ 1500 VDC (UL 600 VAC/ 750 VDC) | 1000 VAC/ 1500 VDC |
| Dimensions | | | |
| Length | 2000 mm (Standard) other lengths on request | 2000 mm (Standard) other lengths on request | 2000 mm (Standard) other lengths on request |
| Width | 9-120 mm other widths on request | 20-120 mm other widths on request | 9-50 mm other widths on request |
| Norms and standards | | | |
| | DIN EN ISO 9001:2008 DIN EN 50525 Underwriters Laboratories (UL) Canadian Standards Association (CSA) Rohs CE | DIN EN ISO 9001:2008 DIN EN 50525 Rohs CE | DIN EN ISO 9001:2008 DIN EN 50525 Rohs CE |





TECHNICAL DATA ISOFLEXX®

ISOFLEXX® bar screw connections

The following standards should be observed:

- DIN 43671 and 43670: Busbars with rectangular cross-section
- DIN 43673: Busbars - drilling and crew connection

Creating busbar connections:

It is generally advisable to tighten non-rusting screws with a torque wrench.

In addition, sprung elements should be used that can maintain the required contact pressure. The tension discs maintain the tension force within a defined range and are therefore also recommended for the fixing of screws.

Sufficient tension force prevents the screws from loosening by themselves. This facilitates maintenance of busbar connections. In fact, no maintenance may be necessary at all.

In the case of vibrations etc., micro-encapsulated screws or other screw fixing devices should be used.

With DC and AC current up to 6300 A, connecting material (bolts, nuts) of strength class 8.8 or higher (DIN 267T3) can be used in indoor areas.

Treatment of contact surfaces:

The surfaces should be even but not polished. The contact resistance is lower if the contact surfaces have medium coarseness (RA 1.6-3.2) as this makes it easier to pass through the oxides. However, the contact surfaces should be free of oxidation and grease. If this is not the case, you must clean the contact surfaces.



Boreholes DIN 43673

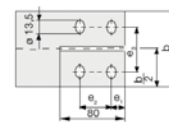
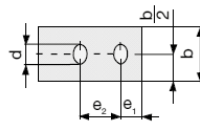
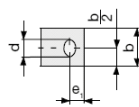
Bar widths

12 to 50

25 to 60

80 to 120

Drilling of bar ends
(drilling profile)



Drilling measurements

| Nom.width b | d | e ₁ | d | e ₁ | e ₂ | e ₁ | e ₂ | e ₃ |
|-------------|------|----------------|------|----------------|----------------|----------------|----------------|----------------|
| 12 | 5,5 | 6 | | | | | | |
| 15 | 6,6 | 7,5 | | | | | | |
| 20 | 9 | 10 | | | | | | |
| 25 | 11 | 12,5 | 11 | 12,5 | 30 | | | |
| 30 | 11 | 15 | 11 | 15 | 30 | | | |
| 40 | 13,5 | 20 | 13,5 | 20 | 40 | | | |
| 50 | 13,5 | 25 | 13,5 | 20 | 40 | | | |
| 60 | | | 13,5 | 20 | 40 | | | |
| 80 | | | 3 | | | 20 | 40 | 40 |
| 100 | | | | | | 20 | 40 | 60 |
| 120 | | | | | | 20 | 40 | 60 |

