



# Industrial Cables

Power cables for  
**industrial**  
installations

An aerial photograph of an industrial facility, likely a power plant or refinery, captured at dusk. Two tall, dark smokestacks rise from the complex, with the one on the left being more prominent. The facility itself is a mix of large, light-colored buildings and intricate piping structures, many of which are illuminated with warm yellow lights. In the foreground, there are more industrial buildings and some greenery. The sky is a deep blue with scattered clouds, and a soft pinkish glow is visible on the left side, suggesting the setting or rising sun. A large, white, rounded hexagon is superimposed over the center of the image, framing the text.

Driving  
your  
energy

**Top Cable**



E<sub>ca</sub>

## APPLICATION

Powerflex® RV-K cable is suitable for all types of low voltage industrial-type connections, in urban grids, building installations, etc. Its high flexibility makes the installation process substantially easier and, as a result, is particularly suitable for use in difficult layouts. It can be buried or installed in a tube as well as outdoors without requiring additional protection. This cable can withstand damp conditions including total immersion in water (AD7).

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Cross-linked polyethylene insulation type DIX-3 according to HD 603-1 and type XLPE according to IEC 60502-1.

The standard identification of insulated conductors according to HD 308 and UNE-21089-1, is the following:

|           |                                                     |
|-----------|-----------------------------------------------------|
| 1 x       | Natural                                             |
| 2 x       | Blue + Brown                                        |
| 3 G       | Blue + Brown + Green/Yellow                         |
| 3 x       | Brown + Black + Grey                                |
| 3 x + 1 x | Brown + Black + Grey + Blue (reduced cross-section) |
| 4 G       | Brown + Black + Grey + Green/Yellow                 |
| 4 x       | Brown + Black + Grey + Blue                         |
| 5 G       | Brown + Black + Grey + Blue + Green/Yellow          |
| 6 or more | Black numbered + Green/Yellow                       |

### Outer sheath

Flexible PVC outer sheath, type DMV-18 according to HD 603-1 and type ST2 according to IEC 60502-1. Black colour.

## STANDARDS / COMPLIANCE



**According to**  
IEC 60502-1 / UNE 21123-2



**Standards and approvals**  
AENOR / BUREAU VERITAS / KEMA-KEUR / RoHS / CE



**CPR (Construction Products Regulation)**  
E<sub>ca</sub>



## CHARACTERISTICS



**Electrical performance**  
Low voltage: 0,6/1 kV.



**Thermal performance**  
Maximum service temperature: 90°C.  
Maximum short-circuit temperature: 250°C (max. 5 s).  
Minimum service temperature: -40°C (fixed and protected installations).  
Minimum installation and handling temperature: 0°C (on cable surface).



**Fire performance**  
Flame non-propagation according to EN 60332-1/IEC 60332-1.  
Reaction to fire CPR: E<sub>ca</sub> according to EN 50575.  
Reduced halogen emission. Chlorine <15%.



**Mechanical performance**  
Minimum bending radius: 5x cable diameter.  
Impact resistance: AG2 Medium severity.

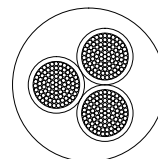
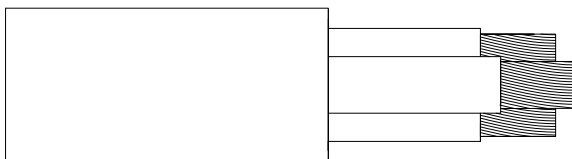


**Environmental performance**  
Chemical & Oil resistance: Good.  
UV Resistant according to UNE 211605.  
Water resistance: AD7 immersion.



**Installation conditions**  
Open Air.  
Buried.  
In conduit.  
In tray.

## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section<br>(mm²) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Buried<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|------------------------|------------------|-------------------|------------------------------|----------------------------|-----------------------------------------|
| 1 x 1,5                | 5,7              | 45                | 28                           | 27                         | 33,9                                    |
| 1 x 2,5                | 6,2              | 55                | 39                           | 35                         | 20,3                                    |
| 1 x 4                  | 6,7              | 70                | 53                           | 46                         | 12,6                                    |
| 1 x 6                  | 7,3              | 90                | 68                           | 58                         | 8,41                                    |
| 1 x 10                 | 8,2              | 135               | 93                           | 77                         | 4,87                                    |
| 1 x 16                 | 9,2              | 190               | 124                          | 100                        | 3,08                                    |
| 1 x 25                 | 11,0             | 285               | 161                          | 129                        | 1,98                                    |
| 1 x 35                 | 12,1             | 385               | 200                          | 155                        | 1,41                                    |
| 1 x 50                 | 13,8             | 520               | 242                          | 183                        | 0,984                                   |
| 1 x 70                 | 15,7             | 715               | 310                          | 225                        | 0,693                                   |
| 1 x 95                 | 17,6             | 925               | 377                          | 270                        | 0,525                                   |
| 1 x 120                | 19,2             | 1.165             | 437                          | 306                        | 0,410                                   |
| 1 x 150                | 21,5             | 1.450             | 504                          | 343                        | 0,328                                   |
| 1 x 185                | 23,9             | 1.750             | 575                          | 387                        | 0,270                                   |
| 1 x 240                | 26,9             | 2.280             | 679                          | 448                        | 0,204                                   |
| 1 x 300                | 29,6             | 2.830             | 783                          | 502                        | 0,163                                   |
| 1 x 400                | 33,8             | 3.735             | 930                          | 592                        | 0,123                                   |
| 1 x 500                | 37,4             | 4.780             | 1.070                        | 670                        | 0,097                                   |
| 1 x 630                | 42,7             | 6.280             | 1.232                        | 762                        | 0,073                                   |
| 1 x 800                | 51,5             | 8.235             | 1.426                        | 870                        | 0,056                                   |
| 1 x 1000               | 59,9             | 10.410            | 1.640                        | 988                        | 0,044                                   |
| 2 x 1,5                | 8,2              | 90                | 26                           | 27                         | 33,9                                    |
| 2 x 2,5                | 9,2              | 120               | 36                           | 35                         | 20,3                                    |
| 2 x 4                  | 10,3             | 165               | 49                           | 46                         | 12,6                                    |
| 2 x 6                  | 11,3             | 215               | 63                           | 58                         | 8,41                                    |
| 2 x 10                 | 13,2             | 320               | 86                           | 77                         | 4,87                                    |
| 2 x 16                 | 14,9             | 450               | 115                          | 100                        | 3,08                                    |
| 2 x 25                 | 20,8             | 810               | 149                          | 129                        | 1,98                                    |
| 2 x 35                 | 22,0             | 1.000             | 185                          | 155                        | 1,41                                    |
| 2 x 50                 | 25,7             | 1.375             | 225                          | 183                        | 0,984                                   |
| 2 x 70                 | 29,5             | 1.880             | 289                          | 225                        | 0,693                                   |
| 2 x 95                 | 33,0             | 2.430             | 352                          | 270                        | 0,525                                   |
| 3 G 1,5                | 8,9              | 110               | 26                           | 27                         | 33,9                                    |
| 3 G 2,5                | 9,8              | 145               | 36                           | 35                         | 20,3                                    |
| 3 G 4                  | 11,0             | 200               | 49                           | 46                         | 12,6                                    |
| 3 G 6                  | 12,1             | 265               | 63                           | 58                         | 8,41                                    |
| 3 G 10                 | 14,3             | 405               | 86                           | 77                         | 4,87                                    |
| 3 x 16                 | 16,4             | 595               | 115                          | 100                        | 3,08                                    |
| 3 x 25                 | 20,7             | 955               | 149                          | 129                        | 1,98                                    |
| 3 x 35                 | 23,1             | 1.275             | 185                          | 155                        | 1,41                                    |
| 3 x 50                 | 26,8             | 1.750             | 225                          | 183                        | 0,984                                   |
| 3 x 70                 | 29,6             | 2.370             | 289                          | 225                        | 0,693                                   |
| 3 x 95                 | 35,0             | 3.140             | 352                          | 270                        | 0,525                                   |
| 3 x 120                | 39,8             | 4.115             | 410                          | 306                        | 0,41                                    |
| 3 x 150                | 44,7             | 5.130             | 473                          | 343                        | 0,328                                   |
| 3 x 185                | 49,9             | 6.285             | 542                          | 387                        | 0,270                                   |
| 3 x 240                | 54,1             | 7.875             | 641                          | 448                        | 0,204                                   |

| Cross-section<br>(mm²) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Buried<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|------------------------|------------------|-------------------|------------------------------|----------------------------|-----------------------------------------|
| 3 x 300                | 62,3             | 10.100            | 741                          | 502                        | 0,163                                   |
| 3x16+1x10              | 17,6             | 700               | 115                          | 100                        | 3,08                                    |
| 3x25+1x16              | 22,7             | 1.140             | 149                          | 129                        | 1,98                                    |
| 3x35+1x16              | 25,0             | 1.480             | 185                          | 155                        | 1,41                                    |
| 3x50+1x25              | 29,1             | 2.050             | 225                          | 183                        | 0,984                                   |
| 3x70+1x35              | 33,8             | 2.850             | 289                          | 225                        | 0,693                                   |
| 3x95+1x50              | 38,2             | 3.700             | 352                          | 270                        | 0,525                                   |
| 3x120+1x70             | 42,1             | 4.750             | 410                          | 306                        | 0,410                                   |
| 3x150+1x70             | 46,8             | 5.800             | 473                          | 343                        | 0,328                                   |
| 3x185+1x95             | 53,5             | 7.200             | 542                          | 387                        | 0,270                                   |
| 3x240+1x120            | 58,5             | 9.100             | 641                          | 448                        | 0,204                                   |
| 4 G 1,5                | 9,7              | 130               | 26                           | 27                         | 33,9                                    |
| 4 G 2,5                | 10,7             | 175               | 36                           | 35                         | 20,3                                    |
| 4 G 4                  | 12,0             | 245               | 49                           | 46                         | 12,6                                    |
| 4 G 6                  | 13,4             | 330               | 63                           | 58                         | 8,41                                    |
| 4 G 10                 | 15,7             | 505               | 86                           | 77                         | 4,87                                    |
| 4 x 16                 | 18,2             | 750               | 115                          | 100                        | 3,08                                    |
| 4 x 25                 | 24,1             | 1.245             | 149                          | 129                        | 1,98                                    |
| 4 x 35                 | 26,3             | 1.675             | 185                          | 155                        | 1,41                                    |
| 4 x 50                 | 31,3             | 2.315             | 225                          | 183                        | 0,984                                   |
| 4 x 70                 | 36,1             | 3.205             | 289                          | 225                        | 0,693                                   |
| 4 x 95                 | 40,2             | 4.130             | 352                          | 270                        | 0,525                                   |
| 4 x 120                | 44,6             | 5.245             | 410                          | 306                        | 0,410                                   |
| 4 x 150                | 49,8             | 6.575             | 473                          | 343                        | 0,328                                   |
| 4 x 185                | 56,1             | 8.050             | 542                          | 387                        | 0,270                                   |
| 4 x 240                | 64,5             | 10.695            | 641                          | 448                        | 0,204                                   |
| 5 G 1,5                | 10,4             | 155               | 26                           | 27                         | 33,9                                    |
| 5 G 2,5                | 11,6             | 215               | 36                           | 35                         | 20,3                                    |
| 5 G 4                  | 13,2             | 300               | 49                           | 46                         | 12,6                                    |
| 5 G 6                  | 14,7             | 405               | 63                           | 58                         | 8,41                                    |
| 5 G 10                 | 17,1             | 625               | 86                           | 77                         | 4,87                                    |
| 5 G 16                 | 20,2             | 935               | 115                          | 100                        | 3,08                                    |
| 5 G 25                 | 26,6             | 1.555             | 149                          | 129                        | 1,98                                    |
| 5 G 35                 | 29,3             | 2.080             | 185                          | 155                        | 1,41                                    |
| 5 G 50                 | 34,5             | 2.895             | 225                          | 183                        | 0,984                                   |
| 5 G 70                 | 38,7             | 3.930             | 289                          | 225                        | 0,693                                   |
| 5 G 95                 | 44,6             | 5.190             | 352                          | 270                        | 0,525                                   |
| 5 G 120                | 49,7             | 6.560             | 410                          | 306                        | 0,410                                   |
| 5 G 150                | 55,6             | 8.145             | 473                          | 343                        | 0,328                                   |
| 5 G 185                | 62,5             | 9.975             | 542                          | 387                        | 0,270                                   |
| 5 G 240                | 71,8             | 13.210            | 641                          | 448                        | 0,204                                   |
| 7 G 1,5                | 11,2             | 190               | 26                           | 27                         | 33,9                                    |
| 7 G 2,5                | 12,4             | 265               | 36                           | 35                         | 20,3                                    |
| 10 G 1,5               | 13,2             | 260               | 26                           | 27                         | 33,9                                    |
| 10 G 2,5               | 16,3             | 380               | 36                           | 35                         | 20,3                                    |
| 12 G 1,5               | 14,2             | 295               | 26                           | 27                         | 33,9                                    |
| 12 G 2,5               | 15,7             | 420               | 36                           | 35                         | 20,3                                    |
| 14 G 1,5               | 14,9             | 315               | 26                           | 27                         | 33,9                                    |
| 24 G 1,5               | 20,4             | 550               | 26                           | 27                         | 33,9                                    |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K-m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and  $\cos\phi=1$ .

In all cases it is supposed a single-phase circuit.

### SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| A/mm <sup>2</sup> | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

### CORRECTION FACTORS FOR AIR TEMPERATURE

| Air T. (°C) | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
|-------------|------|------|----|------|------|------|------|------|------|
| Factor      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

### CORRECTION FACTORS FOR GROUND TEMPERATURE

| Ground T. (°C) | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45   | 50   |
|----------------|------|------|----|------|------|------|------|------|------|
| Factor         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,80 | 0,76 |

### CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

| Moisture degree of soil | Very damp | Slightly damp | Slightly dry | Dry | Very dry |
|-------------------------|-----------|---------------|--------------|-----|----------|
| Thermal Resist. (K·m/W) | 1         | 1,5           | 2            | 2,5 | 3        |
| Factor                  | 1,50      | 1,28          | 1,12         | 1   | 0,90     |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.



Cca

## TOEPASSING

Powerflex® Plus YMvKf cable is suitable for all types of industrial low voltage connections, urban grids, building installations, etc. This cable is fire retardant and is recommended for use in public places and hazardous industries. Its flexibility makes installation substantially easier, making it highly suitable for difficult layouts. This cable can also be used in buried installations or in tubes or outdoors without requiring additional protection. This cable withstands damp conditions and even total submersion in water (AD7).

## CONSTRUCTIE

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Cross-linked polyethylene insulation, type XLPE according to IEC 60502-1 and HD 604. The standard identification of insulated conductors, according to HD 308 is the following:

|     |                                            |
|-----|--------------------------------------------|
| 1 x | Black                                      |
| 2 x | Blue + Brown                               |
| 3 x | Blue + Brown + Grey                        |
| 4 G | Brown + Black + Grey + Green/Yellow        |
| 5 G | Brown + Black + Grey + Blue + Green/Yellow |

### Buitenmantel

Flexible PVC/ST2 outer sheath, according to IEC 60502-1 and HD 604. Grey colour.

## KENMERKEN



### Elektrische prestaties

Low voltage 0,6/1kV.



### Thermal performance

Maximum service temperature: 90°C.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and prot. installations)



### Brandgedrag

Flame non-propagation according to EN 60332-1 and IEC 60332-1.

Fire non-propagation according to EN 60332-3-24/IEC 60332-3-24.

Reaction to fire CPR: C<sub>ca</sub>-s2,d2,a3 according to 50575.

Reduced halogen emission. Chlorine <15%.



### Mechanische prestaties

Minimum bending radius: x5 cable diameter.

Impact resistance: AG2 Medium severity.



### Omgevings prestaties

Chemical & Oil resistance: Acceptable..

UV Resistant according to UNE 211605.

Water resistance AD7 immersion.

## STANDARDS / COMPLIANCE



### According to

HD 604-4-D / IEC 60502-1



### Standards and approvals

AENOR / BUREAU VERITAS / KEMA-KEUR / RoHS / CE.

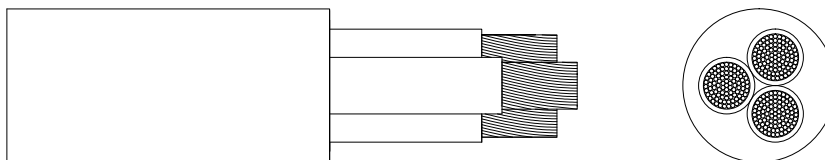


### CPR (Construction Products Regulation)

C<sub>ca</sub>-s2,d2,a3.



### DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br><sup>1</sup> | Buried<br><sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|--------------------------|------------------------|-----------------------------------------|
| 1 x 10                              | 8,2              | 145               | 93                       | 77                     | 4,87                                    |
| 1 x 16                              | 9,2              | 200               | 124                      | 100                    | 3,08                                    |
| 1 x 25                              | 10,9             | 295               | 161                      | 129                    | 1,98                                    |
| 1 x 35                              | 11,8             | 385               | 200                      | 155                    | 1,41                                    |
| 1 x 50                              | 13,6             | 525               | 242                      | 183                    | 0,984                                   |
| 1 x 70                              | 15,4             | 715               | 310                      | 225                    | 0,693                                   |
| 1 x 95                              | 17,5             | 925               | 377                      | 270                    | 0,525                                   |
| 1 x 120                             | 19,1             | 1.160             | 437                      | 306                    | 0,410                                   |
| 1 x 150                             | 21,3             | 1.440             | 504                      | 343                    | 0,328                                   |
| 1 x 185                             | 23,4             | 1.735             | 575                      | 387                    | 0,270                                   |
| 1 x 240                             | 26,2             | 2.260             | 679                      | 448                    | 0,204                                   |
| 1 x 300                             | 29,1             | 2.860             | 783                      | 502                    | 0,163                                   |
| 1 x 400                             | 33,8             | 3.765             | 940                      | 563                    | 0,123                                   |
| 1 x 500                             | 37,5             | 4.805             | 1.083                    | 637                    | 0,097                                   |
| 1 x 630                             | 43,7             | 6.340             | 1.254                    | 719                    | 0,073                                   |
| 2 x 10                              | 15,4             | 410               | 86                       | 77                     | 4,87                                    |
| 2 x 16                              | 17,1             | 555               | 115                      | 100                    | 3,08                                    |
| 2 x 25                              | 20,6             | 815               | 149                      | 129                    | 1,98                                    |
| 2 x 35                              | 22,9             | 1.070             | 185                      | 155                    | 1,41                                    |
| 3 G 10                              | 16,1             | 495               | 86                       | 77                     | 4,87                                    |
| 3 x 16                              | 18,1             | 690               | 115                      | 100                    | 3,08                                    |
| 3 x 25                              | 21,4             | 1.015             | 149                      | 129                    | 1,98                                    |
| 3 x 35                              | 23,8             | 1.340             | 185                      | 155                    | 1,41                                    |
| 3 x 50                              | 27,6             | 1.840             | 225                      | 183                    | 0,984                                   |
| 3 x 70                              | 30,3             | 2.460             | 289                      | 225                    | 0,693                                   |
| 3 x 95                              | 35,6             | 3.245             | 352                      | 270                    | 0,525                                   |
| 3 x 120                             | 39,8             | 4.105             | 410                      | 306                    | 0,410                                   |
| 3 x 150                             | 43,9             | 5.080             | 473                      | 343                    | 0,328                                   |
| 3 x 185                             | 48,6             | 6.160             | 542                      | 387                    | 0,270                                   |
| 3 x 240                             | 54,7             | 8.020             | 641                      | 448                    | 0,204                                   |
| 3 x 16 + 1 x 10                     | 19,1             | 795               | 115                      | 100                    | 3,08                                    |
| 3 x 25 + 1 x 16                     | 23,9             | 1.165             | 149                      | 129                    | 1,98                                    |
| 3 x 35 + 1 x 25                     | 25,3             | 1.580             | 185                      | 155                    | 1,41                                    |
| 3 x 50 + 1 x 25                     | 28,8             | 2.060             | 225                      | 183                    | 0,984                                   |
| 3 x 70 + 1 x 35                     | 32,9             | 2.810             | 289                      | 225                    | 0,693                                   |
| 3 x 95 + 1 x 50                     | 37,1             | 3.675             | 352                      | 270                    | 0,525                                   |
| 4 G 10                              | 17,5             | 660               | 86                       | 77                     | 4,87                                    |
| 4 G 16                              | 19,7             | 850               | 115                      | 100                    | 3,08                                    |
| 4 G 25                              | 23,2             | 1.250             | 149                      | 129                    | 1,98                                    |
| 4 G 35                              | 25,4             | 1.655             | 185                      | 155                    | 1,41                                    |

| Cross-section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br><sup>1</sup> | Buried<br><sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|--------------------------|------------------------|-----------------------------------------|
| 4 G 50                              | 30,8             | 2.310             | 225                      | 183                    | 0,984                                   |
| 4 G 70                              | 35,4             | 3.175             | 289                      | 225                    | 0,693                                   |
| 4 G 95                              | 39,2             | 4.095             | 352                      | 270                    | 0,525                                   |
| 4 G 120                             | 44,4             | 5.215             | 410                      | 306                    | 0,410                                   |
| 4 G 150                             | 48,7             | 6.460             | 473                      | 343                    | 0,328                                   |
| 4 G 185                             | 54,2             | 7.860             | 542                      | 387                    | 0,270                                   |
| 4 G 240                             | 61,5             | 10.265            | 641                      | 448                    | 0,204                                   |
| 4 x 35 + 1 G 25                     | 28,2             | 1.940             | 185                      | 155                    | 1,41                                    |
| 4 x 50 + 1 G 25                     | 32,6             | 2.575             | 225                      | 183                    | 0,984                                   |
| 4 x 70 + 1 G 35                     | 37,6             | 3.545             | 289                      | 225                    | 0,693                                   |
| 4 x 95 + 1 G 50                     | 42,2             | 4.620             | 352                      | 270                    | 0,525                                   |
| 5 G 10                              | 19,0             | 720               | 86                       | 77                     | 4,87                                    |
| 5 G 16                              | 21,6             | 1.030             | 115                      | 100                    | 3,08                                    |
| 5 G 25                              | 25,9             | 1.540             | 149                      | 129                    | 1,98                                    |
| 5 G 35                              | 28,3             | 2.035             | 185                      | 155                    | 1,41                                    |
| 5 G 50                              | 34,0             | 2.830             | 225                      | 183                    | 0,984                                   |
| 5 G 70                              | 38,6             | 3.880             | 289                      | 225                    | 0,693                                   |
| 5 G 95                              | 44,2             | 5.070             | 352                      | 270                    | 0,525                                   |
| 5 G 120                             | 48,7             | 6.395             | 410                      | 306                    | 0,410                                   |
| 5 G 150                             | 53,9             | 7.930             | 473                      | 343                    | 0,328                                   |
| 5 G 185                             | 60,5             | 9.660             | 542                      | 387                    | 0,270                                   |
| 5 G 240                             | 68,6             | 12.635            | 641                      | 448                    | 0,204                                   |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K·m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and cosφ=1.

