**B2_{ca}**

APPLICATION

Toxfree® ZH SZ-K (AS) is a LSHF easy handling flexible cables suitable to be installed in high temperature areas inside equipment and machines.

Thanks to its silicone insulation, this cable can withstand higher conductor temperatures.

The LSHF rubber outer sheath protects the insulation against mechanical aggressions.

Flame and fire retardant cable.

CONSTRUCTION

Conductor

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

Separator

Polyester tape applied over the conductor.

Insulation

Special silicone, type EI2 according to EN 50363-1 and type SR (Silicone Rubber) 150°C/1000 V and 3000 V according to UL 758 (Style 30105 and 30106).

Natural colour.

Outer sheath

Elastomer fireproofs and halogen free, type EM8 according to EN 50363-6 and type EVA 90°C/1000 V and 3000 V according to UL 758 (Style 12022 and 12023), with improved thermal characteristics.

Black colour.

CHARACTERISTICS



Electrical performance

Low voltage: According to IEC 0,6/1 kV and 1,8/3 kV
According to UL (AWM) 1000 V and 3000 V



Thermal performance

Maximum conductor temperature: 150°C.
Maximum short-circuit temperature: 350°C (max. 5 s).
Minimum service temperature: -40°C (fixed and protected installations).



Fire performance

Flame non-propagation according to IEC 60332-1 / EN 60332-1.
Fire non-propagation according to EN 60332-3-24 / IEC 60332-3-24.
Reaction to fire CPR: B2_{ca}-s1b, d1, a1 according to EN 50575.
Low smoke halogen free according to EN 60754-1 / IEC 60754-1.
Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.
Smoke density according to EN 61034 / IEC 61034:
Light transmittance > 60%.



Mechanical performance

Minimum bending radius: 5x cable diameter.



Environmental performance

UV Resistant according to HD 605/A1 Ap.2.2.20 (720 h / 65 °C / 60 W/m²).

STANDARDS / COMPLIANCE



Based on / According to
IEC 60502-1 / UL 758



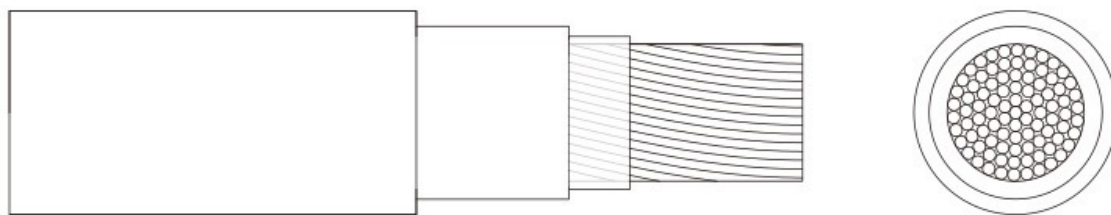
Standards and approvals
RoHS / CE / UL LISTED



CPR (Construction Products Regulation)
B2_{ca}-s1b, d1, a1



DIMENSIONS & ADMISSIBLE INTENSITIES



TOXFREE ZH SZ-K (AS) 0,6/1 kV (1000 V AWM)

Cross-section (mm²)(AWG-MCM)	Conductor Diameter (mm)	Insulation thickness (mm)	Outer sheath thickness (mm)	External Diameter (mm)	Weight (kg/km)	Ampacity Cir. Monophasic (A)	Ampacity Cir. Three phases (A)	R 20°C (Ω /km)	Voltage drop Monophasic (V/A · km)	Voltage drop Three phases (V/A · km)
1 x 25 (4 AWG)	6,4	1,2	1,4	11,6	315	210	184	0,780	2,357	2,041
1 x 35 (2 AWG)	7,5	1,2	1,4	12,7	410	261	230	0,554	1,674	1,450
1 x 50 (1 AWG)	9,0	1,4	1,4	14,6	560	315	282	0,386	1,166	1,010
1 x 70 (2/0 AWG)	10,5	1,4	1,5	16,3	755	405	364	0,272	0,822	0,712
1 x 95 (3/0 AWG)	12,2	1,6	1,5	18,4	980	492	446	0,206	0,622	0,539
1 x 120 (4/0 AWG)	13,7	1,6	1,6	20,1	1.225	570	521	0,161	0,486	0,421
1 x 150 (250 MCM)	15,4	1,8	1,7	22,4	1.520	657	605	0,129	0,390	0,337
1 x 185 (350 MCM)	16,5	2,0	1,8	24,1	1.830	750	695	0,106	0,320	0,277
1 x 240 (450 MCM)	19,5	2,2	1,8	27,5	2.380	885	827	0,0801	0,242	0,210
1 x 300 (550 MCM)	22,1	2,4	2,0	30,9	3.025	1.021	960	0,0641	0,194	0,168
1 x 400 (750 MCM)	26,0	2,6	2,1	35,4	3.960	1.226	1.132	0,0486	0,147	0,127