All dimensions in mm



+49 (0) 63 33/60 29-0



+49 (0) 63 33/60 29-29



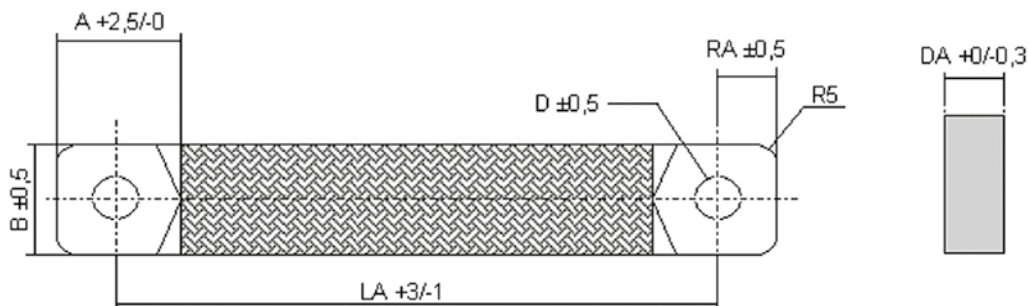
www.sps-standard.com



info@sp-standard.com



TECHNICAL DATA ULTRAFLEXX®



| Type | Cross-section [mm ²] | Connection | | | Borehole [mm] | Spacing [mm] | Length hole/ hole [mm] | Weight per meter [kg/m] | Nominal current ² | |
|------------------------------------|-------------------------------------|---------------|--------------------|----------------|------------------|-----------------|---------------------------|----------------------------|------------------------------|--------------|
| | | Width [mm] | Thick-ness [mm] | Length [mm] | | | | | Indiv. | two parallel |
| | | B | DA | A | D | RA | LA | | [A] | [A] |
| UFL 25 - LA - D - RA ¹ | 25 | 20 | 1,5 | 35 | 8,5 / 10,5 | 9 | 150 - 1000 | 0,25 | 160 | 270 |
| UFL 50 - LA - D - RA ¹ | 50 | 20 | 4 | 35 | 8,5 / 10,5 | 9 | 150 - 1000 | 0,51 | 270 | 460 |
| UFL 100 - LA - D - RA ¹ | 100 | 20 | 6 | 35 | 8,5 / 10,5 | 9 | 150 - 1000 | 1,02 | 425 | 730 |
| UFL 120 - LA - D - RA ¹ | 120 | 32 | 4,5 | 35 | 10,5 / 12,5 | 12 | 150 - 1000 | 1,22 | 470 | 810 |
| UFL 240 - LA - D - RA ¹ | 240 | 32 | 9 | 35 | 10,5 / 12,5 | 12 | 150 - 1000 | 2,44 | 745 | 1280 |

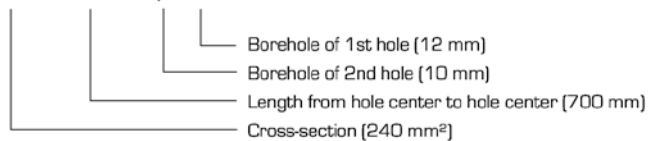
¹Specify Length (LA), Borehole (D) and Spacing (RA)

²Nominal current at 35°C ambient temperature and 85°C conductor temperature

The conductor temperature varies accordingly with higher or lower ambient temperature; max. operating temperature: 105°C

Deviating current loads can be converted using the factors listed in DIN 43671.

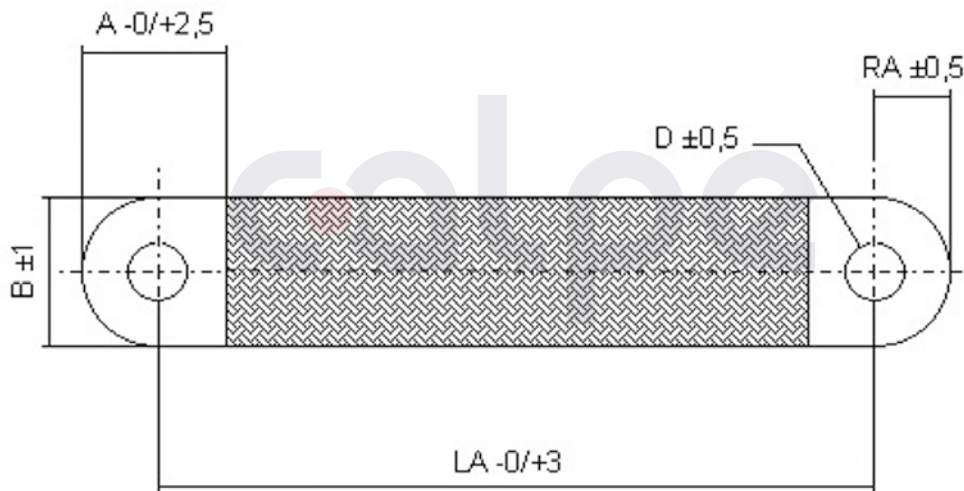
Ultraflexx® nomenclature: UFL 240 - 700 - 10/12