For all cables is supposed a single-phase circuit.

### SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

|                         |     |     |     |     |     |     |     |     |    |
|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| <b>Time (s)</b>         | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
| <b>A/mm<sup>2</sup></b> | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

### CORRECTION FACTORS FOR AIR TEMPERATURE

|                    |      |      |    |      |      |      |      |      |      |
|--------------------|------|------|----|------|------|------|------|------|------|
| <b>Air T. (°C)</b> | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
| <b>Factor</b>      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

### CORRECTION FACTORS FOR GROUND TEMPERATURE

|                       |      |      |    |      |      |      |      |     |      |
|-----------------------|------|------|----|------|------|------|------|-----|------|
| <b>Ground T. (°C)</b> | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45  | 50   |
| <b>Factor</b>         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,8 | 0,76 |

### CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

|                                |           |               |              |     |          |
|--------------------------------|-----------|---------------|--------------|-----|----------|
| <b>Moisture degree of soil</b> | Very damp | Slightly damp | Slightly dry | Dry | Very dry |
| <b>Thermal Resist. (K·m/W)</b> | 1         | 1,5           | 2            | 2,5 | 3        |
| <b>Factor</b>                  | 1,50      | 1,28          | 1,12         | 1   | 0,90     |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.



**B2<sub>ca</sub>**  
**C<sub>ca</sub>**

## APPLICATION

Toxfree® ZH YMz1Kf is a LSHF safety cable. In the event of fire, it does not emit toxic gases, nor does it give off corrosive gases, avoiding any possible damage to people or electronic equipment. For these reasons it is highly recommended for use in public places such as: hospitals, schools, museums, airports, bus terminals, shopping centers, offices, laboratories, etc.

- Industrial use.
- Public places

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible), according to EN 60228 and IEC 60228.

### Insulation

Cross-linked polyethylene type XLPE according to IEC 60502-1 and type DIX-3 according to HD 603.

The standard identification of insulated conductors according to HD 308 is the following:

|           |                                                     |
|-----------|-----------------------------------------------------|
| 1 x       | Natural                                             |
| 2 x       | Blue + Brown                                        |
| 3 G       | Blue + Brown + Green/Yellow                         |
| 3 x       | Brown + Black + Grey                                |
| 3 x + 1 x | Brown + Black + Grey + Blue (reduced cross-section) |
| 4 G       | Brown + Black + Grey + Green/Yellow                 |
| 4 x       | Brown + Black + Grey + Blue                         |
| 5 G       | Brown + Black + Grey + Blue + Green/Yellow          |
| 6 or more | Black numbered + Green/Yellow                       |

### Outer sheath

Low Smoke Halogen Free (LSHF) polyolefin outer sheath. Grey colour.

## CHARACTERISTICS

### Electrical performance

Low voltage: 0,6/1 kV



### Thermal performance

Maximum service temperature: 90°C.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations)

Minimum installation and handling temperature: -0°C.



### Fire performance

Flame non-propagation according to IEC 60332-1 / EN 60332-1.

Fire non-propagation according to EN 60332-3 / IEC 60332-3 and EN 50399.

Reaction to fire CPR: B2<sub>ca</sub>-s1a,d1, a1 or C<sub>ca</sub>-s1a,d1,a1, according to EN 50575 (see cross-section).

Low Smoke Halogen Free according to EN 60754-1 / IEC 60754-1.

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 80%.

Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.



### Mechanical performance

Minimum bending radius: 5x cable diameter.

Impact resistance: AG2 Medium severity.



### Environmental performance

Chemical & Oil resistance: acceptable.

UV Resistant according to EN 50618.

Water resistance: AD5 Jets.



### Installation conditions

Open Air.

Buried.

In conduit.

## STANDARDS / COMPLIANCE



### According to

IEC 60502-1 / UNE 21123-4



### Standards and approvals

AENOR / KEMA-KEUR / RoHS / CE



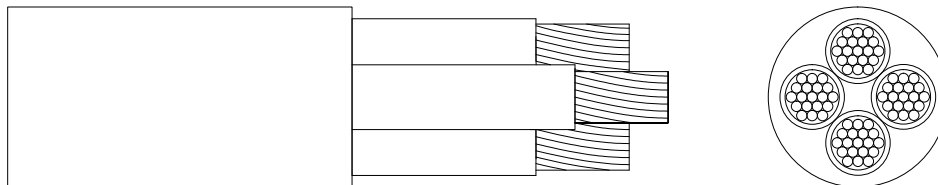
### CPR (Construction Products Regulation)

B2<sub>ca</sub>-s1a,d1,a1 (according to cross-section) or

C<sub>ca</sub>-s1a,d1,a1 (according to cross-section)



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Buried<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|------------------------------|----------------------------|-----------------------------------------|
| 1 x 2,5                             | 7,1              | 75                | 39                           | 35                         | 20,3                                    |
| 1 x 4                               | 7,6              | 95                | 53                           | 46                         | 12,6                                    |
| 1 x 6                               | 8,2              | 120               | 68                           | 58                         | 8,41                                    |
| 1 x 10                              | 9,1              | 165               | 93                           | 77                         | 4,87                                    |
| 1 x 16                              | 10,1             | 225               | 124                          | 100                        | 3,08                                    |
| 1 x 25                              | 11,3             | 305               | 161                          | 129                        | 1,98                                    |
| 1 x 35                              | 12,2             | 400               | 200                          | 155                        | 1,41                                    |
| 1 x 50                              | 13,9             | 535               | 242                          | 183                        | 0,984                                   |
| 1 x 70                              | 15,8             | 730               | 310                          | 225                        | 0,693                                   |
| 1 x 95                              | 17,6             | 945               | 377                          | 270                        | 0,525                                   |
| 1 x 120                             | 19,5             | 1.185             | 437                          | 306                        | 0,410                                   |
| 1 x 150                             | 21,7             | 1.470             | 504                          | 343                        | 0,328                                   |
| 1 x 185                             | 23,8             | 1.770             | 575                          | 387                        | 0,270                                   |
| 1 x 240                             | 26,7             | 2.310             | 679                          | 448                        | 0,204                                   |
| 1 x 300                             | 29,5             | 2.905             | 783                          | 502                        | 0,163                                   |
| 1 x 400                             | 34,2             | 3.825             | 930                          | 592                        | 0,123                                   |
| 1 x 500                             | 37,9             | 4.885             | 1.070                        | 670                        | 0,097                                   |
| 1 x 630                             | 43,1             | 6.410             | 1.232                        | 762                        | 0,073                                   |
| 2 x 1,5                             | 9,3              | 125               | 26                           | 27                         | 33,9                                    |
| 2 x 2,5                             | 9,8              | 145               | 36                           | 35                         | 20,3                                    |
| 2 x 4                               | 10,8             | 190               | 49                           | 46                         | 12,6                                    |
| 2 x 6                               | 11,8             | 245               | 63                           | 58                         | 8,41                                    |
| 2 x 10                              | 13,6             | 355               | 86                           | 77                         | 4,87                                    |
| 2 x 16                              | 15,3             | 495               | 115                          | 100                        | 3,08                                    |
| 3 G 1,5                             | 10,4             | 155               | 26                           | 27                         | 33,9                                    |
| 3 G 2,5                             | 10,9             | 190               | 36                           | 35                         | 20,3                                    |
| 3 G 4                               | 11,9             | 240               | 49                           | 46                         | 12,6                                    |
| 3 G 6                               | 13,0             | 310               | 63                           | 58                         | 8,41                                    |
| 3 G 10                              | 14,8             | 450               | 86                           | 77                         | 4,87                                    |
| 3 x 16                              | 16,8             | 645               | 115                          | 100                        | 3,08                                    |
| 3 x 25                              | 21,4             | 1.020             | 149                          | 129                        | 1,98                                    |
| 3 x 35                              | 23,8             | 1.345             | 185                          | 155                        | 1,41                                    |
| 3 x 50                              | 27,2             | 1.825             | 225                          | 183                        | 0,984                                   |
| 3 x 70                              | 30,3             | 2.470             | 289                          | 225                        | 0,693                                   |
| 3 x 95                              | 35,2             | 3.245             | 352                          | 270                        | 0,525                                   |
| 3 x 120                             | 39,1             | 4.095             | 410                          | 306                        | 0,410                                   |
| 3 x 150                             | 43,9             | 5.105             | 473                          | 343                        | 0,328                                   |
| 3 x 185                             | 48,6             | 6.195             | 542                          | 387                        | 0,270                                   |
| 3 x 16 + 1 x 10                     | 19,1             | 800               | 115                          | 100                        | 3,08                                    |
| 3 x 25 + 1 x 16                     | 22,5             | 1.165             | 149                          | 129                        | 1,98                                    |
| 3 x 35 + 1 x 16                     | 24,4             | 1.480             | 185                          | 155                        | 1,41                                    |
| 3 x 50 + 1 x 25                     | 28,6             | 2.050             | 225                          | 183                        | 0,984                                   |
| 3 x 70 + 1 x 35                     | 32,9             | 2.815             | 289                          | 225                        | 0,693                                   |

| Cross-section<br>(mm²) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Buried<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|------------------------|------------------|-------------------|------------------------------|----------------------------|-----------------------------------------|
| 3 x 95 + 1 x 50        | 37,1             | 3.690             | 352                          | 270                        | 0,525                                   |
| 3 x 120 + 1 x 70       | 40,8             | 4.700             | 410                          | 306                        | 0,410                                   |
| 3 x 150 + 1 x 70       | 45,9             | 5.725             | 473                          | 343                        | 0,328                                   |
| 3 x 185 + 1 x 95       | 51,4             | 7.000             | 542                          | 387                        | 0,270                                   |
| 3 x 240 + 1 x 120      | 58,6             | 9.185             | 641                          | 448                        | 0,204                                   |
| 3 x 300                | 61,0             | 10.180            | 741                          | 502                        | 0,163                                   |
| 4 G 1,5                | 11,2             | 180               | 26                           | 27                         | 33,9                                    |
| 4 G 2,5                | 11,9             | 225               | 36                           | 35                         | 20,3                                    |
| 4 G 4                  | 12,9             | 290               | 49                           | 46                         | 12,6                                    |
| 4 G 6                  | 14,3             | 380               | 63                           | 58                         | 8,41                                    |
| 4 G 10                 | 16,3             | 565               | 86                           | 77                         | 4,87                                    |
| 4 x 16                 | 18,8             | 815               | 115                          | 100                        | 3,08                                    |
| 4 x 25                 | 23,8             | 1.275             | 149                          | 129                        | 1,98                                    |
| 4 x 35                 | 25,9             | 1.700             | 185                          | 155                        | 1,41                                    |
| 4 x 50                 | 30,1             | 2.310             | 225                          | 183                        | 0,984                                   |
| 4 x 70                 | 34,8             | 3.185             | 289                          | 225                        | 0,693                                   |
| 4 x 95                 | 39,9             | 4.185             | 352                          | 270                        | 0,525                                   |
| 4 x 120                | 44,8             | 5.305             | 410                          | 306                        | 0,410                                   |
| 4 x 150                | 49,3             | 6.548             | 473                          | 343                        | 0,328                                   |
| 4 x 185                | 54,8             | 7.965             | 542                          | 387                        | 0,270                                   |
| 4 x 240                | 61,7             | 10.370            | 641                          | 448                        | 0,204                                   |
| 4 x 300                | 68,0             | 13.055            | 741                          | 502                        | 0,163                                   |
| 5 G 1,5                | 12,6             | 230               | 26                           | 27                         | 33,9                                    |
| 5 G 2,5                | 13,2             | 275               | 36                           | 35                         | 20,3                                    |
| 5 G 4                  | 14,4             | 355               | 49                           | 46                         | 12,6                                    |
| 5 G 6                  | 15,9             | 470               | 63                           | 58                         | 8,41                                    |
| 5 G 10                 | 18,0             | 685               | 86                           | 77                         | 4,87                                    |
| 5 G 16                 | 20,9             | 1.000             | 115                          | 100                        | 3,08                                    |
| 5 G 25                 | 25,9             | 1.550             | 149                          | 129                        | 1,98                                    |
| 5 G 35                 | 28,3             | 2.050             | 185                          | 155                        | 1,41                                    |
| 5 G 50                 | 33,7             | 2.840             | 225                          | 183                        | 0,984                                   |
| 5 G 70                 | 38,6             | 3.905             | 289                          | 225                        | 0,693                                   |
| 5 G 95                 | 43,5             | 5.080             | 352                          | 270                        | 0,525                                   |
| 5 G 120                | 49,5             | 6.395             | 410                          | 306                        | 0,410                                   |
| 5 G 150                | 55,1             | 7.935             | 473                          | 343                        | 0,328                                   |
| 5 G 185                | 61,1             | 9.665             | 542                          | 387                        | 0,270                                   |
| 5 G 240                | 68,8             | 12.620            | 641                          | 448                        | 0,204                                   |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K-m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and  $\cos\varphi=1$ .

In all cases it is supposed a single-phase circuit.

## SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

|                         |     |     |     |     |     |     |     |     |    |
|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| <b>Time (s)</b>         | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
| <b>A/mm<sup>2</sup></b> | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

## CORRECTION FACTORS FOR AIR TEMPERATURE

|                    |      |      |    |      |      |      |      |      |      |
|--------------------|------|------|----|------|------|------|------|------|------|
| <b>Air T. (°C)</b> | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
| <b>Factor</b>      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

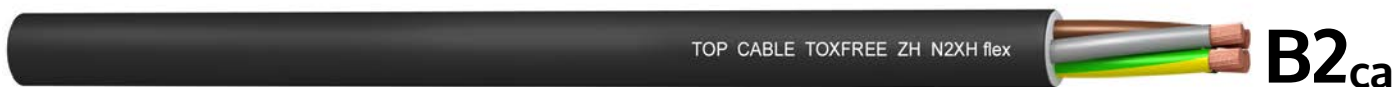
## CORRECTION FACTORS FOR GROUND TEMPERATURE

|                       |      |      |    |      |      |      |      |     |      |
|-----------------------|------|------|----|------|------|------|------|-----|------|
| <b>Ground T. (°C)</b> | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45  | 50   |
| <b>Factor</b>         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,8 | 0,76 |

## CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

|                                |                  |                      |                     |            |                 |
|--------------------------------|------------------|----------------------|---------------------|------------|-----------------|
| <b>Moisture degree of soil</b> | <b>Very damp</b> | <b>Slightly damp</b> | <b>Slightly dry</b> | <b>Dry</b> | <b>Very dry</b> |
| <b>Thermal Resist. (K·m/W)</b> | 1                | 1,5                  | 2                   | 2,5        | 3               |
| <b>Factor</b>                  | 1,50             | 1,28                 | 1,12                | 1          | 0,90            |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.



## APPLICATION

Toxfree® ZH N2XH flex is a LSHF safety cable for fixed installations. In the event of fire, it does not emit toxic gases, nor does it give off corrosive gases, avoiding any possible damage to people or electronic equipment. For these reasons it is highly recommended for use in public places such as: hospitals, schools, museums, airports, bus terminals, shopping malls, offices, laboratories, etc.

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Cross-linked polyethylene insulation type XLPE according to IEC 60502-1.

The standard identification of insulated conductors according to HD 308 is the following:

|         |                                                     |
|---------|-----------------------------------------------------|
| 1 x     | Natural                                             |
| 2 x     | Blue + Brown                                        |
| 3 G     | Blue + Brown + Green/Yellow                         |
| 3 x     | Brown + Black + Grey                                |
| 3 x+1 x | Brown + Black + Grey + Blue (reduced cross-section) |
| 4 G     | Brown + Black + Grey + Green/Yellow                 |
| 4 x     | Brown + Black + Grey + Blue                         |
| 5 G     | Brown + Black + Grey + Blue + Green/Yellow          |

### Outer sheath

Low Smoke Halogen Free (LSHF) polyolefin outer sheath. Black colour.

## STANDARDS / COMPLIANCE



**According to**  
IEC 60502-1



**Standards and approvals**  
KEMA-KEUR / CE



**CPR (Construction Products Regulation)**  
B2<sub>ca</sub>-s1a, d1, a1



## CHARACTERISTICS



**Electrical performance**  
Low voltage: 0,6/1 kV



**Thermal performance**  
Maximum service temperature: 90oC.  
Maximum short-circuit temperature: 250oC (max. 5 s).  
Minimum service temperature: -40oC (fixed and protected installations).  
Minimum installation and handling temperature: 0oC (on cable surface).



**Fire performance**  
Flame non-propagation according to EN 60332-1 / IEC 60332-1.  
Fire non-propagation according to EN 60332-3-24 / IEC 60332-3-24 and EN 50399.  
Reaction to fire CPR: B2<sub>ca</sub>-s1a,d1,a1 according to EN 50575.  
LSHF (Low Smoke Halogen Free) according to EN 60754-1 / IEC 60754-1.  
Low smoke emission according to EN 61034 / IEC 61034:  
Light transmittance > 80%.  
Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.



**Mechanical performance**  
Minimum bending radius: 5x cable diameter.  
Impact resistance: AG2 Medium severity.

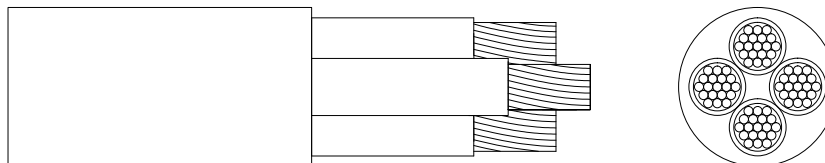


**Environmental performance**  
Chemical & Oil resistance: acceptable.  
UV Resistant according to EN 50618.  
Water resistance: AD5 Jets.



**Installation conditions**  
Open Air.  
Buried.  
In conduit.

## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Buried<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|------------------------------|----------------------------|-----------------------------------------|
| 1 x 2,5                             | 7,5              | 85                | 29                           | 30                         | 17,7                                    |
| 1 x 4                               | 8,1              | 100               | 40                           | 39                         | 11,0                                    |
| 1 x 6                               | 8,6              | 125               | 53                           | 49                         | 7,32                                    |
| 1 x 10                              | 9,2              | 165               | 74                           | 65                         | 4,23                                    |
| 1 x 16                              | 10,2             | 225               | 101                          | 84                         | 2,68                                    |
| 1 x 25                              | 11,3             | 305               | 135                          | 107                        | 1,73                                    |
| 1 x 35                              | 12,2             | 400               | 169                          | 129                        | 1,23                                    |
| 1 x 50                              | 13,9             | 535               | 207                          | 153                        | 0,86                                    |
| 1 x 70                              | 15,8             | 730               | 268                          | 188                        | 0,603                                   |
| 1 x 95                              | 17,6             | 945               | 328                          | 226                        | 0,457                                   |
| 1 x 120                             | 19,5             | 1.185             | 383                          | 257                        | 0,357                                   |
| 1 x 150                             | 21,7             | 1.470             | 444                          | 287                        | 0,286                                   |
| 1 x 185                             | 23,8             | 1.770             | 510                          | 324                        | 0,235                                   |
| 1 x 240                             | 26,7             | 2.310             | 607                          | 375                        | 0,178                                   |
| 1 x 300                             | 29,5             | 2.905             | 703                          | 419                        | 0,142                                   |
| 1 x 400                             | 34,2             | 3.825             | 823                          | 493                        | 0,108                                   |
| 1 x 500                             | 37,9             | 4.885             | 946                          | 558                        | 0,085                                   |
| 1 x 630                             | 43,1             | 6.410             | 1.088                        | 634                        | 0,064                                   |
| 2 x 1,5                             | 9,8              | 130               | 26                           | 26                         | 34,0                                    |
| 2 x 2,5                             | 10,7             | 165               | 36                           | 34                         | 20,4                                    |
| 2 x 4                               | 11,1             | 190               | 49                           | 44                         | 12,7                                    |
| 2 x 6                               | 12,2             | 245               | 63                           | 56                         | 8,45                                    |
| 2 x 10                              | 13,6             | 355               | 86                           | 73                         | 4,89                                    |
| 2 x 16                              | 15,3             | 495               | 100                          | 84                         | 3,1                                     |
| 3 G 1,5                             | 11,3             | 170               | 26                           | 26                         | 34,0                                    |
| 3 G 2,5                             | 12,1             | 210               | 36                           | 34                         | 20,4                                    |
| 3 G 4                               | 12,2             | 240               | 49                           | 44                         | 12,7                                    |
| 3 G 6                               | 13,4             | 315               | 63                           | 56                         | 8,45                                    |
| 3 G 10                              | 14,8             | 450               | 86                           | 73                         | 4,89                                    |
| 3 x 16                              | 16,8             | 645               | 100                          | 84                         | 2,68                                    |
| 3 x 25                              | 21,4             | 1.020             | 127                          | 107                        | 1,73                                    |
| 3 x 35                              | 23,8             | 1.345             | 158                          | 129                        | 1,23                                    |
| 3 x 50                              | 27,2             | 1.825             | 192                          | 153                        | 0,86                                    |
| 3 x 70                              | 30,3             | 2.470             | 246                          | 188                        | 0,603                                   |
| 3 x 16 + 1 x 10                     | 19,1             | 800               | 100                          | 84                         | 2,68                                    |
| 3 x 25 + 1 x 16                     | 22,5             | 1.165             | 127                          | 107                        | 1,73                                    |
| 3 x 35 + 1 x 16                     | 24,4             | 1.480             | 158                          | 129                        | 1,23                                    |
| 3 x 50 + 1 x 25                     | 28,6             | 2.050             | 192                          | 153                        | 0,86                                    |
| 3 x 70 + 1 x 35                     | 32,9             | 2.815             | 246                          | 188                        | 0,603                                   |
| 3 x 95 + 1 x 50                     | 37,1             | 3.690             | 298                          | 226                        | 0,457                                   |
| 3 x 120 + 1 x 70                    | 40,8             | 4.700             | 346                          | 257                        | 0,357                                   |
| 3 x 150 + 1 x 70                    | 45,9             | 5.725             | 399                          | 287                        | 0,286                                   |
| 3 x 185 + 1 x 95                    | 51,4             | 7.000             | 456                          | 324                        | 0,235                                   |
| 3 x 240 + 1 x 120                   | 58,6             | 9.185             | 538                          | 375                        | 0,178                                   |
| 3 x 300                             | 61               | 10.180            | 621                          | 419                        | 0,142                                   |
| 4 G 1,5                             | 11,7             | 185               | 23                           | 23                         | 29,3                                    |

| Cross-section<br>(mm²) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Buried<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|------------------------|------------------|-------------------|------------------------------|----------------------------|-----------------------------------------|
| 4 G 2,5                | 12,2             | 225               | 32                           | 30                         | 17,7                                    |
| 4 G 4                  | 13,2             | 290               | 42                           | 39                         | 11,0                                    |
| 4 G 6                  | 14,7             | 385               | 54                           | 49                         | 7,32                                    |
| 4 G 10                 | 16,3             | 565               | 75                           | 65                         | 4,23                                    |
| 4 x 16                 | 18,8             | 815               | 100                          | 84                         | 2,68                                    |
| 4 x 25                 | 23,8             | 1.275             | 127                          | 107                        | 1,73                                    |
| 4 x 35                 | 25,9             | 1.700             | 158                          | 129                        | 1,23                                    |
| 4 x 50                 | 30,1             | 2.310             | 192                          | 153                        | 0,86                                    |
| 4 x 70                 | 34,8             | 3.185             | 246                          | 188                        | 0,603                                   |
| 4 x 95                 | 39,9             | 4.184             | 298                          | 226                        | 0,457                                   |
| 4 x 120                | 44,8             | 5.305             | 346                          | 257                        | 0,357                                   |
| 4 x 150                | 49,3             | 6.548             | 399                          | 287                        | 0,286                                   |
| 4 x 185                | 54,8             | 7.965             | 456                          | 324                        | 0,235                                   |
| 4 x 240                | 61,7             | 10.370            | 538                          | 375                        | 0,178                                   |
| 4 x 300                | 68,0             | 13.055            | 621                          | 419                        | 0,142                                   |
| 5 G 1,5                | 13,1             | 235               | 23                           | 23                         | 29,3                                    |
| 5 G 2,5                | 14,4             | 300               | 32                           | 30                         | 17,7                                    |
| 5 G 4                  | 14,8             | 360               | 42                           | 39                         | 11,0                                    |
| 5 G 6                  | 16,3             | 470               | 54                           | 49                         | 7,32                                    |
| 5 G 10                 | 18,0             | 685               | 75                           | 65                         | 4,23                                    |
| 5 G 16                 | 20,9             | 1.000             | 100                          | 84                         | 2,68                                    |
| 5 G 25                 | 25,9             | 1.550             | 127                          | 107                        | 1,73                                    |
| 5 G 35                 | 28,3             | 2.050             | 158                          | 129                        | 1,23                                    |
| 5 G 50                 | 33,7             | 2.840             | 192                          | 153                        | 0,86                                    |
| 5 G 70                 | 38,6             | 3.905             | 246                          | 188                        | 0,603                                   |
| 5 G 95                 | 43,5             | 5.080             | 298                          | 226                        | 0,457                                   |
| 5 G 120                | 49,5             | 6.395             | 346                          | 257                        | 0,357                                   |
| 5 G 150                | 55,1             | 7.935             | 399                          | 287                        | 0,286                                   |
| 5 G 185                | 61,1             | 9.665             | 456                          | 324                        | 0,235                                   |
| 5 G 240                | 68,8             | 12.620            | 538                          | 375                        | 0,178                                   |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K-m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and  $\cos\varphi=1$ .

For cables having 2 and 3 conductors up to 10 mm<sup>2</sup> it is supposed a single-phase circuit. For the rest of the cables, it is supposed a three-phase circuit.

## SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| A/mm <sup>2</sup> | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

## CORRECTION FACTORS FOR AIR TEMPERATURE

| Air T. (°C) | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
|-------------|------|------|----|------|------|------|------|------|------|
| Factor      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

## CORRECTION FACTORS FOR GROUND TEMPERATURE

| Ground T. (°C) | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45   | 50   |
|----------------|------|------|----|------|------|------|------|------|------|
| Factor         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,80 | 0,76 |

## CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

| Moisture degree of soil | Very damp | Slightly damp | Slightly dry | Dry | Very dry |
|-------------------------|-----------|---------------|--------------|-----|----------|
| Thermal Resist. (K·m/W) | 1         | 1,5           | 2            | 2,5 | 3        |
| Factor                  | 1,50      | 1,28          | 1,12         | 1   | 0,90     |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.



**B2<sub>ca</sub>**  
**C<sub>ca</sub>**

## APPLICATION

Toxfree® ZH RZ1-K (AS) is a LSHF safety cable. In the event of fire, it does not emit toxic gases, nor does it give off corrosive gases, avoiding any possible damage to people or electronic equipment. For these reasons it is highly recommended for use in public places such as: hospitals, schools, museums, airports, bus terminals, shopping centers, offices, laboratories, etc.

- Industrial use.
- Public places

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible), according to EN 60228 and IEC 60228.

### Insulation

Cross-linked polyethylene type XLPE according to IEC 60502-1 and type DIX-3 according to HD 603.

The standard identification of insulated conductors according to HD 308 is the following:

|           |                                                     |
|-----------|-----------------------------------------------------|
| 1 x       | Natural                                             |
| 2 x       | Blue + Brown                                        |
| 3 G       | Blue + Brown + Green/Yellow                         |
| 3 x       | Brown + Black + Grey                                |
| 3 x + 1 x | Brown + Black + Grey + Blue (reduced cross-section) |
| 4 G       | Brown + Black + Grey + Green/Yellow                 |
| 4 x       | Brown + Black + Grey + Blue                         |
| 5 G       | Brown + Black + Grey + Blue + Green/Yellow          |
| 6 or more | Black numbered + Green/Yellow                       |

### Outer sheath

Low Smoke Halogen Free (LSHF) polyolefin outer sheath. Green colour.

## CHARACTERISTICS

### Electrical performance

Low voltage: 0,6/1 kV



### Thermal performance

Maximum service temperature: 90°C.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations)

Minimum installation and handling temperature: -0°C.



### Fire performance

Flame non-propagation according to IEC 60332-1 / EN 60332-1.

Fire non-propagation according to EN 60332-3 / IEC 60332-3 and EN 50399.

Reaction to fire CPR: B2<sub>ca</sub>-s1a,d1, a1 or C<sub>ca</sub>-s1a,d1,a1, according to EN 50575 (see cross-section).

Low Smoke Halogen Free according to EN 60754-1 / IEC 60754-1.

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 80%.

Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.



### Mechanical performance

Minimum bending radius: 5x cable diameter.

Impact resistance: AG2 Medium severity.



### Environmental performance

Chemical & Oil resistance: acceptable.

UV Resistant according to EN 50618.

Water resistance: AD5 Jets.



### Installation conditions

Open Air.

Buried.

In conduit.

## STANDARDS / COMPLIANCE



### According to

IEC 60502-1 / UNE 21123-4



### Standards and approvals

AENOR / KEMA-KEUR / RoHS / CE



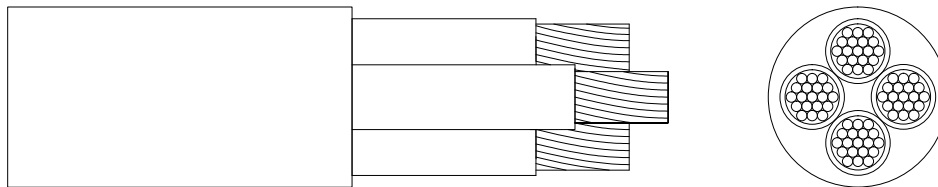
### CPR (Construction Products Regulation)

B2<sub>ca</sub>-s1a,d1,a1 (according to cross-section) or

C<sub>ca</sub>-s1a,d1,a1 (according to cross-section)



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section<br>(mm²) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Buried<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|------------------------|------------------|-------------------|------------------------------|----------------------------|-----------------------------------------|
| 1 x 2,5                | 7,1              | 75                | 39                           | 35                         | 20,3                                    |
| 1 x 4                  | 7,6              | 95                | 53                           | 46                         | 12,6                                    |
| 1 x 6                  | 8,2              | 120               | 68                           | 58                         | 8,41                                    |
| 1 x 10                 | 9,1              | 165               | 93                           | 77                         | 4,87                                    |
| 1 x 16                 | 10,1             | 225               | 124                          | 100                        | 3,08                                    |
| 1 x 25                 | 11,3             | 305               | 161                          | 129                        | 1,98                                    |
| 1 x 35                 | 12,2             | 400               | 200                          | 155                        | 1,41                                    |
| 1 x 50                 | 13,9             | 535               | 242                          | 183                        | 0,984                                   |
| 1 x 70                 | 15,8             | 730               | 310                          | 225                        | 0,693                                   |
| 1 x 95                 | 17,6             | 945               | 377                          | 270                        | 0,525                                   |
| 1 x 120                | 19,5             | 1.185             | 437                          | 306                        | 0,410                                   |
| 1 x 150                | 21,7             | 1.470             | 504                          | 343                        | 0,328                                   |
| 1 x 185                | 23,8             | 1.770             | 575                          | 387                        | 0,270                                   |
| 1 x 240                | 26,7             | 2.310             | 679                          | 448                        | 0,204                                   |
| 1 x 300                | 29,5             | 2.905             | 783                          | 502                        | 0,163                                   |
| 1 x 400                | 34,2             | 3.825             | 930                          | 592                        | 0,123                                   |
| 1 x 500                | 37,9             | 4.885             | 1.070                        | 670                        | 0,097                                   |
| 1 x 630                | 43,1             | 6.410             | 1.232                        | 762                        | 0,073                                   |
| 2 x 1,5                | 9,3              | 125               | 26                           | 27                         | 33,9                                    |
| 2 x 2,5                | 9,8              | 145               | 36                           | 35                         | 20,3                                    |
| 2 x 4                  | 10,8             | 190               | 49                           | 46                         | 12,6                                    |
| 2 x 6                  | 11,8             | 245               | 63                           | 58                         | 8,41                                    |
| 2 x 10                 | 13,6             | 355               | 86                           | 77                         | 4,87                                    |
| 2 x 16                 | 15,3             | 495               | 115                          | 100                        | 3,08                                    |
| 3 G 1,5                | 10,4             | 155               | 26                           | 27                         | 33,9                                    |
| 3 G 2,5                | 10,9             | 190               | 36                           | 35                         | 20,3                                    |
| 3 G 4                  | 11,9             | 240               | 49                           | 46                         | 12,6                                    |
| 3 G 6                  | 13,0             | 310               | 63                           | 58                         | 8,41                                    |
| 3 G 10                 | 14,8             | 450               | 86                           | 77                         | 4,87                                    |
| 3 x 16                 | 16,8             | 645               | 115                          | 100                        | 3,08                                    |
| 3 x 25                 | 21,4             | 1.020             | 149                          | 129                        | 1,98                                    |
| 3 x 35                 | 23,8             | 1.345             | 185                          | 155                        | 1,41                                    |
| 3 x 50                 | 27,2             | 1.825             | 225                          | 183                        | 0,984                                   |
| 3 x 70                 | 30,3             | 2.470             | 289                          | 225                        | 0,693                                   |
| 3 x 95                 | 35,2             | 3.245             | 352                          | 270                        | 0,525                                   |
| 3 x 120                | 39,1             | 4.095             | 410                          | 306                        | 0,410                                   |
| 3 x 150                | 43,9             | 5.105             | 473                          | 343                        | 0,328                                   |
| 3 x 185                | 48,6             | 6.195             | 542                          | 387                        | 0,270                                   |
| 3 x 16 + 1 x 10        | 19,1             | 800               | 115                          | 100                        | 3,08                                    |
| 3 x 25 + 1 x 16        | 22,5             | 1.165             | 149                          | 129                        | 1,98                                    |
| 3 x 35 + 1 x 16        | 24,4             | 1.480             | 185                          | 155                        | 1,41                                    |
| 3 x 50 + 1 x 25        | 28,6             | 2.050             | 225                          | 183                        | 0,984                                   |
| 3 x 70 + 1 x 35        | 32,9             | 2.815             | 289                          | 225                        | 0,693                                   |

| Cross-section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Buried<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|------------------------------|----------------------------|-----------------------------------------|
| 3 x 95 + 1 x 50                     | 37,1             | 3.690             | 352                          | 270                        | 0,525                                   |
| 3 x 120 + 1 x 70                    | 40,8             | 4.700             | 410                          | 306                        | 0,410                                   |
| 3 x 150 + 1 x 70                    | 45,9             | 5.725             | 473                          | 343                        | 0,328                                   |
| 3 x 185 + 1 x 95                    | 51,4             | 7.000             | 542                          | 387                        | 0,270                                   |
| 3 x 240 + 1 x 120                   | 58,6             | 9.185             | 641                          | 448                        | 0,204                                   |
| 3 x 300                             | 61,0             | 10.180            | 741                          | 502                        | 0,163                                   |
| 4 G 1,5                             | 11,2             | 180               | 26                           | 27                         | 33,9                                    |
| 4 G 2,5                             | 11,9             | 225               | 36                           | 35                         | 20,3                                    |
| 4 G 4                               | 12,9             | 290               | 49                           | 46                         | 12,6                                    |
| 4 G 6                               | 14,3             | 380               | 63                           | 58                         | 8,41                                    |
| 4 G 10                              | 16,3             | 565               | 86                           | 77                         | 4,87                                    |
| 4 x 16                              | 18,8             | 815               | 115                          | 100                        | 3,08                                    |
| 4 x 25                              | 23,8             | 1.275             | 149                          | 129                        | 1,98                                    |
| 4 x 35                              | 25,9             | 1.700             | 185                          | 155                        | 1,41                                    |
| 4 x 50                              | 30,1             | 2.310             | 225                          | 183                        | 0,984                                   |
| 4 x 70                              | 34,8             | 3.185             | 289                          | 225                        | 0,693                                   |
| 4 x 95                              | 39,9             | 4.185             | 352                          | 270                        | 0,525                                   |
| 4 x 120                             | 44,8             | 5.305             | 410                          | 306                        | 0,410                                   |
| 4 x 150                             | 49,3             | 6.548             | 473                          | 343                        | 0,328                                   |
| 4 x 185                             | 54,8             | 7.965             | 542                          | 387                        | 0,270                                   |
| 4 x 240                             | 61,7             | 10.370            | 641                          | 448                        | 0,204                                   |
| 4 x 300                             | 68,0             | 13.055            | 741                          | 502                        | 0,163                                   |
| 5 G 1,5                             | 12,6             | 230               | 26                           | 27                         | 33,9                                    |
| 5 G 2,5                             | 13,2             | 275               | 36                           | 35                         | 20,3                                    |
| 5 G 4                               | 14,4             | 355               | 49                           | 46                         | 12,6                                    |
| 5 G 6                               | 15,9             | 470               | 63                           | 58                         | 8,41                                    |
| 5 G 10                              | 18,0             | 685               | 86                           | 77                         | 4,87                                    |
| 5 G 16                              | 20,9             | 1.000             | 115                          | 100                        | 3,08                                    |
| 5 G 25                              | 25,9             | 1.550             | 149                          | 129                        | 1,98                                    |
| 5 G 35                              | 28,3             | 2.050             | 185                          | 155                        | 1,41                                    |
| 5 G 50                              | 33,7             | 2.840             | 225                          | 183                        | 0,984                                   |
| 5 G 70                              | 38,6             | 3.905             | 289                          | 225                        | 0,693                                   |
| 5 G 95                              | 43,5             | 5.080             | 352                          | 270                        | 0,525                                   |
| 5 G 120                             | 49,5             | 6.395             | 410                          | 306                        | 0,410                                   |
| 5 G 150                             | 55,1             | 7.935             | 473                          | 343                        | 0,328                                   |
| 5 G 185                             | 61,1             | 9.665             | 542                          | 387                        | 0,270                                   |
| 5 G 240                             | 68,8             | 12.620            | 641                          | 448                        | 0,204                                   |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K-m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and  $\cos\varphi=1$ .

In all cases it is supposed a single-phase circuit.

## SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

|                         |     |     |     |     |     |     |     |     |    |
|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| <b>Time (s)</b>         | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
| <b>A/mm<sup>2</sup></b> | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

## CORRECTION FACTORS FOR AIR TEMPERATURE

|                    |      |      |    |      |      |      |      |      |      |
|--------------------|------|------|----|------|------|------|------|------|------|
| <b>Air T. (°C)</b> | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
| <b>Factor</b>      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

## CORRECTION FACTORS FOR GROUND TEMPERATURE

|                       |      |      |    |      |      |      |      |     |      |
|-----------------------|------|------|----|------|------|------|------|-----|------|
| <b>Ground T. (°C)</b> | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45  | 50   |
| <b>Factor</b>         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,8 | 0,76 |

## CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

|                                |                  |                      |                     |            |                 |
|--------------------------------|------------------|----------------------|---------------------|------------|-----------------|
| <b>Moisture degree of soil</b> | <b>Very damp</b> | <b>Slightly damp</b> | <b>Slightly dry</b> | <b>Dry</b> | <b>Very dry</b> |
| <b>Thermal Resist. (K·m/W)</b> | 1                | 1,5                  | 2                   | 2,5        | 3               |
| <b>Factor</b>                  | 1,50             | 1,28                 | 1,12                | 1          | 0,90            |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.



## B2<sub>ca</sub>

## APPLICATION

Toxfree® ZH Z1Z1-K (AS) is a LSHF safety cable. In the event of fire, it does not emit toxic gases, nor does it give off corrosive gases, avoiding any possible damage to people or electronic equipment. For these reasons it is highly recommended for use in public places such as: hospitals, schools, museums, airports, bus terminals, shopping malls, offices, laboratories, etc.