TECHNICAL DATA GROUNDING BRAIDS

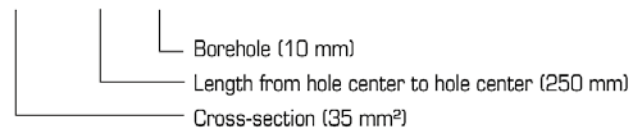
| Type | Cross-section [mm ²] | Width B ± 1 mm [mm] | Length A hole/ hole [mm] | Spacing RA | Mass [kg/m] | Borehole [mm] |
|---------------|-------------------------------------|------------------------|-----------------------------|------------|----------------|------------------|
| MBS 6-XXX-6 | 6 | 12 | 16 | 7,5 | 0,062 | 6,5 |
| MBS 10-XXX-6 | 10 | 12 | 16 | 7,5 | 0,104 | 6,5 |
| MBS 16-XXX-6 | 16 | 15 | 16 | 11,5 | 0,164 | 6,5 |
| MBS 16-XXX-8 | 16 | 15 | 16 | 11,5 | 0,164 | 8,5 |
| MBS 25-XXX-10 | 25 | tinned 23 / bare 21 | 21 | 11,5 | 0,262 | 10,5 |
| MBS 30-XXX-10 | 30 | 23 | 21 | 11,5 | 0,314 | 10,5 |
| MBS 35-XXX-10 | 35 | 23 ¹ | 22 | 11,5 | 0,366 | 10,5 |
| MBS 50-XXX-10 | 50 | 28 | 24 | 11,5 | 0,528 | 10,5 |
| MBS 50-XXX-12 | 50 | 28 | 24 | 11,5 | 0,528 | 12,5 |

¹ For 35 mm² the tolerance is ± 2 mm.



Grounding braid nomenclature:

MBS - 35 - 250 - 10





TECHNICAL DATA COPPAL®

Continuous ampacity

| Dimensions [mm] | Cross-section [mm²] | Resistance (DC, 20°C) [μΩ/m] | Continuous ampacity [A] (Bar temperature 65°C, ambient temperature 35°C) | | | |
|--------------------|------------------------|------------------------------------|---|------|-----------------------|------|
| | | | AC (50 Hz / 60 Hz) | | DC (and 16 2/3 Hz) | |
| | | | [Bar temperature 85°C, ambient temperature 35°C] | | DC (and 16 2/3 Hz) | |
| 20 x 5 | 100 | 265 | 235 | 235 | 311 | 311 |
| 30 x 5 | 150 | 177 | 328 | 329 | 435 | 436 |
| 20 x 10 | 200 | 138 | 363 | 365 | 481 | 484 |
| 40 x 5 | 200 | 133 | 418 | 420 | 554 | 557 |
| 30 x 10 | 300 | 88 | 493 | 497 | 653 | 659 |
| 50 x 5 | 250 | 105 | 508 | 511 | 673 | 677 |
| 60 x 5 | 300 | 88 | 594 | 599 | 787 | 794 |
| 40 x 10 | 400 | 66 | 617 | 625 | 818 | 828 |
| 40 x 12 | 480 | 56 | 681 | 727 | 902 | 963 |
| 50 x 10 | 500 | 53 | 736 | 751 | 975 | 995 |
| 80 x 5 | 400 | 66 | 762 | 773 | 1010 | 1024 |
| 50 x 12 | 600 | 45 | 809 | 831 | 1072 | 1101 |
| 60 x 10 | 600 | 44 | 853 | 875 | 1130 | 1159 |
| 60 x 12 | 720 | 37 | 934 | 967 | 1238 | 1281 |
| 80 x 10 | 800 | 33 | 1074 | 1119 | 1423 | 1483 |
| 100 x 10 | 1000 | 27 | 1287 | 1358 | 1705 | 1799 |
| 100 x 12 | 1200 | 22 | 1399 | 1496 | 1854 | 1982 |
| 120 x 10 | 1200 | 22 | 1488 | 1589 | 1972 | 2105 |
| 120 x 12 | 1440 | 19 | 1617 | 1755 | 2143 | 2325 |