- Industrial use.
- Public places.

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Special low smoke and halogen free polyolefin insulation.

The standard identification of insulated conductors according to HD 308 is the following:

6 G or more      Black numbered + Green/Yellow

### Outer sheath

Low Smoke Halogen Free (LSHF) polyolefin outer sheath. Green colour, non-toxic and fire retardant. Other outer sheath colours available on request.

## CHARACTERISTICS

### ⚡ Electrical performance

Low voltage: 0,6/1 kV.



### Thermal performance

Maximum service temperature: 70°C.

Maximum short-circuit temperature: 160°C (max. 5 s).

Minimum service temperature: -40°C (static, with protection).



### Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1.

Fire non-propagation according to EN 60332-3 / IEC 60332-3 and EN 50399.

Reaction to fire CPR: B2<sub>ca</sub>-s1a,d1,a1 according to EN 50575.

LSHF (Low Smoke Halogen Free) according to EN 60754-1 / IEC 60754-1.

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 80%.

Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.



### Mechanical performance

Minimum bending radius: 5x cable diameter.

Impact resistance: AG2 Medium severity.



### Environmental performance

Chemical & Oil resistance: Acceptable.

UV Resistant: UNE 211605 and EN 50618.

Water resistance: AD5 Jets.



### Installation conditions

Open Air.

Buried.

In conduit.

## STANDARDS / COMPLIANCE



### Based to:

IEC 60502-1 / UNE 21123-4



### Standards and approvals

RoHS / CE

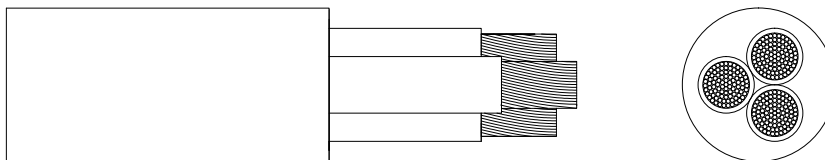


### CPR (Construction Products Regulation)

B2<sub>ca</sub>-s1a,d1,a1



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Buried in duct<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|------------------------------|------------------------------------|-----------------------------------------|
| 7 G 1,5                             | 11,2             | 220               | 22                           | 22                                 | 31,8                                    |
| 7 G 2,5                             | 12,7             | 305               | 30                           | 29                                 | 19,1                                    |
| 8 G 1,5                             | 12,3             | 250               | 22                           | 22                                 | 31,8                                    |
| 8 G 2,5                             | 13,8             | 345               | 30                           | 29                                 | 19,1                                    |
| 10 G 1,5                            | 13,2             | 295               | 22                           | 22                                 | 31,8                                    |
| 10 G 2,5                            | 14,7             | 415               | 30                           | 29                                 | 19,1                                    |
| 12 G 1,5                            | 13,9             | 335               | 22                           | 22                                 | 31,8                                    |
| 19 G 1,5                            | 16,7             | 500               | 22                           | 22                                 | 31,8                                    |
| 24 G 1,5                            | 18,8             | 615               | 22                           | 22                                 | 31,8                                    |

<sup>1</sup> Reference method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D1 according to IEC 60364-5-52. Buried in duct at 0,7 m depth with soil thermal resistivity of 2,5 K·m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and cosφ=1.

For 6 or more conductors, it is supposed a single-phase circuit. For the rest of the cables it is supposed a three-phase circuit.

## SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| A/mm <sup>2</sup> | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

## CORRECTION FACTORS FOR AIR TEMPERATURE

| Air T. (°C) | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
|-------------|------|------|----|------|------|------|------|------|------|
| Factor      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

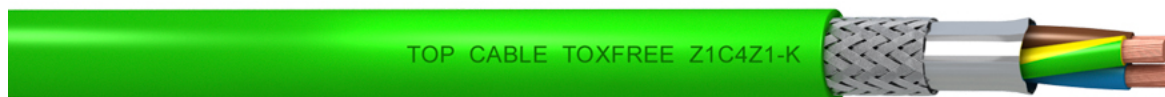
## CORRECTION FACTORS FOR GROUND TEMPERATURE

| Ground T. (°C) | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45  | 50   |
|----------------|------|------|----|------|------|------|------|-----|------|
| Factor         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,8 | 0,76 |

## CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

| Moisture degree of soil | Very damp | Slightly damp | Slightly dry | Dry | Very dry |
|-------------------------|-----------|---------------|--------------|-----|----------|
| Thermal Resist. (K·m/W) | 1         | 1,5           | 2            | 2,5 | 3        |
| Factor                  | 1,18      | 1,1           | 1,05         | 1   | 0,96     |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.



C<sub>ca</sub>

## APPLICATION

Toxfree® Z1C4Z1-K is a screened LSHF safety cable. In case of fire, it does not emit toxic or corrosive gases, thereby protecting public health and avoiding any possible damage to electronic equipment. For this reason, its use is highly recommended for public places and for all installations where it is necessary avoid to electric interference of nearby circuits.

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Special polyolefin insulation, with low smoke and halogen free fumes under fire conditions.

The standard identification of insulated conductors according to UNE 21089-1 and HD 308 is the following:

|           |                                            |
|-----------|--------------------------------------------|
| 1 x       | Natural                                    |
| 2 x       | Blue + Brown                               |
| 3 G       | Blue + Brown + Green/Yellow                |
| 4 G       | Brown + Black + Grey + Green/Yellow        |
| 4 x       | Brown + Black + Grey + Blue                |
| 5 G       | Brown + Black + Grey + Green/Yellow + Blue |
| 6 or more | Black numbered + Green/yellow              |

### Screen

Coverage of 100% composed by aluminium-polyester tape and tinned copper braid.

### Outer sheath

Low Smoke Halogen Free (LSHF) polyolefin. Green colour, non-toxic and fire retardant. The ripcord allows you to gently tear the outer sheath allowing you to gently peel it away without damaging the screen.

Other outer sheath colours available on request.

## CHARACTERISTICS

### Electrical performance

Low voltage: 0,6/1 kV



### Thermal performance

Maximum service temperature: 70°C.

Maximum short-circuit temperature: 160°C (max. 5 s).

Minimum service temperature: -40°C (static, with protection).



### Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1.

Fire non-propagation according to EN 60332-3 / IEC 60332-3 and EN 50399.

Reaction to fire CPR: C<sub>ca</sub>-s1a,d1,a1 according to 50575.

LSHF (Low Smoke Halogen Free) according to EN 60754-1 / IEC 60754-1.

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 80%.

Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.



### Mechanical performance

Minimum bending radius: 5x cable diameter.

Impact resistance: AG2 Medium severity.



### Environmental performance

Chemical & Oil resistance: acceptable.

UV Resistant according to EN 50618.

Water resistance: AD5 Jets.



### Installation conditions

Open Air.

Buried.

In conduit.

## STANDARDS / COMPLIANCE



### Based to

IEC 60502-1 / UNE 21123-4



### Standards and approvals

RoHS / CE

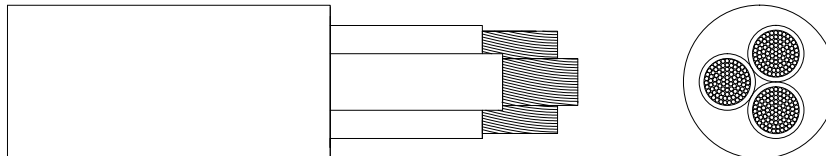


### CPR (Construction Products Regulation)

C<sub>ca</sub>-s1a, d1, a1



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Buried in duct<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|------------------------------|------------------------------------|-----------------------------------------|
| 2 x 1,5                             | 8,6              | 105               | 22                           | 22                                 | 31,8                                    |
| 2 x 2,5                             | 9,9              | 135               | 30                           | 29                                 | 19,1                                    |
| 2 x 4                               | 10,8             | 170               | 40                           | 37                                 | 11,8                                    |
| 2 x 6                               | 11,5             | 210               | 51                           | 46                                 | 7,9                                     |
| 3 G 1,5                             | 9,4              | 130               | 22                           | 22                                 | 31,8                                    |
| 3 G 2,5                             | 10,3             | 165               | 30                           | 29                                 | 19,1                                    |
| 3 G 4                               | 11,5             | 215               | 40                           | 37                                 | 11,8                                    |
| 3 G 6                               | 12,6             | 280               | 51                           | 46                                 | 7,9                                     |
| 3 x 10                              | 16,4             | 460               | 70                           | 60                                 | 4,6                                     |
| 3 x 16                              | 18,4             | 640               | 94                           | 78                                 | 2,9                                     |
| 3 x 25                              | 22,4             | 970               | 119                          | 99                                 | 1,9                                     |
| 3 x 35                              | 25,2             | 1.275             | 148                          | 119                                | 1,3                                     |
| 3 x 50                              | 29,5             | 1.760             | 180                          | 140                                | 0,92                                    |
| 4 G 1,5                             | 10,2             | 155               | 18,5                         | 18                                 | 25,1                                    |
| 4 G 2,5                             | 11,0             | 200               | 25                           | 24                                 | 16,5                                    |
| 4 G 4                               | 12,5             | 270               | 34                           | 30                                 | 10,3                                    |
| 4 G 6                               | 13,4             | 350               | 43                           | 38                                 | 6,8                                     |
| 4 G 10                              | 18,0             | 585               | 60                           | 50                                 | 4,0                                     |
| 4 G 16                              | 20,7             | 835               | 80                           | 64                                 | 2,5                                     |
| 4 G 70                              | 36,1             | 3.070             | 196                          | 143                                | 0,56                                    |
| 5 G 1,5                             | 11,0             | 180               | 18,5                         | 18                                 | 25,1                                    |
| 5 G 2,5                             | 12,0             | 240               | 25                           | 24                                 | 16,5                                    |
| 5 G 4                               | 13,7             | 325               | 34                           | 30                                 | 10,3                                    |
| 5 G 6                               | 15,2             | 425               | 43                           | 38                                 | 6,8                                     |
| 5 G 10                              | 19,8             | 720               | 60                           | 50                                 | 4,0                                     |
| 5 G 16                              | 23,0             | 1.035             | 80                           | 64                                 | 2,5                                     |
| 5 G 25                              | 27,2             | 1.550             | 101                          | 82                                 | 1,6                                     |
| 5 G 35                              | 29,8             | 2.045             | 126                          | 98                                 | 1,2                                     |
| 5 G 50                              | 36,5             | 2.860             | 153                          | 116                                | 0,80                                    |
| 7 G 1,5                             | 11,8             | 230               | 18,5                         | 18                                 | 25,1                                    |
| 8 G 1,5                             | 12,8             | 260               | 18,5                         | 18                                 | 25,1                                    |
| 10 G 1,5                            | 13,8             | 305               | 18,5                         | 18                                 | 25,1                                    |
| 12 G 1,5                            | 14,6             | 350               | 18,5                         | 18                                 | 25,1                                    |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D1 according to IEC 60364-5-52. Buried in duct at 0,7 m depth with soil thermal resistivity of 2,5 K·m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and cosφ=1.

For cables having 2 conductors or 3 conductors up to 10 mm<sup>2</sup>, it is supposed a single-phase circuit. For the rest of the cables it is supposed a three-phase circuit.

## SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

|                         |     |     |     |     |     |     |     |     |    |
|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| <b>Time (s)</b>         | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
| <b>A/mm<sup>2</sup></b> | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

## CORRECTION FACTORS FOR AIR TEMPERATURE

|                    |      |      |    |      |      |      |      |      |      |
|--------------------|------|------|----|------|------|------|------|------|------|
| <b>Air T. (°C)</b> | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
| <b>Factor</b>      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

## CORRECTION FACTORS FOR GROUND TEMPERATURE

|                       |      |      |    |      |      |      |      |     |      |
|-----------------------|------|------|----|------|------|------|------|-----|------|
| <b>Ground T. (°C)</b> | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45  | 50   |
| <b>Factor</b>         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,8 | 0,76 |

## CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

|                                |                  |                      |                     |            |                 |
|--------------------------------|------------------|----------------------|---------------------|------------|-----------------|
| <b>Moisture degree of soil</b> | <b>Very damp</b> | <b>Slightly damp</b> | <b>Slightly dry</b> | <b>Dry</b> | <b>Very dry</b> |
| <b>Thermal Resist. (K·m/W)</b> | 1                | 1,5                  | 2                   | 2,5        | 3               |
| <b>Factor</b>                  | 1,18             | 1,10                 | 1,05                | 1          | 0,96            |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.



C<sub>ca</sub>

## APPLICATION

TOPDRIVE® VFD (EMC) ROZ1-K (AS) cable has been specially designed for Variable Frequency Drive Motors and installations where it is necessary to limit the effects of electromagnetic interference (EMI). This is a flexible cable for fixed installations, for variable speed motors or pumps.

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible), according to EN 60228 and IEC 60228.

### Protective Conductor

The ground conductor is divided into three conductors; the equivalent cross-section is approximately 50% of the section of the phase conductor. For 4G cables, ground conductor has the same cross-section as the phase conductors.

### Insulation

Cross-linked polyethylene type XLPE according to IEC 60502-1, type HF XLPE 90°C according to IEC 60092-360.

The standard identification of insulated conductors is the following:

3 x 3 G Grey + Brown + Black + Green/Yellow (3 G) (from 6 mm<sup>2</sup> onwards)

4 G Grey + Brown + Black + Green/Yellow (up to 4 mm<sup>2</sup>)

### Assembly of cores

For 3x+3G cables, the three phase conductors are cabled helically with the three protective conductors distributed in the interstices. For 4G cables, the three phase conductors and protection conductor are cabled helically.

### Screen

Aluminium-polyester tape screen helically placed over the insulated conductors. Over the tape there is a tinned copper braid screen. The tape and the braid act as a double screen to cut out all of the electromagnetic interference, with a minimum total section of 10% of the phase conductor, ensuring a total shielding coverage.

### Outer sheath

Polyolefin LSHF outer sheath, type ST8 according to IEC 60502-1 and type SHF1 according to IEC 60092-360. black colour. The ripcord allows you to tear the outer sheath without damaging the screen.

## CHARACTERISTICS

### Electrical performance

Low voltage: 0,6/1 kV

### Thermal performance

Maximum service temperature: 90°C.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations)

### Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1.

Fire non-propagation according to EN 60332-3 / IEC 60332-3 and EN 50399.

Reaction to fire CPR: C<sub>ca</sub>-s1a, d1, a1 according to EN 50575.

LSHF (Low Smoke Halogen Free) according to EN 60754-1 / IEC 60754-1

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 80%.

Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.

### Mechanical performance

Minimum bending radius: 10x cable diameter.

Impact resistance: AG2 Medium severity.

### Environmental performance

Chemical & Oil resistance: acceptable.

UV Resistant according to EN 50618.

Water resistance: AD5 Jets.

### Installation conditions

Open Air.

Buried.

In conduit.

## STANDARDS / COMPLIANCE



### According to

IEC 60502-1 / IEC 60092-353



### Standards and approvals

BUREAU VERITAS / DNV-GL / ABS /

LLOYD'S REGISTER / RoHS / CE

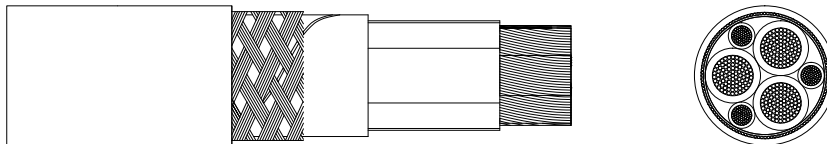


### CPR (Construction Products Regulation)

C<sub>ca</sub>-s1a, d1, a1



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section (mm <sup>2</sup> ) | Diameter under the braid (mm) | Outer diameter (mm) | Weight (Kg/km) | Open air (A) <sup>1</sup> | Buried (A) <sup>2</sup> | R20°C (Ω/km) | Voltage drop (V/A · km) <sup>3</sup> |
|----------------------------------|-------------------------------|---------------------|----------------|---------------------------|-------------------------|--------------|--------------------------------------|
| 3 x 6 + 3 G 1,5                  | 10,5                          | 15                  | 390            | 63                        | 58                      | 3,30         | 8,41                                 |
| 3 x 10 + 3 G 1,5                 | 11,1                          | 15,6                | 510            | 86                        | 77                      | 1,91         | 4,87                                 |
| 3 x 16 + 3 G 2,5                 | 14,0                          | 18,9                | 750            | 115                       | 100                     | 1,21         | 3,08                                 |
| 3 x 16 + 3 G 6                   | 16,9                          | 22,2                | 915            | 115                       | 100                     | 1,21         | 3,08                                 |
| 3 x 25 + 3 G 4                   | 16,9                          | 22,3                | 1.135          | 149                       | 129                     | 0,780        | 1,98                                 |
| 3 x 25 + 3 G 6                   | 16,9                          | 22,3                | 1.185          | 149                       | 129                     | 0,780        | 1,98                                 |
| 3 x 35 + 3 G 6                   | 19,5                          | 24,9                | 1.495          | 185                       | 155                     | 0,554        | 1,41                                 |
| 3 x 50 + 3 G 10                  | 22,7                          | 28,1                | 2.035          | 225                       | 183                     | 0,386        | 0,984                                |
| 3 x 70 + 3 G 10                  | 26,2                          | 31,1                | 2.565          | 289                       | 225                     | 0,272        | 0,693                                |
| 3 x 70 + 3 G 16                  | 26,2                          | 31,6                | 2.790          | 289                       | 225                     | 0,272        | 0,693                                |
| 3 x 95 + 3 G 16                  | 30,1                          | 35,5                | 3.450          | 352                       | 270                     | 0,206        | 0,525                                |
| 3 x 120 + 3 G 16                 | 33,3                          | 39,5                | 4.320          | 410                       | 306                     | 0,161        | 0,410                                |
| 3 x 120 + 3 G 25                 | 33,3                          | 39,4                | 4.550          | 410                       | 306                     | 0,161        | 0,410                                |
| 3 x 150 + 3 G 25                 | 38,4                          | 44,8                | 5.445          | 473                       | 343                     | 0,129        | 0,328                                |
| 3 x 185 + 3 G 35                 | 41,6                          | 48,4                | 6.675          | 542                       | 387                     | 0,106        | 0,270                                |
| 3 x 240 + 3 G 50                 | 49,2                          | 56,3                | 8.765          | 641                       | 448                     | 0,0801       | 0,204                                |
| 3 x 300 + 3 G 50                 | 54,5                          | 62,1                | 10.650         | 741                       | 502                     | 0,0641       | 0,163                                |
| 4 G 1,5                          | 6,9                           | 11,4                | 185            | 26                        | 27                      | 13,30        | 33,9                                 |
| 4 G 2,5                          | 7,7                           | 12,2                | 230            | 36                        | 35                      | 7,98         | 20,3                                 |
| 4 G 4                            | 9,2                           | 13,7                | 300            | 49                        | 46                      | 4,95         | 12,6                                 |
| 4 G 6                            | 10,6                          | 15,1                | 385            | 63                        | 58                      | 3,30         | 8,41                                 |
| 4 G 10                           | 12,7                          | 17,2                | 560            | 86                        | 77                      | 1,91         | 4,87                                 |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K-m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and  $\cos\phi=1$ .

In all cases it is supposed a single-phase circuit.

## SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| A/mm <sup>2</sup> | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

## CORRECTION FACTORS FOR AIR TEMPERATURE

| Air T. (°C) | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
|-------------|------|------|----|------|------|------|------|------|------|
| Factor      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

## CORRECTION FACTORS FOR GROUND TEMPERATURE

| Ground T. (°C) | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45  | 50   |
|----------------|------|------|----|------|------|------|------|-----|------|
| Factor         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,8 | 0,76 |

## CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

| Moisture degree of soil | Very damp | Slightly damp | Slightly dry | Dry | Very dry |
|-------------------------|-----------|---------------|--------------|-----|----------|
| Thermal Resist. (K·m/W) | 1         | 1,5           | 2            | 2,5 | 3        |
| Factor                  | 1,50      | 1,28          | 1,12         | 1   | 0,90     |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.

Flexible screened PVC cable, for safe signal transmission.

ACCORDING TO: EN 50525 (for 300/500 V cables) / IEC 60502 (for 0,6/1 kV cables).



**E<sub>ca</sub>**  
**C<sub>ca</sub>**

## APPLICATION

Screenflex® 110 LiYCY VC4V-K is a screened control cable. It is used in all types of signal transmission connections where the voltage induced by an exterior electromagnetic field may affect the signal transmitted. Its most common applications are control circuits, electronic equipment connections, computer systems, etc.

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Flexible PVC insulation, type TI2 according to EN 50363-3 and type PVC/A according to IEC 60502-1.

The standard identification of insulated conductors according to HD 308 and EN 50334 is the following:

|           |                                            |
|-----------|--------------------------------------------|
| 1 x       | Natural                                    |
| 2 x       | Blue + Brown                               |
| 3 G       | Blue + Brown + Green/Yellow                |
| 3 x       | Brown + Black + Grey                       |
| 4 G       | Brown + Black + Grey + Green/Yellow        |
| 4 x       | Brown + Black + Grey + Blue                |
| 5 G       | Brown + Black + Grey + Green/Yellow + Blue |
| 6 or more | Black numbered + Green/Yellow.             |

Other identifications (JZ, OZ, J, O) are available on request.

### Screen

Aluminium-polyester tape screen with overlapping tinned copper braid, ensuring full screening coverage.

### Outer sheath

Flexible PVC type TM2 according to EN 50363-4-1 and type ST1 according to IEC 60502-1. Black or grey colour (grey for fire non-propagation).

The ripcord allows you to gently tear the outer-sheath and remove it without damaging the screen.

## CHARACTERISTICS



### Electrical performance

Low voltage: 300/500 V. (up to 1,5 mm<sup>2</sup>).

0,6/1kV (from 2,5mm<sup>2</sup> onwards).



### Thermal performance

Maximum service temperature: 70°C.

Maximum short-circuit temperature: 160°C (max. 5 s).

Minimum service temperature: -40°C (static, with protection).



### Fire performance

Flame non-propagation based on EN 60332-1/IEC 60332-1.

Fire non-propagation based on EN 60332-3/IEC 60332-3 (only grey outer sheath).

Reaction to fire CPR according to EN 50575:

C<sub>ca</sub> -s2, d1, a3 (grey outer sheath 300/500 V)

C<sub>ca</sub> -s3, d1, a3 (grey outer sheath 0,6/1 kV).

E<sub>ca</sub> (black outer sheath).

Low halogen emission. Chlorine <15%.



### Mechanical performance

Minimum bending radius: 5x cable diameter.

Impact resistance: AG2 Medium severity.



### Environmental performance

Chemical & Oil resistance: Good.

UV Resistant based on UNE 211605.

Water resistance: AD5 Jets.

## STANDARDS / COMPLIANCE



### According to:

EN 50525 / IEC 60502-1.



### Standards and approvals

RoHS / CE.



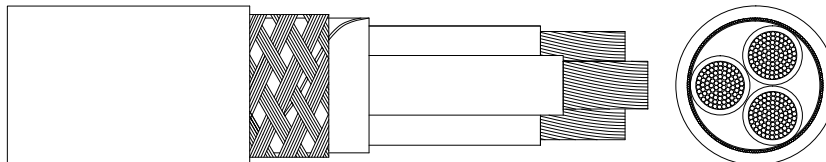
### CPR (Construction Products Regulation)

C<sub>ca</sub> -s2, d1, a3 (grey outer sheath 300/500V)

E<sub>ca</sub> (black outer sheath).



### DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>1</sup> | Voltage drop<br>(V/A · km) <sup>2</sup> |
|-------------------------------------|------------------|-------------------|------------------------------|-----------------------------------------|
| 2 x 0,75                            | 6,2              | 55                | 6                            | 62,4                                    |
| 2 x 1                               | 6,3              | 60                | 10                           | 46,8                                    |
| 2 x 1,5                             | 7,3              | 75                | 16                           | 31,9                                    |
| 3 G 0,75                            | 6,5              | 65                | 6                            | 62,4                                    |
| 3 G 1                               | 6,6              | 70                | 10                           | 46,8                                    |
| 3 G 1,5                             | 7,7              | 95                | 16                           | 31,9                                    |
| 4 G 0,75                            | 6,9              | 75                | 6                            | 62,4                                    |
| 4 G 1                               | 7,0              | 85                | 10                           | 46,8                                    |
| 4 G 1,5                             | 8,4              | 120               | 16                           | 31,9                                    |
| 5 G 0,75                            | 7,4              | 90                | 6                            | 62,4                                    |
| 5 G 1                               | 7,8              | 105               | 10                           | 46,8                                    |
| 5 G 1,5                             | 9,5              | 150               | 16                           | 31,9                                    |
| 6 G 0,75                            | 7,9              | 105               | 6                            | 62,4                                    |
| 6 G 1                               | 8,3              | 125               | 10                           | 46,8                                    |
| 6 G 1,5                             | 10,2             | 175               | 16                           | 31,9                                    |
| 7 G 0,75                            | 8                | 110               | 6                            | 62,4                                    |
| 7 G 1                               | 8,3              | 130               | 10                           | 46,8                                    |
| 7 G 1,5                             | 10,2             | 190               | 16                           | 31,9                                    |
| 8 G 0,75                            | 8,7              | 125               | 6                            | 62,4                                    |
| 8 G 1                               | 9,3              | 155               | 10                           | 46,8                                    |
| 8 G 1,5                             | 11               | 215               | 16                           | 31,9                                    |
| 10 G 0,75                           | 9,7              | 150               | 6                            | 62,4                                    |
| 10 G 1                              | 10,3             | 185               | 10                           | 46,8                                    |
| 10 G 1,5                            | 12,5             | 265               | 16                           | 31,9                                    |
| 12 G 0,75                           | 10,3             | 170               | 6                            | 62,4                                    |
| 12 G 1                              | 10,8             | 210               | 10                           | 46,8                                    |
| 12 G 1,5                            | 12,9             | 300               | 16                           | 31,9                                    |
| 14 G 0,75                           | 10,7             | 195               | 6                            | 62,4                                    |
| 14 G 1                              | 11,1             | 235               | 10                           | 46,8                                    |
| 14 G 1,5                            | 13,7             | 340               | 16                           | 31,9                                    |
| 16 G 0,75                           | 11,4             | 220               | 6                            | 62,4                                    |
| 16 G 1                              | 12               | 270               | 10                           | 46,8                                    |
| 16 G 1,5                            | 14,5             | 370               | 16                           | 31,9                                    |
| 19 G 0,75                           | 12               | 245               | 6                            | 62,4                                    |
| 19 G 1                              | 12,8             | 310               | 10                           | 46,8                                    |
| 19 G 1,5                            | 15,4             | 450               | 16                           | 31,9                                    |
| 24 G 0,75                           | 13,4             | 305               | 6                            | 62,4                                    |
| 24 G 1                              | 14,2             | 380               | 10                           | 46,8                                    |
| 24 G 1,5                            | 17,5             | 555               | 16                           | 31,9                                    |
| 30 G 0,75                           | 14,4             | 380               | 6                            | 62,4                                    |
| 30 G 1                              | 15,5             | 465               | 10                           | 46,8                                    |
| 30 G 1,5                            | 19               | 680               | 16                           | 31,9                                    |
| 37 G 1                              | 16,9             | 560               | 10                           | 46,8                                    |
| 37 G 1,5                            | 20,5             | 815               | 16                           | 31,9                                    |
| 52 G 1                              | 19,4             | 730               | 10                           | 46,8                                    |
| 61 G 1                              | 20,5             | 835               | 10                           | 46,8                                    |

<sup>1</sup> One cable with adequate ventilation and ambient temperature of 30 °C according to EN 50565-1.

<sup>2</sup> At maximum service temperature and cosφ=1.

For all cables is supposed a single-phase circuit where not all conductors are fully charged.

# SCREENFLEX® 110/200

## LiYCY VC4V-K

| Cross-section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Open air<br>(A) <sup>3</sup> | Buried<br>(A) <sup>4</sup> | Voltage drop<br>(V/A · km) <sup>5</sup> |
|-------------------------------------|------------------|-------------------|------------------------------|----------------------------|-----------------------------------------|
| 1 x 10                              | 11,7             | 225               | 60                           | 50                         | 3,97                                    |
| 1 x 16                              | 12,6             | 290               | 82                           | 64                         | 2,51                                    |
| 1 x 25                              | 14,5             | 405               | 110                          | 82                         | 1,62                                    |
| 1 x 35                              | 15,6             | 510               | 137                          | 98                         | 1,15                                    |
| 1 x 50                              | 17,5             | 675               | 167                          | 116                        | 0,802                                   |
| 1 x 70                              | 19,6             | 900               | 216                          | 143                        | 0,565                                   |
| 1 x 95                              | 21,7             | 1.140             | 264                          | 169                        | 0,428                                   |
| 1 x 120                             | 23,3             | 1.395             | 308                          | 192                        | 0,335                                   |
| 1 x 150                             | 25,6             | 1.715             | 356                          | 217                        | 0,268                                   |
| 1 x 185                             | 27,4             | 2.010             | 409                          | 243                        | 0,220                                   |
| 1 x 240                             | 31,4             | 2.650             | 485                          | 280                        | 0,166                                   |
| 1 x 300                             | 34,3             | 3.255             | 561                          | 316                        | 0,133                                   |
| 2 x 2,5                             | 8,6              | 110               | 30                           | 29                         | 19,2                                    |
| 2 x 4                               | 11,4             | 180               | 40                           | 37                         | 11,9                                    |
| 2 x 6                               | 12,5             | 225               | 51                           | 46                         | 7,92                                    |
| 2 x 10                              | 15,2             | 350               | 70                           | 60                         | 4,58                                    |
| 2 x 16                              | 17,5             | 485               | 94                           | 78                         | 2,90                                    |
| 2 x 25                              | 21,4             | 670               | 119                          | 99                         | 1,87                                    |
| 2 x 35                              | 24,2             | 895               | 148                          | 119                        | 1,33                                    |
| 3 G 2,5                             | 9,4              | 145               | 30                           | 29                         | 19,2                                    |
| 3 G 4                               | 11,7             | 225               | 40                           | 37                         | 11,9                                    |
| 3 G 6                               | 12,9             | 285               | 51                           | 46                         | 7,92                                    |
| 3 G 10                              | 16,1             | 450               | 70                           | 60                         | 4,58                                    |
| 3 x 16                              | 18,7             | 630               | 80                           | 64                         | 2,51                                    |
| 3 x 25                              | 23,1             | 965               | 101                          | 82                         | 1,62                                    |
| 3 x 35                              | 25,2             | 1.255             | 126                          | 98                         | 1,15                                    |
| 3 x 50                              | 29,6             | 1.745             | 153                          | 116                        | 0,802                                   |
| 3 x 70                              | 33,6             | 2.360             | 196                          | 143                        | 0,565                                   |
| 4 x 2,5                             | 10,2             | 180               | 25                           | 24                         | 16,6                                    |
| 4 x 4                               | 12,6             | 275               | 34                           | 30                         | 10,3                                    |
| 4 x 6                               | 14,4             | 360               | 43                           | 38                         | 6,86                                    |
| 4 x 10                              | 17,5             | 570               | 60                           | 50                         | 3,97                                    |
| 4 x 16                              | 20,1             | 815               | 80                           | 64                         | 2,51                                    |
| 4 x 25                              | 24,5             | 1.225             | 101                          | 82                         | 1,62                                    |
| 4 x 35                              | 28,2             | 1.655             | 126                          | 98                         | 1,15                                    |
| 4 x 50                              | 32,3             | 2.270             | 153                          | 116                        | 0,802                                   |
| 4 x 70                              | 37,5             | 3.105             | 196                          | 143                        | 0,565                                   |
| 4 x 95                              | 42,6             | 4.020             | 238                          | 169                        | 0,428                                   |
| 5 G 2,5                             | 11,2             | 220               | 25                           | 24                         | 16,6                                    |
| 5 G 4                               | 14,3             | 340               | 34                           | 30                         | 10,3                                    |
| 5 G 6                               | 16,0             | 450               | 43                           | 38                         | 6,86                                    |
| 5 G 10                              | 19,6             | 725               | 60                           | 50                         | 3,97                                    |
| 5 G 16                              | 22,3             | 1.030             | 80                           | 64                         | 2,51                                    |
| 5 G 25                              | 28,1             | 1.565             | 101                          | 82                         | 1,62                                    |
| 5 G 35                              | 31,3             | 2.100             | 126                          | 98                         | 1,15                                    |
| 6 G 2,5                             | 12,4             | 255               | 30                           | 29                         | 19,2                                    |
| 7 G 2,5                             | 12,5             | 275               | 30                           | 29                         | 19,2                                    |
| 10 G 2,5                            | 14,9             | 375               | 30                           | 29                         | 19,2                                    |
| 12 G 2,5                            | 15,6             | 445               | 30                           | 29                         | 19,2                                    |
| 14 G 2,5                            | 16,9             | 505               | 30                           | 29                         | 19,2                                    |
| 16 G 2,5                            | 17,8             | 575               | 30                           | 29                         | 19,2                                    |
| 19 G 2,5                            | 18,9             | 665               | 30                           | 29                         | 19,2                                    |
| 24 G 2,5                            | 21,4             | 825               | 30                           | 29                         | 19,2                                    |
| 27 G 2,5                            | 22,4             | 925               | 30                           | 29                         | 19,2                                    |
| 30 G 2,5                            | 23,3             | 1.015             | 30                           | 29                         | 19,2                                    |
| 37 G 2,5                            | 25,5             | 1.280             | 30                           | 29                         | 19,2                                    |

<sup>3</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>4</sup> Reference method D1 according to IEC 60364-5-52. In a duct buried at 0,7 m depth with soil thermal resistivity of 2,5 K·m/W and 20°C of ground temperature.

<sup>5</sup> At maximum service temperature and  $\cos\phi=1$ .

For cables having 2 conductors or 3 cores up to 10 mm<sup>2</sup>, it is supposed a single-phase circuit. For the rest of the cables it is supposed a three-phase circuit.

For cables having 6 or more conductors, it is supposed a single-phase circuit that not all conductors are fully charged

### SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2  | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|-----|-----|----|-----|----|
| A/mm <sup>2</sup> | 364 | 257 | 210 | 163 | 115 | 94  | 81 | 73  | 66 |

### CORRECTION FACTORS FOR AIR TEMPERATURE

| Air T. (°C) | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60  |
|-------------|------|------|----|------|------|------|------|------|-----|
| Factor      | 1,12 | 1,06 | 1  | 0,94 | 0,87 | 0,79 | 0,71 | 0,61 | 0,5 |

### CORRECTION FACTORS FOR GROUND TEMPERATURE

| Ground T. (°C) | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45   | 50   |
|----------------|------|------|----|------|------|------|------|------|------|
| Factor         | 1,10 | 1,05 | 1  | 0,95 | 0,89 | 0,84 | 0,77 | 0,71 | 0,63 |

### CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

| Moisture degree of soil | Very damp | Slightly damp | Slightly dry | Dry | Very dry |
|-------------------------|-----------|---------------|--------------|-----|----------|
| Thermal Resist. (K·m/W) | 1         | 1,5           | 2            | 2,5 | 3        |
| Factor                  | 1,18      | 1,10          | 1,05         | 1   | 0,96     |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.



**E<sub>ca</sub>**

## APPLICATION

Topflex® MS Tri-rated H07V2-K cable has been designed for the internal wiring of electrical cabinets, switch boards and small electrical devices. Due to its manufacturing characteristics, it can be used in conduit or in flexible motor ducts, transformers and other machinery in general.

- Industrial use.
- Electrical panel wiring.

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible), according to EN 60228, IEC 60228 and BS 6360.

### Insulation

Flexible PVC, extra sliding, high service temperature type T13 according to EN 50363-3, and Class 43 UL 1581. The special characteristics of the material ensure good easy-slide properties to the cable.

The standard identification of insulated conductors is the following:

|              |               |
|--------------|---------------|
| Blue         | RAL 5012      |
| Brown        | RAL 8003      |
| Black        | RAL 9005      |
| Red          | RAL 3000      |
| Green/Yellow | RAL 6018/1021 |
| Grey         | RAL 7000      |
| Dark Blue    | RAL 5010      |
| White        | RAL 9010      |
| Orange       | RAL 2003      |
| Violet       | RAL 4005      |
| Pink         | RAL 3015      |

## CHARACTERISTICS

### ⚡ Electrical performance

Low voltage

H05V2-K 300/500 V. - H07V2-K 450/750 V

BS 600/1000 V. - UL 600V. - CSA 600V

### 🔥 Thermal performance

Maximum service temperature: 90°C s/HD and BS,  
105°C s / UL and CSA.

Maximum short-circuit temperature: 160°C (max 5 s).

Minimum service temperature: -40°C (fixed and protected installations).

### 🔥 Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1. VW-1 and FT2 according to UL 2556

Reaction to fire CPR: Eca according to EN 50575.

### 🌀 Mechanical performance

Minimum bending radius: 5x cable diameter.

### 🌿 Environmental performance

Chemical & Oil resistance: Acceptable.

Water resistance: AD3 Sprays.

### CROSS SECTION PACKAGING

|                            |                                       |
|----------------------------|---------------------------------------|
| 0,50-6 mm <sup>2</sup>     | 100 m reels (or barrels upon request) |
| 10-16 mm <sup>2</sup>      | 100 m reels or bulk drums             |
| 25 mm <sup>2</sup> onwards | 100 m reels or bulk drums             |

## STANDARDS / COMPLIANCE



### According to

EN 50525-2-31 / UL 758 / CSA C22.2 / BS 6231.



### Standards and approvals

HAR / AENOR / UL LISTED / RoHS / CE.



### CPR (Construction Products Regulation)

E<sub>ca</sub>



### DIMENSIONS & ADMISSIBLE INTENSITIES



| Section (mm <sup>2</sup> ) | AWG     | EN 50525-2-31 | BS 6231 | UL 758     | UL 2556    | CSA 22.2 |
|----------------------------|---------|---------------|---------|------------|------------|----------|
| 0,50                       | 22      | H05V2-K       | CK      | Style 1015 | FT2        | Type TEW |
| 0,75                       | 20      | H05V2-K       | CK      | Style 1015 | FT2        | Type TEW |
| 1                          | 18      | H05V2-K       | CK      | Style 1015 | FT2        | Type TEW |
| 1,5                        | 16      | H07V2-K       | CK      | Style 1015 | FT2        | Type TEW |
| 2,5                        | 14      | H07V2-K       | CK      | Style 1015 | FT2        | Type TEW |
| 4                          | 12      | H07V2-K       | CK      | Style 1015 | FT2        | Type TEW |
| 6                          | 10      | H07V2-K       | CK      | Style 1015 | FT2        | Type TEW |
| 10                         | 8       | H07V2-K       | CK      | Style 1028 | FT2 - VW-1 | Type TEW |
| 16                         | 6       | H07V2-K       | CK      | Style 1283 | FT2 - VW-1 | Type TEW |
| 25                         | 4       | H07V2-K       | CK      | Style 1283 | FT2 - VW-1 | Type TEW |
| 35                         | 2       | H07V2-K       | CK      | Style 1283 | FT2 - VW-1 | Type TEW |
| 50                         | 1       | 07V2-K        | CK      | Style 1284 | FT2 - VW-1 | Type TEW |
| 70                         | 2/0     | 07V2-K        | CK      | Style 1284 | FT2 - VW-1 | Type TEW |
| 95                         | 3/0     | 07V2-K        | CK      | Style 1284 | FT2 - VW-1 | Type TEW |
| 120                        | 4/0     | 07V2-K        | CK      | Style 1284 | FT2 - VW-1 | Type TEW |
| 150                        | 250 MCM | 07V2-K        | CK      | Style 1284 | FT2 - VW-1 | ---      |
| 185                        | 350 MCM | 07V2-K        | CK      | Style 1284 | FT2 - VW-1 | ---      |
| 240                        | 450 MCM | 07V2-K        | CK      | Style 1284 | FT2 - VW-1 | ---      |
| 300                        | 550 MCM | 07V2-K        | ---     | Style 1284 | FT2 - VW-1 | ---      |
| 400                        | 750 MCM | 07V2-K        | ---     | Style 1284 | FT2 - VW-1 | ---      |

Equivalences and designation applicable for every size and standard

| Cross-Section (mm <sup>2</sup> ) | Diameter (mm) | Weight (kg/km) | Current (A)<br>2 cond. <sup>1</sup> | Current (A)<br>3 cond. <sup>1</sup> | Voltage drop (V/A · km) <sup>2</sup> |
|----------------------------------|---------------|----------------|-------------------------------------|-------------------------------------|--------------------------------------|
| 1 x 0,50                         | 2,5           | 10             | 12                                  | 10                                  | 99,5                                 |
| 1 x 0,75                         | 2,7           | 13             | 15                                  | 13                                  | 66,6                                 |
| 1 x 1                            | 2,8           | 15             | 18                                  | 16                                  | 49,9                                 |
| 1 x 1,5                          | 3             | 20             | 23                                  | 20                                  | 34,0                                 |
| 1 x 2,5                          | 3,5           | 30             | 31                                  | 28                                  | 20,4                                 |
| 1 x 4                            | 4             | 45             | 42                                  | 37                                  | 12,7                                 |
| 1 x 6                            | 4,6           | 65             | 54                                  | 48                                  | 8,45                                 |
| 1 x 10                           | 6,4           | 115            | 75                                  | 66                                  | 4,89                                 |
| 1 x 16                           | 8,1           | 180            | 100                                 | 88                                  | 3,10                                 |
| 1 x 25                           | 9,5           | 265            | 133                                 | 117                                 | 2,00                                 |
| 1 x 35                           | 10,6          | 355            | 164                                 | 144                                 | 1,42                                 |
| 1 x 50                           | 13,1          | 505            | 198                                 | 175                                 | 0,99                                 |
| 1 x 70                           | 14,8          | 685            | 253                                 | 222                                 | 0,696                                |
| 1 x 95                           | 16,6          | 890            | 306                                 | 269                                 | 0,527                                |
| 1 x 120                          | 17,8          | 1.115          | 354                                 | 312                                 | 0,412                                |
| 1 x 150                          | 20,2          | 1.400          | 393                                 | 342                                 | 0,330                                |

# TOPFLEX<sup>®</sup> MS

## TRI-RATED / H07V2-K

| Cross-Section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Current<br>(A)<br>2 cond. <sup>1</sup> | Current<br>(A)<br>3 cond. <sup>1</sup> | Voltage drop<br>(V/A · km) <sup>2</sup> |
|-------------------------------------|------------------|-------------------|----------------------------------------|----------------------------------------|-----------------------------------------|
| 1 x 185                             | 21,9             | 1.675             | 449                                    | 384                                    | 0,270                                   |
| 1 x 240                             | 24,3             | 2.180             | 528                                    | 450                                    | 0,205                                   |
| 1 x 300                             | 27,7             | 2.790             | 603                                    | 514                                    | 0,164                                   |
| 1 x 400                             | 31,6             | 3.650             | 725                                    | 620                                    | 0,124                                   |

<sup>1</sup> Reference method B1 for 90°C insulation cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> At maximum service temperature, cosφ=1 and single-phase circuit.

### SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2  | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|-----|-----|----|-----|----|
| A/mm <sup>2</sup> | 316 | 223 | 182 | 141 | 100 | 82  | 71 | 63  | 58 |

### CORRECTION FACTORS FOR AIR TEMPERATURE

| Air T. (°C) | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
|-------------|------|------|----|------|------|------|------|------|------|
| Factor      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.



**D<sub>ca</sub>**

## APPLICATION

Toxfree® ZH H05Z-K & H07Z-K is a flexible cable for fixed and protected installations.

It is highly recommended for use in public places such as: hospitals, schools, museums, airports, bus terminals, shopping malls, offices, laboratories, etc.

Not suitable for wet places or immersed.

- Domestic use.
- Public places.
- Electrical panel wiring.

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Halogen free thermosetting flexible rubber insulation, type EI5 according to EN 50363-5.

The standard identification of insulated conductors is the following:

|              |               |
|--------------|---------------|
| Blue         | RAL 5015      |
| Brown        | RAL 8003      |
| Black        | RAL 9005      |
| Red          | RAL 3000      |
| Green/Yellow | RAL 6018/1021 |
| Grey         | RAL 7000      |
| White        | RAL 9010      |

Other colours available on request.

## CHARACTERISTICS

### Electrical performance

Low voltage: 300/500 V. 450/750 V.

Rated Voltage: H05Z-K (up to 1 mm<sup>2</sup>): 300/500 V.

H07Z-K (from 1,5 mm<sup>2</sup> onwards): 450/750 V.

### Thermal performance

Maximum service temperature: 90°C.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations).

### Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1.

Reaction to fire CPR: D<sub>ca</sub>-s1b, d1, a1 according to EN 50575 (see cross-section).

LSHF (Low Smoke Zero Halogen) according to EN 60754-1 / IEC 60754-1.

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 60%.

Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.

### Mechanical performance

Minimum bending radius: 5x cable diameter.

### Environmental performance

Chemical & Oil resistance: Acceptable.

### Installation conditions

In conduit.

## STANDARDS / COMPLIANCE



### According to

EN 50525-3-41



### Standards and approvals

HAR / AENOR / RoHS / CE



### CPR (Construction Products Regulation)

D<sub>ca</sub>-s1b, d1, a1 (according to cross-section)



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section (mm²) | Diameter (mm) | Weight (Kg/km) | Open Air (A) <sup>1</sup> (2 cores) | Open Air (A) <sup>1</sup> (3 cores) | Voltage drop (V/A · km) <sup>2</sup> |
|---------------------|---------------|----------------|-------------------------------------|-------------------------------------|--------------------------------------|
| 1 x 1               | 2,4           | 13             |                                     |                                     | 49,72                                |
| 1 x 1,5             | 2,9           | 20             | 23                                  | 20                                  | 33,91                                |
| 1 x 2,5             | 3,6           | 30             | 31                                  | 28                                  | 20,35                                |
| 1x4                 | 4,1           | 45             | 42                                  | 37                                  | 12,62                                |
| 1x6                 | 4,7           | 60             | 54                                  | 48                                  | 8,41                                 |
| 1 x 10              | 6,0           | 105            | 75                                  | 66                                  | 4,87                                 |
| 1 x 16              | 7,0           | 160            | 100                                 | 88                                  | 3,08                                 |
| 1 x 25              | 8,8           | 245            | 133                                 | 117                                 | 1,99                                 |
| 1 x35               | 9,9           | 340            | 164                                 | 144                                 | 1,41                                 |
| 1 x 50              | 11,8          | 470            | 198                                 | 175                                 | 0,98                                 |
| 1 x 70              | 13,2          | 650            | 253                                 | 222                                 | 0,69                                 |
| 1 x 95              | 15,4          | 860            | 306                                 | 269                                 | 0,52                                 |
| 1 x 120             | 16,9          | 1.080          | 354                                 | 312                                 | 0,41                                 |
| 1 x 150             | 19,0          | 1.345          | 393                                 | 342                                 | 0,32                                 |

<sup>1</sup> Reference method B1 according to IEC 60364-5-52 in open air at 30°C ambient temperature. Two or three loaded conductors installed in conduit on a wall.

<sup>2</sup> At maximum service temperature, cosφ=1 and single-phase circuit.

## SHORT CIRCUIT CURRENT CARRYING CAPACITIES

| Time (s) | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| A/mm²    | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

## CORRECTION FACTORS

| Air T. (°C) | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
|-------------|------|------|----|------|------|------|------|------|------|
| Factor      | 1,12 | 1,06 | 1  | 0,94 | 0,87 | 0,79 | 0,71 | 0,61 | 0,50 |



**D<sub>ca</sub>**

## APPLICATION

Toxfree® ZH H05Z-K & H07Z-K is a flexible cable for fixed and protected installations.

It is highly recommended for use in public places such as: hospitals, schools, museums, airports, bus terminals, shopping malls, offices, laboratories, etc.

Not suitable for wet places or immersed.

- Domestic use.
- Public places.
- Electrical panel wiring.

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Halogen free thermosetting flexible rubber insulation, type EI5 according to EN 50363-5.

The standard identification of insulated conductors is the following:

|              |               |
|--------------|---------------|
| Blue         | RAL 5015      |
| Brown        | RAL 8003      |
| Black        | RAL 9005      |
| Red          | RAL 3000      |
| Green/Yellow | RAL 6018/1021 |
| Grey         | RAL 7000      |
| White        | RAL 9010      |

Other colours available on request.

## CHARACTERISTICS

### Electrical performance

Low voltage: 300/500 V. 450/750 V.

Rated Voltage: H05Z-K (up to 1 mm<sup>2</sup>): 300/500 V.

H07Z-K (from 1,5 mm<sup>2</sup> onwards): 450/750 V.

### Thermal performance

Maximum service temperature: 90°C.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations).

### Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1.

Reaction to fire CPR: D<sub>ca</sub>-s1b, d1, a1 according to EN 50575 (see cross-section).

LSHF (Low Smoke Zero Halogen) according to EN 60754-1 / IEC 60754-1.

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 60%.

Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.

### Mechanical performance

Minimum bending radius: 5x cable diameter.

### Environmental performance

Chemical & Oil resistance: Acceptable.

### Installation conditions

In conduit.

## STANDARDS / COMPLIANCE



### According to

EN 50525-3-41



### Standards and approvals

HAR / AENOR / RoHS / CE



### CPR (Construction Products Regulation)

D<sub>ca</sub>-s1b, d1, a1 (according to cross-section)





E<sub>ca</sub>

## APPLICATION

Xtrem<sup>®</sup> H07RN-F rubber cables are designed to supply power to low voltage appliances including electric motors and submersible pumps in deep water installations, as well as many other electrical equipment. Thanks to its extraordinary flexibility and mechanical strength, the Xtrem<sup>®</sup> H07RN-F cable is ideal for power transmission in both fixed installation or mobile service. The use nominal voltage up to 1000 V is accepted in fixed protected assemblies. Top Cable Xtrem<sup>®</sup> H07RN-F cables are designed to power all types of electrical equipment including motors and submersible pumps in deep water installations (AD8).

- Industrial use.
- Robotics.
- Temporary site installations.
- Mobile use.
- Windmills

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor, class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Thermosetting rubber insulation type EI7 according to EN 50363-1.

The standard identification, according to HD 308 and HD 186, is the following:

- |           |                                            |
|-----------|--------------------------------------------|
| 1 x       | Natural                                    |
| 2 x       | Blue + Brown                               |
| 3 G       | Blue + Brown + Green/Yellow                |
| 3 x       | Brown + Black + Grey                       |
| 4 G       | Brown + Black + Grey + Green/Yellow        |
| 4 x       | Brown + Black + Grey + Blue                |
| 5 G       | Brown + Black + Grey + Blue + Green/Yellow |
| 6 or more | Black numbered + Green/Yellow              |

### Outer sheath

Thermosetting flexible rubber outer sheath type EM2 according to EN 50363-2-1. Black colour.

## CHARACTERISTICS



### Electrical performance

Low voltage: 450/750V.



### Thermal performance

Maximum service temperature: 90°C.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations) and -25°C (mobile use).



### Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1.

Reaction to fire CPR: E<sub>ca</sub> according to EN 50575.



### Mechanical performance

Minimum bending radius:

3 x cable diameter < 12 mm.

4 x cable diameter ≥ 12 mm.

Impact resistance: AG2 Medium severity.



### Environmental performance

Chemical & Oil resistance: excellent.

Grease & mineral oils resistance: excellent.

Water resistance: AD8 Submersion.

Cable for submersible pumps in drinkable water according to AS/ NZS 4020. Deep wells | Drinkable water | AWQC.



### Installation conditions

Open Air.

Submersible pumps cable.



### Other

Meter by meter marking.

## STANDARDS / COMPLIANCE



### According to

EN 50525-2-31 / IEC 60092-353 / IEC 60245



### Standards and approvals

HAR / AENOR / DNV / RoHS / CE

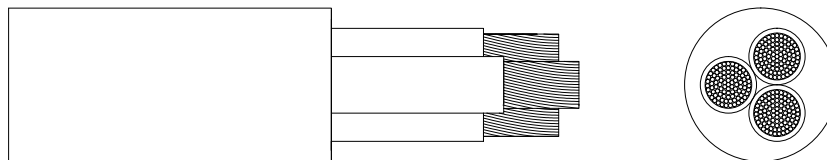


### CPR (Construction Products Regulation)

E<sub>ca</sub>



### DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-Section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Fixed Inst.<br>(A) <sup>1</sup> | Mobile Service<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|---------------------------------|------------------------------------|-----------------------------------------|
| 1 x 1,5                             | 5,9              | 45                | 28                              | 16                                 | 30,7                                    |
| 1 x 2,5                             | 6,5              | 60                | 39                              | 25                                 | 18,4                                    |
| 1x4                                 | 7,4              | 85                | 53                              | 34                                 | 11,4                                    |
| 1x6                                 | 8,1              | 110               | 68                              | 43                                 | 7,63                                    |
| 1 x 10                              | 9,9              | 175               | 93                              | 60                                 | 4,42                                    |
| 1 x 16                              | 11,2             | 240               | 124                             | 79                                 | 2,80                                    |
| 1 x 25                              | 13,0             | 345               | 161                             | 104                                | 1,80                                    |
| 1 x 35                              | 14,6             | 460               | 200                             | 129                                | 1,28                                    |
| 1 x 50                              | 17,0             | 635               | 242                             | 162                                | 0,893                                   |
| 1 x 70                              | 19,1             | 845               | 310                             | 202                                | 0,629                                   |
| 1 x 95                              | 21,4             | 1.100             | 377                             | 240                                | 0,476                                   |
| 1 x 120                             | 23,3             | 1.375             | 437                             | 280                                | 0,372                                   |
| 1 x 150                             | 25,8             | 1.695             | 504                             | 321                                | 0,298                                   |
| 1 x 185                             | 28,1             | 2.045             | 575                             | 363                                | 0,245                                   |
| 1 x 240                             | 31,3             | 2.635             | 679                             | 433                                | 0,185                                   |
| 1 x 300                             | 34,4             | 3.275             | 783                             | 497                                | 0,148                                   |
| 1 x 400                             | 39,0             | 4.270             | 940                             | 586                                | 0,112                                   |
| 1 x 500                             | 41,9             | 5.370             | 1.083                           | 670                                | 0,0888                                  |
| 1 x 630                             | 47,8             | 6.960             | 1.254                           | 784                                | 0,0664                                  |
| 2 x 1                               | 7,4              | 75                | 21                              | 10                                 | 45,1                                    |
| 2 x 1,5                             | 8,4              | 100               | 26                              | 16                                 | 30,7                                    |
| 2 x 2,5                             | 9,8              | 145               | 36                              | 25                                 | 18,4                                    |
| 2 x 4                               | 11,5             | 200               | 49                              | 34                                 | 11,4                                    |
| 2 x 6                               | 12,3             | 250               | 63                              | 43                                 | 7,63                                    |
| 2 x 10                              | 17,5             | 485               | 86                              | 60                                 | 4,42                                    |
| 2 x 16                              | 20,0             | 670               | 115                             | 79                                 | 2,80                                    |
| 2 x 25                              | 24,5             | 995               | 149                             | 105                                | 1,80                                    |
| 2 x 35                              | 26,0             | 1.240             | 185                             | 130                                | 1,28                                    |
| 2 x 50                              | 31,9             | 1.765             | 225                             | 165                                | 0,893                                   |
| 2 x 70                              | 36,0             | 2.335             | 289                             | 205                                | 0,629                                   |
| 3 G 1                               | 8,1              | 95                | 21                              | 10                                 | 45,1                                    |
| 3 G 1,5                             | 9,3              | 125               | 26                              | 16                                 | 30,7                                    |
| 3 G 2,5                             | 11,1             | 185               | 36                              | 25                                 | 18,4                                    |
| 3 G 4                               | 12,7             | 260               | 49                              | 35                                 | 11,4                                    |
| 3 G 6                               | 14,3             | 335               | 63                              | 44                                 | 7,63                                    |
| 3 G 10                              | 19,6             | 630               | 86                              | 62                                 | 4,42                                    |
| 3 G 16                              | 21,8             | 855               | 115                             | 82                                 | 2,80                                    |
| 3 G 25                              | 26,0             | 1.250             | 149                             | 109                                | 1,80                                    |
| 3 G 35                              | 29,4             | 1.650             | 185                             | 135                                | 1,28                                    |
| 3 G 50                              | 33,4             | 2.235             | 225                             | 169                                | 0,893                                   |
| 3 G 70                              | 37,8             | 2.970             | 289                             | 211                                | 0,629                                   |
| 3 G 95                              | 44,0             | 3.930             | 352                             | 250                                | 0,476                                   |
| 3 G 120                             | 47,5             | 4.815             | 410                             | 292                                | 0,372                                   |
| 3 G 150                             | 51,8             | 5.900             | 473                             | 335                                | 0,298                                   |
| 3 G 185                             | 57,7             | 7.165             | 542                             | 378                                | 0,245                                   |
| 4 G 1                               | 8,9              | 120               | 21                              | 10                                 | 45,1                                    |
| 4 G 1,5                             | 10,4             | 160               | 26                              | 16                                 | 30,7                                    |
| 4 G 2,5                             | 12,1             | 225               | 36                              | 20                                 | 18,4                                    |
| 4 G 4                               | 14,0             | 320               | 49                              | 30                                 | 11,4                                    |
| 4 G 6                               | 15,7             | 425               | 63                              | 37                                 | 7,63                                    |
| 4 G 10                              | 21,4             | 775               | 86                              | 52                                 | 4,42                                    |
| 4 G 16                              | 24,6             | 1.080             | 115                             | 69                                 | 2,80                                    |
| 4 G 25                              | 29,5             | 1.610             | 149                             | 92                                 | 1,80                                    |
| 4 G 35                              | 32,7             | 2.100             | 185                             | 114                                | 1,28                                    |
| 4 G 50                              | 37,7             | 2.865             | 225                             | 143                                | 0,893                                   |
| 4 G 70                              | 41,7             | 3.795             | 289                             | 178                                | 0,629                                   |
| 4 G 95                              | 48,8             | 4.995             | 352                             | 210                                | 0,476                                   |
| 4 G 120                             | 52,0             | 6.110             | 410                             | 246                                | 0,372                                   |
| 4 G 150                             | 57,7             | 7.565             | 473                             | 282                                | 0,298                                   |

| Cross-Section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Fixed Inst.<br>(A) <sup>1</sup> | Mobile Service<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|---------------------------------|------------------------------------|-----------------------------------------|
| 4 G 185                             | 63,2             | 9.180             | 542                             | 319                                | 0,245                                   |
| 4 G 240                             | 71,9             | 11.940            | 641                             | 377                                | 0,185                                   |
| 5 G 1                               | 9,6              | 145               | 21                              | 10                                 | 45,1                                    |
| 5 G 1,5                             | 11,3             | 185               | 26                              | 16                                 | 30,7                                    |
| 5 G 2,5                             | 13,5             | 280               | 36                              | 20                                 | 18,4                                    |
| 5 G 4                               | 15,6             | 395               | 49                              | 30                                 | 11,4                                    |
| 5 G 6                               | 17,7             | 530               | 63                              | 38                                 | 7,63                                    |
| 5 G 10                              | 23,9             | 945               | 86                              | 54                                 | 4,42                                    |
| 5 G 16                              | 27,0             | 1.320             | 115                             | 71                                 | 2,80                                    |
| 5 G 25                              | 32,5             | 1.960             | 149                             | 94                                 | 1,80                                    |
| 5 G 35                              | 35,8             | 2.545             | 185                             | 114                                | 1,28                                    |
| 5 G 50                              | 41,9             | 3.535             | 225                             | 143                                | 0,893                                   |
| 5 G 70                              | 46,7             | 4.680             | 289                             | 178                                | 0,629                                   |
| 5 G 95                              | 52,5             | 6.090             | 352                             | 210                                | 0,476                                   |
| 5 G 120                             | 57,3             | 7.455             | 410                             | 246                                | 0,372                                   |
| 5 G 150                             | 65,1             | 9.300             | 473                             | 282                                | 0,298                                   |
| 5 G 185                             | 71,4             | 11.240            | 542                             | 319                                | 0,245                                   |
| 7 G 1,5                             | 15,0             | 315               | 26                              | 16                                 | 30,7                                    |
| 7 G 2,5                             | 16,8             | 435               | 36                              | 25                                 | 18,4                                    |
| 7 G 4                               | 20,2             | 640               | 49                              | 34                                 | 11,4                                    |
| 8 G 1,5                             | 15,5             | 350               | 26                              | 16                                 | 30,7                                    |
| 8 G 2,5                             | 18,4             | 510               | 36                              | 25                                 | 18,4                                    |
| 8 G 4                               | 21,8             | 740               | 49                              | 34                                 | 11,4                                    |
| 10 G 2,5                            | 19,2             | 560               | 36                              | 25                                 | 18,4                                    |
| 10 G 4                              | 22,8             | 830               | 49                              | 34                                 | 11,4                                    |
| 12 G 1,5                            | 17,5             | 445               | 26                              | 16                                 | 30,7                                    |
| 12 G 2,5                            | 20,5             | 650               | 36                              | 25                                 | 18,4                                    |
| 12 G 4                              | 24,4             | 950               | 49                              | 34                                 | 11,5                                    |
| 14 G 2,5                            | 21,7             | 745               | 36                              | 25                                 | 18,4                                    |
| 16 G 1,5                            | 19,6             | 580               | 26                              | 16                                 | 30,7                                    |
| 16 G 2,5                            | 22,5             | 845               | 36                              | 25                                 | 18,4                                    |
| 18 G 1,5                            | 20,5             | 645               | 26                              | 16                                 | 30,7                                    |
| 18 G 2,5                            | 23,6             | 920               | 36                              | 25                                 | 18,4                                    |
| 19 G 1,5                            | 21,2             | 680               | 26                              | 16                                 | 30,7                                    |
| 19 G 2,5                            | 25,1             | 1.005             | 36                              | 25                                 | 18,4                                    |
| 24 G 1,5                            | 23,1             | 815               | 26                              | 16                                 | 30,7                                    |
| 24 G 2,5                            | 27,3             | 1.190             | 36                              | 25                                 | 18,4                                    |
| 27 G 1,5                            | 24,5             | 895               | 26                              | 16                                 | 30,7                                    |
| 27 G 2,5                            | 28,7             | 1.315             | 36                              | 25                                 | 18,4                                    |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC60364-5-52 in open air at 30°C ambient temperature. It is supposed a single-phase circuit.