Continuous ampacity using more than one parallel bar

| Dimensions [mm] | Continuous ampacity [A] (Bar temperature 65°C, ambient temperature 35°C) | | | | | |
|--------------------|---|------|-------|------|-------|------|
| | n = 2 | | n = 3 | | n = 4 | |
| | AC | DC | AC | DC | AC | DC |
| 20 x 5 | 441 | 443 | 646 | 650 | 848 | 858 |
| 30 x 5 | 603 | 607 | 872 | 885 | 1134 | 1162 |
| 20 x 10 | 699 | 709 | 1027 | 1052 | 1340 | 1396 |
| 40 x 5 | 756 | 766 | 1084 | 1110 | 1395 | 1453 |
| 30 x 10 | 923 | 949 | 1331 | 1401 | 1703 | 1853 |
| 50 x 5 | 905 | 1285 | 1334 | 1285 | 1637 | 1743 |
| 60 x 5 | 1047 | 1077 | 1471 | 1550 | 1856 | 2022 |
| 40 x 10 | 1126 | 1176 | 1586 | 1725 | 1996 | 2273 |
| 40 x 12 | 1243 | 1316 | 1737 | 1938 | 2176 | 2559 |
| 50 x 10 | 1314 | 1396 | 1810 | 2038 | 2252 | 2680 |
| 80 x 5 | 1320 | 1376 | 1809 | 1971 | 2248 | 2565 |
| 50 x 12 | 1440 | 1559 | 1966 | 2284 | 2440 | 3009 |
| 60 x 10 | 1492 | 1612 | 2012 | 2344 | 2488 | 3075 |
| 60 x 12 | 1625 | 1796 | 2173 | 2621 | 2690 | 3445 |
| 80 x 10 | 1825 | 2033 | 2378 | 2939 | 2930 | 3843 |
| 100 x 10 | 2141 | 2443 | 2718 | 3518 | 3338 | 4589 |
| 100 x 12 | 2301 | 2709 | 2913 | 3912 | 3581 | 5111 |

Values for vertical orientation of the bar package with clear bar spacings equal to the bar thickness; clear main conductor spacing > 0.8 x main conductor center spacing.



+49 (0) 63 33/60 29-0
+49 (0) 63 33/60 29-29

www.sps-standard.com
info@sp-standard.com



COMPARISON TABLE

Comparison table for copper - CoppAl® - aluminum busbars

| Dimensions mm | Width mm | Cross-section mm ² | Continuous ampacity (A) for busbars in indoor installations at 35°C air temperature and 65°C bar temperature based on DIN 43670 and DIN 43671 | | |
|------------------|-------------|----------------------------------|---|---------|----------------|
| | | | Copper Cu-ETP | CoppAl® | Aluminum Al-EL |
| 12 x 5 | 12 | 60 | 180 | - | 144 |
| 15 x 5 | 15 | 75 | 215 | - | 170 |
| 20 x 5 | 20 | 100 | 274 | 237 | 214 |
| 25 x 5 | 25 | 125 | 327 | - | 255 |
| 30 x 5 | 30 | 150 | 379 | 327 | 295 |
| 40 x 5 | 40 | 200 | 482 | 416 | 376 |
| 50 x 5 | 50 | 250 | 583 | 504 | 455 |
| 60 x 5 | 60 | 300 | 688 | 592 | 533 |
| 80 x 5 | 80 | 400 | 885 | 763 | 688 |
| 100 x 5 | 100 | 500 | 1080 | 935 | 846 |
| 12 x 10 | 12 | 120 | 294 | 249 | 222 |
| 20 x 10 | 20 | 200 | 427 | 367 | 331 |
| 30 x 10 | 30 | 300 | 573 | 494 | 445 |
| 40 x 10 | 40 | 400 | 715 | 617 | 557 |
| 50 x 10 | 50 | 500 | 852 | 737 | 667 |
| 60 x 10 | 60 | 600 | 985 | 854 | 774 |
| 80 x 10 | 80 | 800 | 1240 | 1081 | 983 |
| 100 x 10 | 100 | 1000 | 1490 | 1304 | 1190 |
| 120 x 10 | 120 | 1200 | 1740 | 1523 | 1390 |
| 140 x 10 | 140 | 1400 | 1980 | 1738 | 1590 |
| 160 x 10 | 160 | 1600 | 2220 | 1947 | 1780 |
| 200 x 10 | 200 | 2000 | 2690 | 2361 | 2160 |
| 40 x 12 | 40 | 480 | 800 | 690 | 625 |
| 50 x 12 | 50 | 600 | 955 | 825 | 745 |
| 60 x 12 | 60 | 720 | 1105 | 955 | 865 |
| 100 x 12 | 100 | 1200 | 1670 | 1460 | 1335 |
| 120 x 12 | 120 | 1440 | 1950 | 1705 | 1555 |
| 140 x 12 | 140 | 1680 | 2220 | 1945 | 1780 |
| 160 x 12 | 160 | 1920 | 2485 | 2180 | 1995 |
| 200 x 12 | 200 | 2400 | 3015 | 2645 | 2420 |