<sup>2</sup> One cable in open air at 30°C ambient temperature according to EN 50565. For cables having 4 or 5 cores, it is supposed a three-phase circuit. For the rest of the cables it is supposed a single-phase circuit.

<sup>3</sup> At 60°C conductor temperature, cos φ= 1 and single-phase circuit.

## SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| A/mm <sup>2</sup> | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

## CORRECTION FACTORS TEMPERATURE

| Air Temp (°C)      | 30 | 35   | 40   | 45   | 50   | 55   |
|--------------------|----|------|------|------|------|------|
| Mobile service     | 1  | 0,91 | 0,82 | 0,71 | 0,58 | 0,41 |
| Fixed installation | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 |



## B2<sub>ca</sub>

## APPLICATION

Toxfree® Xtrem ZH H07ZZ-F (AS) is a flexible cable for mobile service, suitable for installations where low smoke and halogen free fumes under fire conditions are required.

Suitable for installations where the cable must withstand medium mechanical stress, for machines in industrial and agricultural workshops, for motors and transportable machines on construction sites, for windmills and for agricultural applications.

- Industrial use.
- Mobile use.
- Windmills.

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Halogen free thermosetting rubber insulation, type EI8 according to EN 50363-5.

The standard identification according to HD 308, is the following:

|           |                                            |
|-----------|--------------------------------------------|
| 1 x       | Natural                                    |
| 2 x       | Blue + Brown                               |
| 3 G       | Blue + Brown + Green/Yellow                |
| 4 G       | Brown + Black + Grey + Green/Yellow        |
| 5 G       | Brown + Black + Grey + Blue + Green/Yellow |
| 6 or more | Black numbered + Green/Yellow              |

### Outer sheath

Halogen free thermosetting flexible rubber outer sheath type EM8 according to EN 50363-6.  
Black colour.

## CHARACTERISTICS



### Electrical performance

Low voltage 450/750 V.



### Thermal performance

Maximum service temperature: 90°C.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations).



### Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1.

Fire non-propagation according to EN 60332-3 / IEC 60332-3.

Reaction to fire CPR: B2<sub>ca</sub>-s1b, d1, a1, according to EN 50575 (see cross-section).

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 60%.

Low corrosive gases emission according to UNE-EN 60754-2 / IEC 60754-2.



### Mechanical performance

Minimum bending radius: 3x cable diameter < 12 mm.

4x cable diameter ≥ 12 mm.

Impact resistance: AG2 Medium severity.



### Environmental performance

Chemical & Oil resistance: excellent.

Grease & mineral oils resistance: excellent.

Water resistance: AD7 immersion.



### Installation conditions

Open Air.

In conduit.



### Other

Meter by meter marking.

## STANDARDS / COMPLIANCE



### According to

EN 50525-3-21



### Standards and approvals

HAR / AENOR / CE

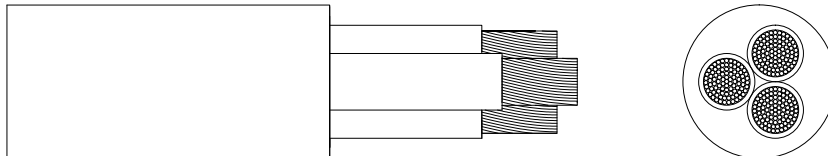


### CPR (Construction Products Regulation)

B2<sub>ca</sub>-s1b, d1, a1. (according to cross-section)



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-Section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(kg/km) | Fixed Inst.<br>(A) <sup>1</sup> | Mobile Service<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|---------------------------------|------------------------------------|-----------------------------------------|
| 1 x 6                               | 8,2              | 115               | 53                              | 38                                 | 6,63                                    |
| 1 x 10                              | 9,9              | 180               | 74                              | 53                                 | 3,84                                    |
| 1 x 16                              | 11,2             | 255               | 101                             | 71                                 | 2,43                                    |
| 1 x 25                              | 13,1             | 370               | 135                             | 94                                 | 1,57                                    |
| 1 x 35                              | 14,7             | 485               | 169                             | 117                                | 1,11                                    |
| 1 x 50                              | 17,1             | 670               | 207                             | 148                                | 0,776                                   |
| 1 x 70                              | 19,2             | 895               | 268                             | 185                                | 0,546                                   |
| 1 x 95                              | 21,7             | 1.125             | 328                             | 222                                | 0,414                                   |
| 1 x 120                             | 23,8             | 1.425             | 383                             | 260                                | 0,320                                   |
| 1 x 150                             | 26,2             | 1.770             | 444                             | 300                                | 0,259                                   |
| 1 x 185                             | 28,8             | 2.130             | 510                             | 341                                | 0,213                                   |
| 1 x 240                             | 32,0             | 2.735             | 607                             | 407                                | 0,161                                   |
| 1 x 300                             | 34,9             | 3.360             | 703                             | 468                                | 0,129                                   |
| 1 x 630                             | 48,8             | 7.055             | 1.088                           | 742                                | 0,057                                   |
| 2 x 1                               | 8,3              | 95                | 21                              | 10                                 | 45,2                                    |
| 2 x 1,5                             | 8,7              | 110               | 26                              | 16                                 | 31,9                                    |
| 2 x 2,5                             | 10,4             | 160               | 36                              | 25                                 | 18,5                                    |
| 2 x 4                               | 12,0             | 220               | 49                              | 34                                 | 11,5                                    |
| 2 x 6                               | 13,5             | 290               | 63                              | 43                                 | 7,66                                    |
| 2 x 10                              | 17,8             | 505               | 86                              | 60                                 | 4,43                                    |
| 2 x 16                              | 21,4             | 730               | 115                             | 79                                 | 2,81                                    |
| 2 x 25                              | 25,5             | 1.060             | 149                             | 105                                | 1,81                                    |
| 3 G 1                               | 8,8              | 110               | 21                              | 10                                 | 45,2                                    |
| 3 G 1,5                             | 9,7              | 140               | 26                              | 16                                 | 30,9                                    |
| 3 G 2,5                             | 11,4             | 200               | 36                              | 25                                 | 18,5                                    |
| 3 G 4                               | 13,0             | 275               | 49                              | 35                                 | 11,5                                    |
| 3 G 6                               | 14,3             | 352               | 63                              | 44                                 | 7,66                                    |
| 3 G 10                              | 19,8             | 650               | 86                              | 62                                 | 4,43                                    |
| 3 G 16                              | 22,4             | 895               | 115                             | 82                                 | 2,81                                    |
| 3 G 25                              | 26,8             | 1.305             | 149                             | 109                                | 1,81                                    |
| 3 G 35                              | 29,7             | 1.700             | 185                             | 135                                | 1,29                                    |
| 3 G 50                              | 35,4             | 2.395             | 225                             | 169                                | 0,896                                   |
| 3 G 70                              | 39,6             | 3.155             | 289                             | 211                                | 0,631                                   |
| 4 G 1                               | 9,7              | 135               | 17                              | 10                                 | 39,2                                    |
| 4 G 1,5                             | 10,6             | 170               | 23                              | 16                                 | 26,7                                    |
| 4 G 2,5                             | 12,6             | 245               | 32                              | 20                                 | 16,0                                    |
| 4 G 4                               | 14,5             | 340               | 42                              | 30                                 | 9,95                                    |
| 4 G 6                               | 16,3             | 460               | 54                              | 37                                 | 6,63                                    |
| 4 G 10                              | 21,3             | 790               | 75                              | 52                                 | 3,84                                    |
| 4 G 16                              | 24,3             | 1.105             | 100                             | 69                                 | 2,43                                    |
| 4 G 25                              | 30,2             | 1.685             | 127                             | 92                                 | 1,57                                    |
| 4 G 35                              | 33,3             | 2.180             | 158                             | 114                                | 1,11                                    |
| 4 G 50                              | 38,6             | 3.020             | 192                             | 143                                | 0,776                                   |
| 4 G 70                              | 43,1             | 3.995             | 246                             | 178                                | 0,546                                   |
| 4 G 95                              | 50,5             | 5.260             | 298                             | 210                                | 0,414                                   |
| 5 G 1                               | 10,5             | 160               | 17                              | 10                                 | 39,2                                    |
| 5 G 1,5                             | 11,6             | 205               | 23                              | 16                                 | 26,7                                    |
| 5 G 2,5                             | 13,9             | 295               | 32                              | 20                                 | 16,0                                    |
| 5 G 4                               | 16,3             | 435               | 42                              | 30                                 | 9,95                                    |
| 5 G 6                               | 17,9             | 555               | 54                              | 38                                 | 6,63                                    |
| 5 G 10                              | 23,6             | 975               | 75                              | 54                                 | 3,84                                    |
| 5 G 16                              | 27,3             | 1.380             | 100                             | 71                                 | 2,43                                    |
| 5 G 25                              | 33,0             | 2.055             | 127                             | 94                                 | 1,57                                    |
| 5 G 35                              | 35,8             | 2.640             | 158                             | 114                                | 1,11                                    |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> One cable in open air at 30°C ambient temperature according to EN 50565.

<sup>3</sup> At 60°C conductor temperature and  $\cos \varphi = 1$ .

For cables having 2 or 3 cores, it is supposed a single-phase circuit. For the rest of the cables it is supposed a three-phase circuit.

## SHORT CIRCUIT CURRENT CARRYING CAPACITIES

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| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2   | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| A/mm <sup>2</sup> | 452 | 320 | 261 | 202 | 143 | 117 | 101 | 90  | 83 |

## CORRECTION FACTORS

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| Air T. (°C)        | 30 | 35   | 40   | 45   | 50   | 55   |
|--------------------|----|------|------|------|------|------|
| Mobile service     | 1  | 0,91 | 0,82 | 0,71 | 0,58 | 0,41 |
| Fixed installation | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 |



**B2<sub>ca</sub>**

## APPLICATION

Toxfree® Xtrem ZH H07ZZ-F (AS) is a flexible cable for mobile service, suitable for installations where low smoke and halogen free fumes under fire conditions are required.

Suitable for installations where the cable must withstand medium mechanical stress, for machines in industrial and agricultural workshops, for motors and transportable machines on construction sites, for windmills and for agricultural applications.

- Industrial use.
- Mobile use.
- Windmills.

## CONSTRUCTION

### Conductor

Electrolytic annealed copper conductor class 5 (flexible) according to EN 60228 and IEC 60228.

### Insulation

Halogen free thermosetting rubber insulation, type EI8 according to EN 50363-5.

The standard identification according to HD 308, is the following:

|           |                                            |
|-----------|--------------------------------------------|
| 1 x       | Natural                                    |
| 2 x       | Blue + Brown                               |
| 3 G       | Blue + Brown + Green/Yellow                |
| 4 G       | Brown + Black + Grey + Green/Yellow        |
| 5 G       | Brown + Black + Grey + Blue + Green/Yellow |
| 6 or more | Black numbered + Green/Yellow              |

### Outer sheath

Halogen free thermosetting flexible rubber outer sheath type EM8 according to EN 50363-6.  
Black colour.

## CHARACTERISTICS

 **Electrical performance**  
Low voltage 450/750 V.

 **Thermal performance**  
Maximum service temperature: 90°C.  
Maximum short-circuit temperature: 250°C (max. 5 s).  
Minimum service temperature: -40°C (fixed and protected installations).

 **Fire performance**  
Flame non-propagation according to EN 60332-1 / IEC 60332-1.  
Fire non-propagation according to EN 60332-3 / IEC 60332-3.  
Reaction to fire CPR: B2<sub>ca</sub>-s1b, d1, a1, according to EN 50575 (see cross-section).  
Low smoke emission according to EN 61034 / IEC 61034:  
Light transmittance > 60%.  
Low corrosive gases emission according to UNE-EN 60754-2 / IEC 60754-2.

 **Mechanical performance**  
Minimum bending radius: 3x cable diameter < 12 mm.  
4x cable diameter ≥ 12 mm.  
Impact resistance: AG2 Medium severity.

 **Environmental performance**  
Chemical & Oil resistance: excellent.  
Grease & mineral oils resistance: excellent.  
Water resistance: AD7 immersion.

 **Installation conditions**  
Open Air.  
In conduit.

 **Other**  
Meter by meter marking.

## STANDARDS / COMPLIANCE

 **According to**  
EN 50525-3-21

 **Standards and approvals**  
HAR / AENOR / CE

 **CPR (Construction Products Regulation)**  
B2<sub>ca</sub>-s1b, d1, a1. (according to cross-section)





C<sub>ca</sub>

## APPLICATION

The TOPSOLAR® PV H1Z2Z2-K cable, which is TÜV certified according to EN 50618 and AENOR certified according to IEC 62930. It is suitable for both fixed and mobile solar installations (solar farms, rooftop solar installations and floating plants).

It is a highly flexible cable compatible with all major connectors and specially designed for the connection of photovoltaic panels. This versatile single-conductor cable is designed to meet the varying needs of the solar industry. Suitable for wet, damp and humid locations.

- Solar PV installations - string cable.

## CONSTRUCTION

### Conductor

Electrolytic annealed tinned copper conductor, Class 5 (flexible) according to IEC 60228 and EN 60228.

### Insulation

Low smoke Halogen Free (LSHF) cross linked rubber insulation. Insulation requirements according to EN 50618 table B1, Annex B and IEC 62930.

### Outer sheath

Low smoke Halogen Free (LSHF) cross linked flexible rubber outer sheath. Outer sheath requirements according to EN 50618 table B1, Annex B and IEC 62930. Red or black colour.

## STANDARDS / COMPLIANCE



### According to

EN 50618/ IEC 62930 / UTE C 32-502



### Standards and approvals

TÜV (from 2.5 to 25mm<sup>2</sup> in Black and Red) / RETIE /

AENOR/ RoHS / CE



### CPR (Construction Products Regulation)

C<sub>ca</sub>-s1b, d2, a1

## CHARACTERISTICS



### Electrical performance

Low voltage:

1,5/1,5 (1,8) kV DC. / 1,0/1,0 kV AC.



### Thermal performance

Maximum service temperature: 120°C during 20.000 h.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations).



### Fire performance

Flame non-propagation according to EN 60332-1-2 / IEC 60332-1-2.

Fire non-propagation according to EN 50399.

Reaction to fire CPR: C<sub>ca</sub>-s1b, d2, a1, according to EN 50575.

LSHF (Low Smoke Halogen Free) according to EN 60754-1 / IEC 60754-1.

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 60%.

Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.



### Mechanical performance

Minimum bending radius:

4 x cable diameter (cable diameter ≤ 8 mm)

5 x cable diameter (8 < cable diameter ≤ 12 mm)

6 x cable diameter (cable diameter > 12 mm).

Impact resistance: AG2 Medium severity.



### Environmental performance

Chemical & Oil resistance: Excellent.

Grease & mineral oils resistance: Excellent.

Ozone resistant according to EN 50618.

UV Resistant according to EN 50618.

Water resistance: AD8 Submersion.



### Installation conditions

Open Air. Buried. In conduit.



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-Section (mm <sup>2</sup> ) | Diameter (mm) | Weight (kg/km) | Single cable free in air (A) | Single cable on surfaces (A) | To cables adjacent on surface (A) | Voltage drop (V/A · km) |
|----------------------------------|---------------|----------------|------------------------------|------------------------------|-----------------------------------|-------------------------|
| 1 x 4                            | 5,4           | 60             | 55                           | 52                           | 44                                | 14,3                    |
| 1 x 6                            | 6,0           | 80             | 70                           | 67                           | 57                                | 9,49                    |
| 1 x 10                           | 7,0           | 120            | 98                           | 93                           | 79                                | 5,46                    |
| 1 x 16                           | 8,2           | 180            | 132                          | 125                          | 107                               | 3,47                    |
| 1 x 25                           | 10,2          | 280            | 176                          | 167                          | 142                               | 2,23                    |
| 1 x 35                           | 11,5          | 375            | 218                          | 207                          | 176                               | 1,58                    |
| 1 x 50                           | 13,3          | 525            | 276                          | 262                          | 221                               | 1,10                    |
| 1 x 70                           | 15,0          | 720            | 347                          | 330                          | 278                               | 0,772                   |
| 1 x 95                           | 17,0          | 930            | 416                          | 395                          | 333                               | 0,585                   |
| 1 x 120                          | 18,7          | 1.175          | 488                          | 464                          | 390                               | 0,457                   |
| 1 x 150                          | 21,0          | 1.475          | 566                          | 538                          | 453                               | 0,368                   |
| 1 x 185                          | 23,5          | 1.805          | 644                          | 612                          | 515                               | 0,301                   |
| 1 x 240                          | 26,3          | 2.345          | 775                          | 736                          | 620                               | 0,228                   |

The tolerances on the nominal outer diameters are:

Cables with outer diameter  $d \leq 7$  mm. → -0,1 +0,2 mm

Cables with outer diameter  $7 < d < 10$  mm. → -0,1 +0,3 mm

Cables with outer diameter  $d \geq 10$  mm. → -0,2 +0,4 mm

Current-carrying capacities, in amperes, are according to EN 50618 (ambient temperature of 60 °C). In all cases it is supposed a direct current circuit.

Voltage drop is calculated with conductor temperature of 120 °C.

## CORRECTION FACTORS FOR AIR TEMPERATURE

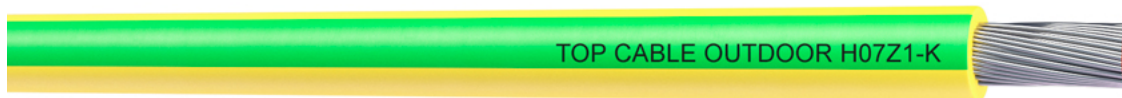
| Air Temp. (°C) | Up to 60 | 70   | 80   | 90   |
|----------------|----------|------|------|------|
| Factor         | 1        | 0,92 | 0,84 | 0,75 |

For groups reduction factors according to IEC 60364-5-52, Table A.52-17 shall apply.

# TOXFREE® ZH OUTDOOR H07Z1-K (AS) type 2 CuSn

Flexible and halogen free earthing connections.

ACCORDING TO: EN 50525-3-31 / UNE 211002.



## B2<sub>ca</sub>

## APPLICATION

Toxfree® ZH Outdoor H07Z1-K is a LSHF safety cable specially engineered for earthing connections in outdoor installations. The tinned copper and the special UV resistant compound make the cable resistant against corrosion and UV rays degradation.

## CONSTRUCTION

### Conductor

Electrolytic annealed tinned copper conductor class 5 (flexible) according to IEC 60228 and EN 60228.

### Insulation

UV resistant (LSHF) polyolefin insulation type T17 according to EN 50363-7.

The standard identification of insulated conductors is the following:

Green/Yellow RAL 6018/1021

Other colours available on request.

## CHARACTERISTICS

### ⚡ Electrical performance

Low voltage: 450/750 V.



### Thermal performance

Maximum service temperature: 70°C.

Maximum short-circuit temperature: 160°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations).



### Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1.

Fire non-propagation according to EN 60332-3-24 / IEC 60332-3-24 and EN 50399.

Reaction to fire CPR: B2<sub>ca</sub>-s1a,d1,a1, according to EN 50575.

LSHF (Low Smoke Zero Halogen) according to EN 60754-1 / IEC 60754-1.

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 80%.

Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.



### Mechanical performance

Minimum bending radius: 5x cable diameter.



### Environmental performance

Chemical & Oil resistance: Excellent.

Grease & mineral oils resistance: Excellent.

UV Resistant according to EN 50618.

Ozone resistant according to EN 50618.

## STANDARDS / COMPLIANCE



### According to

EN 50525-3-31 / UNE 211002



### Standards and approvals

HAR / AENOR / BUREAU VERITAS / RoHS / CE



### CPR (Construction Products Regulation)

B2<sub>ca</sub>-s1a,d1,a1



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section (mm <sup>2</sup> ) | Diameter (mm) | Weight (kg/km) | In conduit 2 cond. (A) <sup>1</sup> | In conduit 3 cond. (A) <sup>1</sup> | Voltage drop (V/A · km) <sup>2</sup> |
|----------------------------------|---------------|----------------|-------------------------------------|-------------------------------------|--------------------------------------|
| 1 x 4                            | 4,1           | 45             | 32                                  | 28                                  | 12,2                                 |
| 1 x 6                            | 4,7           | 65             | 41                                  | 36                                  | 8,11                                 |
| 1 x 10                           | 6,0           | 105            | 57                                  | 50                                  | 4,66                                 |
| 1 x 16                           | 7,0           | 160            | 76                                  | 68                                  | 2,97                                 |
| 1 x 25                           | 8,8           | 250            | 101                                 | 89                                  | 1,90                                 |
| 1 x 35                           | 9,9           | 335            | 125                                 | 110                                 | 1,35                                 |
| 1 x 50                           | 11,7          | 480            | 151                                 | 134                                 | 0,94                                 |

<sup>1</sup> Reference method B1 for two and three loaded conductors installed in conduit on a wall according to IEC60364-5-52 in open air at 30°C ambient temperature.