Data on bending

| Bending Thickness [mm] | Height [mm] | Bending angle | | |
|---------------------------|-------------|---------------|------------|--------|
| | | ≤ 90° | 90° - 120° | > 120° |
| 5 | 20 - 60 | 1d | 2d | 4d |
| 10 | 20 - 120 | 2d | 3d | 4d |
| 12 | 40 - 120 | 2d | 3d | 4d |

CoppAl® bars should not be bent over a sharp edge.



+49 (0) 63 33/60 29-0



+49 (0) 63 33/60 29-29



www.sps-standard.com



info@sps-standard.com



TECHNICAL DATA

Continuous ampacity DIN 43670 und DIN 43671

To calculate the continuous ampacity under changed conditions, multiply the relevant value in

the table by the factors k_2 , k_3 , k_4 or k_6 listed below.

Factor k_2 (change in ambient and bar temperature)

| Bar temperature | Ambient temperature | | |
|-----------------|---------------------|------|------|
| | 25°C | 35°C | 45°C |
| 55°C | 1,04 | 0,80 | 0,54 |
| 65°C | 1,19 | 1,00 | 0,77 |
| 75°C | 1,34 | 1,17 | 0,98 |
| 85°C | 1,47 | 1,33 | 1,16 |
| 95°C | 1,60 | 1,45 | 1,30 |
| 105°C | 1,71 | 1,57 | 1,43 |

See DIN 43670 for other temperature values.

Factor k_3 (horizontal orientation of the bar width)

| No. of bars | Bar width [mm] | Factor k_3 |
|-------------|----------------|--------------|
| 1 | - | 1,00 |
| 2 | bis 80 | 0,85 |
| 3 | bis 80 | 0,80 |
| 3 | über 80 | 0,75 |
| 4 | über 80 | 0,70 |

Factor k_4 (change in geographic location)

| Hight above sea level [m] | Factor k_4 |
|---------------------------|--------------|
| 1000 | 0,71 |
| 2000 | 0,58 |
| 3000 | 0,41 |
| 4000 | 0,29 |

Factor k_6 (for frequencies greater than 60 Hz)

| Frequency [Hz] | Factor k_6 |
|----------------|--------------|
| 100 | 0,71 |
| 150 | 0,58 |
| 300 | 0,41 |
| 600 | 0,29 |
| 1.200 | 0,20 |

Values for bar internal mounting.



+49 (0) 63 33/60 29-0

+49 (0) 63 33/60 29-29



www.sps-standard.com

info@sps-standard.com



PRODUCT CATALOGS



- **SPS RAILWAY GROUNDING SYSTEMS**
- **VISION ELECTRIC VISION BAR BUS BAR SYSTEMS**
- **EMS THE FLEXIBLE COMPANY**
- **VISION ELECTRIC POWER CONNECTIONS**
- **VISION ELECTRIC VISION RAIL BUS BAR SYSTEMS**



+49 (0) 63 33/60 29-0



+49 (0) 63 33/60 29-29



www.sps-standard.com



info@sp-standard.com

LOCATION



SPS Standard Produkte Schwanenmühle GmbH
 66851 Schwanenmühle
 Phone: +49 (0) 63 33/60 29-0
 Fax: +49 (0) 63 33/60 29-29

E-Mail: info@sps-standard.com
www.sps-standard.com



SPS STANDARD PRODUCTE SCHWANENMÜHLE

Dear User,

we constantly strive to further improve our products and services -
and we are always grateful for your ideas and suggestions.

We are also on the look-out for interesting photos of our products as
used in your applications, and there are prizes for the 12 best photos
of the year. Please send your photos in print quality to:

info@sps-standard.com



General information:

The dimensions and technical details listed in this catalogue have been compiled with the greatest possible care, and the illustrations are up-to-date at the time of printing. We expressly reserve the right to make technical modifications and to change dimensions, colors and designs. Only the details listed in our order confirmations are binding. The use of photos, drawings and catalogue excerpts for marketing and advertising or for other purposes is subject to our express written consent.

This catalogue replaces all previous catalogues.