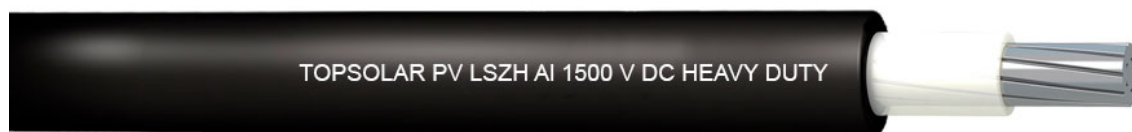
<sup>2</sup> At 70°C conductor temperature, cos φ= 1 and single-phase circuit.

## SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1   | 1,5 | 2  | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|-----|-----|----|-----|----|
| A/mm <sup>2</sup> | 364 | 257 | 210 | 163 | 115 | 94  | 81 | 73  | 66 |

## CORRECTION FACTORS FOR AIR TEMPERATURE

| Air T. (°C) | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
|-------------|------|------|----|------|------|------|------|------|------|
| Factor      | 1,12 | 1,06 | 1  | 0,94 | 0,87 | 0,79 | 0,71 | 0,61 | 0,50 |



## APPLICATION

TOPSOLAR® PV LSZH HEAVY DUTY DC Feeder Aluminium cable is suitable for direct buried installations and open air solar installations. This cable is recommended for connections between string boxes and photovoltaic inverters in large scale rooftops or ground farms.

- Solar PV installations.

## CONSTRUCTION

### Conductor

Aluminium conductor, class 2 according to EN 60228 and IEC 60228.

### Insulation

Cross-linked polyethylene insulation, type XLPE according to IEC 60502-1. Natural colour.

### Outer sheath

Polyethylene halogen free and UV resistant, type ST7 according to IEC 60502-1 with extra thickness as protection for direct buried cables.

Black colour.

## CHARACTERISTICS

### ⚡ Electrical performance

Low voltage: 1,5/1,5 (1,8) kV DC according to EN 50618.

1,8/3 (3,6) kV AC according to IEC 60502-1.

### 🌡 Thermal performance

Maximum service temperature: 90°C.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations).

Minimum installation and handling temperature: 0°C (on cable surface).

### 🔥 Fire performance

Halogen free: according to EN 60754 / IEC 60754.

### ⤵ Mechanical performance

Minimum bending radius: 5x cable diameter.

Impact resistance: AG4 ( $\leq 40$  J) Extra high severity according to NF C 33-226.

Abrasion according to NF C 33-226.

### 🌿 Environmental performance

UV Resistant according to EN 50618.

Water resistance: AD8 Submersion.

## STANDARDS / COMPLIANCE



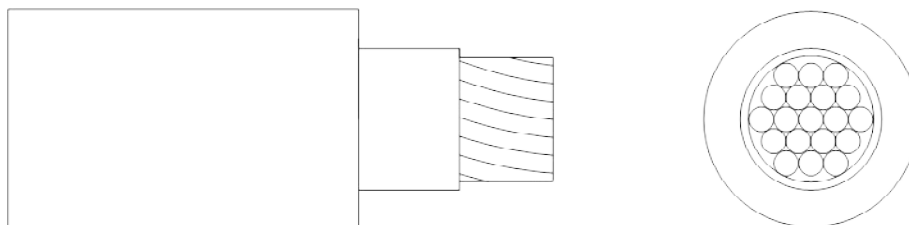
According to  
IEC 60502-1



Standards and approvals  
CE / RoHS



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section<br>(mm <sup>2</sup> ) | Diameter<br>(mm) | Weight<br>(Kg/km) | R20°C<br>(Ω/km) | Open air<br>(A) <sup>1</sup> | Buried<br>(A) <sup>2</sup> | Voltage drop<br>(V/A · km) <sup>3</sup> |
|-------------------------------------|------------------|-------------------|-----------------|------------------------------|----------------------------|-----------------------------------------|
| 1 x 150                             | 25,3             | 755               | 0,206           | 389                          | 261                        | 0,528                                   |
| 1 x 185                             | 26,9             | 880               | 0,164           | 447                          | 296                        | 0,420                                   |
| 1 x 240                             | 29,0             | 1.065             | 0,125           | 530                          | 343                        | 0,320                                   |
| 1 x 300                             | 31,0             | 1.240             | 0,100           | 613                          | 386                        | 0,256                                   |
| 1 x 400                             | 33,2             | 1.505             | 0,0778          | 740                          | 445                        | 0,199                                   |
| 4 x 185                             | 55,4             | 4.180             | 0,164           | 397                          | 296                        | 0,420                                   |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K-m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and  $\cos\phi=1$ .

In all cases it is supposed a single-phase circuit.

## SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1  | 1,5 | 2  | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|----|-----|----|-----|----|
| A/mm <sup>2</sup> | 299 | 211 | 173 | 134 | 94 | 77  | 67 | 60  | 55 |

## CORRECTION FACTORS FOR AIR TEMPERATURE

| Air T. (°C) | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
|-------------|------|------|----|------|------|------|------|------|------|
| Factor      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

## CORRECTION FACTORS FOR GROUND TEMPERATURE

| Ground T. (°C) | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45   | 50   |
|----------------|------|------|----|------|------|------|------|------|------|
| Factor         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,80 | 0,76 |

## CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

| Direct buried cables |           |         |           |         |           |         |
|----------------------|-----------|---------|-----------|---------|-----------|---------|
| 0,5 K·m/W            | 0,7 K·m/W | 1 K·m/W | 1,5 K·m/W | 2 K·m/W | 2,5 K·m/W | 3 K·m/W |
| 1,88                 | 1,62      | 1,50    | 1,28      | 1,12    | 1         | 0,90    |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.

# POWERHARD® AL RV 1,8/3 kV AL

Aluminium cable for power transmission.

ACCORDING TO: IEC 60502-1



100% Green Energy  
Cable Production

## APPLICATION

Powerhard® AL RV cable is suitable for all types of underground networks for public power distribution, as well as low voltage connexions in industrial plants, urban networks, buildings, etc. Due to its rigidity, its use is recommended in installations with a simple configuration where a flexible cable is not needed.

- Industrial use.
- Distribution network.

## CONSTRUCTION

### Conductor

Aluminium conductor, class 2 according to EN 60228 and IEC 60228.

### Insulation

Cross-linked polyethylene insulation type XLPE according to IEC 60502-1. The standard identification of insulated conductors according to HD 308, is the following:

- |     |                             |
|-----|-----------------------------|
| 1 x | Natural                     |
| 4 x | Brown + Black + Grey + Blue |

### Outer sheath

Flexible PVC outer sheath, type ST2 according to IEC 60502-1. Black colour.

## CHARACTERISTICS

### ⚡ Electrical performance

Low voltage: 1,8/3 kV.

### 🌡 Thermal performance

Maximum service temperature: 90°C.

Maximum short-circuit temperature: 250°C (max. 5 s).

Minimum service temperature: -40°C (fixed and protected installations).

### 🔥 Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1.

Reduced halogen emission. Chlorine <15%.

### 📏 Mechanical performance

Minimum bending radius: 5x cable diameter.

Impact resistance: AG2 Medium severity.

### 🌐 Environmental performance

Chemical & Oil resistance: Good.

UV Resistant according to HD 605/A1 and EN 50618.

Water resistance: AD8 Submersion.

### 🔧 Installation conditions

Open Air.

Buried.

In conduit.

## STANDARDS / COMPLIANCE



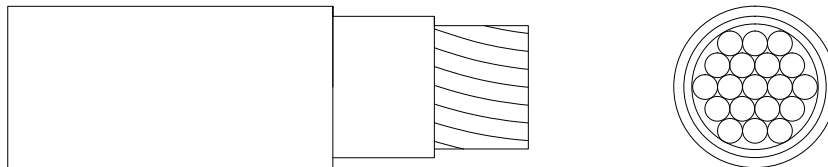
**According to**  
IEC 60502-1.



**Standards and approvals**  
RoHS / CE.



### DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross section (mm²)  | Diameter (mm) | Weight (kg/km) | Open air (A) <sup>1</sup> | Buried (A) <sup>2</sup> | Voltage drop (V/A · km) <sup>3</sup> |
|----------------------|---------------|----------------|---------------------------|-------------------------|--------------------------------------|
| 1 x 50               | 14,5          | 270            | 184                       | 139                     | 1,642                                |
| 1 x 70               | 16,6          | 345            | 237                       | 170                     | 1,135                                |
| 1 x 95               | 17,7          | 425            | 289                       | 204                     | 0,820                                |
| 1 x 120              | 19,5          | 525            | 337                       | 233                     | 0,648                                |
| 1 x 150              | 20,7          | 610            | 389                       | 261                     | 0,527                                |
| 1 x 185              | 22,5          | 740            | 447                       | 296                     | 0,420                                |
| 1 x 240              | 25,0          | 930            | 530                       | 343                     | 0,320                                |
| 1 x 300              | 27,0          | 1.095          | 613                       | 386                     | 0,256                                |
| 1 x 400              | 30,0          | 1..395         | 740                       | 448                     | 0,199                                |
| 1 x 630              | 38,4          | 2.225          | 996                       | 572                     | 0,120                                |
| 3 x 1 x 120 + 1 x 70 | 42,9          | 2.480          | 296                       | 174                     | 0,648                                |
| 4 x 70               | 38,6          | 1.820          | 211                       | 170                     | 1,135                                |
| 4 x 95               | 41,2          | 2.220          | 257                       | 204                     | 0,820                                |
| 4 x 1 x 120          | 47,0          | 2.090          | 296                       | 174                     | 0,648                                |
| 4 x 1 x 150          | 49,9          | 2.465          | 389                       | 195                     | 0,527                                |
| 4 x 1 x 185          | 54,3          | 2.980          | 342                       | 222                     | 0,420                                |
| 4 x 1 x 240          | 60,3          | 3.750          | 466                       | 257                     | 0,320                                |
| 4 x 1 x 300          | 65,1          | 4.420          | 539                       | 289                     | 0,256                                |
| 4 x 1 x 400          | 72,2          | 5.630          | 651                       | 336                     | 0,199                                |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K-m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and  $\cos\varphi=1$ .

For all cables is supposed a single-phase circuit.

### SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

| Time (s)          | 0,1 | 0,2 | 0,3 | 0,5 | 1  | 1,5 | 2  | 2,5 | 3  |
|-------------------|-----|-----|-----|-----|----|-----|----|-----|----|
| A/mm <sup>2</sup> | 299 | 211 | 173 | 134 | 94 | 77  | 67 | 60  | 55 |

### CORRECTION FACTORS FOR AIR TEMPERATURE

| Air T. (°C) | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
|-------------|------|------|----|------|------|------|------|------|------|
| Factor      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

### CORRECTION FACTORS FOR GROUND TEMPERATURE

| Ground T. (°C) | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45  | 50   |
|----------------|------|------|----|------|------|------|------|-----|------|
| Factor         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,8 | 0,76 |

### CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

|                      |           |          |           |          |           |          |
|----------------------|-----------|----------|-----------|----------|-----------|----------|
| Direct buried cables |           |          |           |          |           |          |
| 0,5 K·m/W            | 0,7 K·m/W | 1 K·m/ W | 1,5 K·m/W | 2 K·m/ W | 2,5 K·m/W | 3 K·m/ W |
| 1,88                 | 1,62      | 1,50     | 1,28      | 1,12     | 1         | 0,90     |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.



## B2<sub>ca</sub>

## APPLICATION

Toxfree® ZH RZ1 (AS) Al is an aluminium LSHF cable for fixed installations. These cables are specially recommended for installation in public places and in installations where safety is a priority.

## CONSTRUCTION

### Conductor

Aluminium conductor, class 2, according to EN 60228 and IEC 60228.

### Insulation

Cross-linked polyethylene (XLPE) insulation according to IEC 60502-1 and type DIX-3 according to HD 603.

The standard identification of insulated conductors according to HD 308 is the following:

|     |                             |
|-----|-----------------------------|
| 1 x | Natural                     |
| 3 x | Brown + Black + Grey        |
| 4 x | Brown + Black + Grey + Blue |

### Outer sheath

Low Smoke Halogen Free (LSHF) polyolefin outer sheath. Green colour.

Other outer sheath colours available on request.

## CHARACTERISTICS

### Electrical performance

Low voltage: 0,6/1 kV

### Thermal performance

Maximum service temperature: 90oC.

Maximum short-circuit temperature: 250oC (max. 5 s).

Minimum service temperature: -40oC (fixed and protected installations)

Minimum installation and handling temperature: -0oC.

### Fire performance

Flame non-propagation according to EN 60332-1 / IEC 60332-1.

Fire non-propagation according to EN 60332-3 / IEC 60332-3 and EN 50399.

Reaction to fire CPR: B2ca -s1a, d1, a1 (for single core cables) and

B2ca -s1b, d1, a1 (for multicore cables), according to EN 50575.

LSHF (Low Smoke Halogen Free) according to EN 60754-1 / IEC60754-1.

Low smoke emission according to EN 61034 / IEC 61034:

Light transmittance > 60%.

Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.

### Mechanical performance

Minimum bending radius: 5x cable diameter.

Impact resistance: AG2 Medium severity.

### Environmental performance

Chemical & Oil resistance: acceptable.

UV Resistant according to UNE 211605 and EN 50618.

Water resistance: AD5 Jets.

## STANDARDS / COMPLIANCE



### According to

IEC 60502-1 / UNE 21123-4.



### Standards and approvals

RoHS / CE.



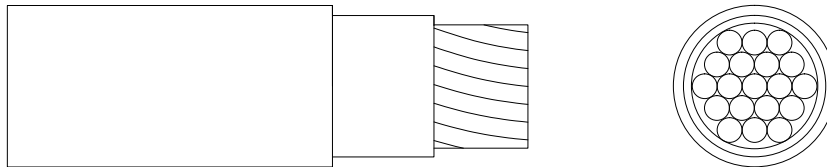
### CPR (Construction Products Regulation)

B2<sub>ca</sub> -s1a, d1, a1 (single core cables) .

B2<sub>ca</sub> -s1b, d1, a1 (multicore cables).



## DIMENSIONS & ADMISSIBLE INTENSITIES



| Cross-section (mm <sup>2</sup> ) | Diameter (mm) | Weight (kg/km) | Open air (A) <sup>1</sup> | Buried (A) <sup>2</sup> | Voltage drop (V/A · km) <sup>3</sup> |
|----------------------------------|---------------|----------------|---------------------------|-------------------------|--------------------------------------|
| 1 x 25                           | 10,9          | 150            | 121                       | 98                      | 3,075                                |
| 1 x 35                           | 12            | 200            | 150                       | 117                     | 2,225                                |
| 1 x 50                           | 13,3          | 245            | 184                       | 139                     | 1,643                                |
| 1 x 70                           | 15,4          | 325            | 237                       | 170                     | 1,135                                |
| 1 x 95                           | 16,7          | 415            | 289                       | 204                     | 0,820                                |
| 1 x 120                          | 18,1          | 485            | 337                       | 233                     | 0,648                                |
| 1 x 150                          | 20,3          | 625            | 389                       | 261                     | 0,528                                |
| 1 x 185                          | 22,4          | 725            | 447                       | 296                     | 0,420                                |
| 1 x 240                          | 25,2          | 970            | 530                       | 343                     | 0,320                                |
| 1 x 300                          | 28,2          | 1.170          | 613                       | 386                     | 0,256                                |
| 1 x 400                          | 31,2          | 1.455          | 740                       | 444                     | 0,199                                |
| 3 x 120                          | 37,7          | 2.080          | 300                       | 233                     | 0,648                                |
| 4 x 150                          | 46,8          | 2.985          | 346                       | 261                     | 0,528                                |
| 4 x 185                          | 52,5          | 3.840          | 397                       | 296                     | 0,420                                |
| 4 x 240                          | 58,2          | 4.890          | 470                       | 343                     | 0,320                                |
| 4 x 300                          | 66,3          | 6.045          | 543                       | 386                     | 0,256                                |

<sup>1</sup> Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

<sup>2</sup> Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K·m/W and 20°C of ground temperature.

<sup>3</sup> At maximum service temperature and cosφ=1.

For all cables, a single-phase circuit is supposed.

## SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

|                         |     |     |     |     |    |     |    |     |    |
|-------------------------|-----|-----|-----|-----|----|-----|----|-----|----|
| <b>Time (s)</b>         | 0,1 | 0,2 | 0,3 | 0,5 | 1  | 1,5 | 2  | 2,5 | 3  |
| <b>A/mm<sup>2</sup></b> | 299 | 211 | 173 | 134 | 94 | 77  | 67 | 60  | 55 |

## CORRECTION FACTORS FOR AIR TEMPERATURE

|                    |      |      |    |      |      |      |      |      |      |
|--------------------|------|------|----|------|------|------|------|------|------|
| <b>Air T. (°C)</b> | 20   | 25   | 30 | 35   | 40   | 45   | 50   | 55   | 60   |
| <b>Factor</b>      | 1,08 | 1,04 | 1  | 0,96 | 0,91 | 0,87 | 0,82 | 0,76 | 0,71 |

## CORRECTION FACTORS FOR GROUND TEMPERATURE

|                       |      |      |    |      |      |      |      |     |      |
|-----------------------|------|------|----|------|------|------|------|-----|------|
| <b>Ground T. (°C)</b> | 10   | 15   | 20 | 25   | 30   | 35   | 40   | 45  | 50   |
| <b>Factor</b>         | 1,07 | 1,04 | 1  | 0,96 | 0,93 | 0,89 | 0,85 | 0,8 | 0,76 |

## CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITY

|                             |           |         |           |         |           |         |  |
|-----------------------------|-----------|---------|-----------|---------|-----------|---------|--|
| <b>Direct buried cables</b> |           |         |           |         |           |         |  |
| 0,5 K·m/W                   | 0,7 K·m/W | 1 K·m/W | 1,5 K·m/W | 2 K·m/W | 2,5 K·m/W | 3 K·m/W |  |
| 1,88                        | 1,62      | 1,5     | 1,28      | 1,12    | 1         | 0,90    |  |

Other correction factors (for grouping cables, for harmonic currents), that are not in this specification, can be applied. Further information can be found in IEC 60364-5-52.

# Top Cable, an **international manufacturer** of industrial and power cables

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**Top Cable is a recognized manufacturer of electric cables, always meeting the highest expectations that contractors, developers, grid operators, panel manufacturers and integrators demand when designing a solar installation. The company has supplied cables to worldwide solar installations from residential installations to large scale rooftops, floating solar projects or ground farms.**

All Top Cable's manufacturing plants are based around Barcelona, Spain. The organization is a medium-sized, family-owned company manufacturing electric cables on an international scale, with offices and warehouses located around the globe. Therefore, we guarantee customer proximity on a global level.

Customers around the world appreciate Top Cable as a technically leading manufacturer of solar cables of outstanding quality. Customers receive their solar deliveries on schedule from the company's main logistics centre located in Barcelona.

Large PV cable stocks are available there to ensure short lead times and shipment flexibility. Top Cable also manages several solar cable stocks across their worldwide offices and warehouses to avoid out-of-stock situations in the supply chain.

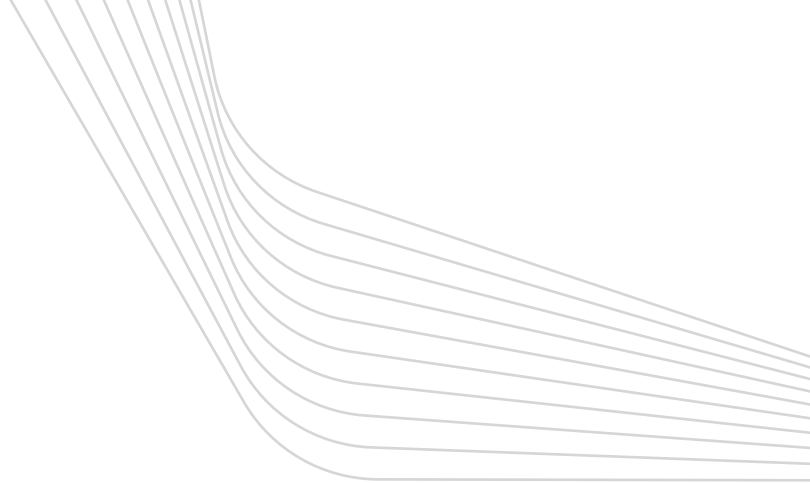
Our PV cables are TÜV certified, meeting the most stringent solar specifications. Check other National Electric Code requirements and PV certificates with your Top Cable technical sales expert.

Top Cable



**Top Cable**





# Innovation

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**Our R&D Centre and laboratories were established to provide research work and to enable us to constantly provide high-performance cables that are suited for multiple applications in various industries.**

Being conscious of the importance of optimal costing, Top Cable has opted for the integration of our processes, through focusing each of our production centres into a specialized production unit, while coordinating with one another to optimize common resources.

Our technical staff are professionally trained and assure the highest quality in the cable production process.



# Top Cable | Industrial Cables

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