TOXFREE ZH SZ-K (AS) 1,8/3 kV (3000 V AWM)

Cross-section (mm²)(AWG-MCM)	Conductor Diameter (mm)	Insulation thickness (mm)	Outer sheath thickness (mm)	External Diameter (mm)	Weight (kg/km)	Ampacity Cir. Monophasic (A)	Ampacity Cir. Three phases (A)	R 20°C (Ω /km)	Voltage drop Monophasic (V/A · km)	Voltage drop Three phases (V/A · km)
1 x 25 (4 AWG)	6,4	2,2	1,4	13,6	370	210	184	0,780	2,357	2,041
1 x 35 (2 AWG)	7,5	2,2	1,4	14,7	475	261	230	0,554	1,674	1,450
1 x 50 (1 AWG)	9,0	2,2	1,5	16,4	625	315	282	0,386	1,166	1,010
1 x 70 (2/0 AWG)	10,5	2,2	1,5	17,9	815	405	364	0,272	0,822	0,712
1 x 95 (3/0 AWG)	12,2	2,4	1,6	20,2	1.060	492	446	0,206	0,622	0,539
1 x 120 (4/0 AWG)	13,7	2,4	1,7	21,9	1.310	570	521	0,161	0,486	0,421
1 x 150 (250 MCM)	15,4	2,4	1,7	23,6	1.585	657	605	0,129	0,390	0,337
1 x 185 (350 MCM)	16,5	2,4	1,8	24,9	1.870	750	695	0,106	0,320	0,277
1 x 240 (450 MCM)	19,5	2,4	1,9	28,1	2.420	885	827	0,0801	0,242	0,210
1 x 300 (550 MCM)	22,1	2,4	2,0	30,9	3.025	1.021	960	0,0641	0,194	0,168
1 x 400 (750 MCM)	26,0	2,6	2,1	35,4	3.960	1.226	1.132	0,0486	0,147	0,127

- Maximum current capacities, in amperes, have been calculated according to table B.52.12 of IEC 60364-5-52 applying a correction factor to consider the cable working temperature. This is due to the current capacities of the standard refer to cables with conductor temperature at 90°C and SZ-K (AS) cables have working temperature of 150°C.

Correction factor is applied according to the formula:

$$K = \sqrt{\frac{(T_{c(max)}^* - T_{ref}) \cdot (1 + 0,004 \cdot T_{c(max)}^{90})}{(T_{c(max)}^{90} - T_{ref}) \cdot (1 + 0,004 \cdot T_{c(max)}^*)}} = 1,304$$

- K for 150 °C: 1,304

- K for 140 °C: 1,264

- K for 130 °C: 1,221

- K for 120 °C: 1,174

All terms in °C,

- $T_{c(max)}^*$ is the new conductor temperature (150, 140, 130 ó 120°C).

- $T_{c(max)}^{90}$ is the temperatura which intensity has been calculated (90°C).

- T_{ref} is the ambient temperature which current capacity refers to (30°C).



TOXFREE[®] ZH SZ-K (AS)

Current-carrying capacities have been calculated on the following conditions:

- Open air (monophasic): monophasic circuit (two conductors loaded in contact), with cables on a metallic perforated tray, with good ventilation and ambient temperature of 30 °C (method F).
- Open air (three phase): three phase circuit (three conductors loaded in contact), with cables on a metallic perforated tray, with good ventilation and ambient temperature of 30 °C (method F).
- Voltage drop is the maximum that may occur. It is calculated for the maximum service temperature (150°C) and for $\cos \varphi = 1$.

SHORT-CIRCUIT CURRENT-CARRYING CAPACITIES

Time (s)	0,1	0,2	0,3	0,5	1	1,5	2	2,5	3
A/mm ²	462	326	267	206	146	119	103	92	84

These values are taken from IEC 949 / UNE 21192 with initial temperature of 150°C and final temperature of 350°C.

CORRECTION FACTORS FOR AIR TEMPERATURE

Air T. (°C)	30	40	50	60	70	80	90	100	110	120
Factor	1	0,96	0,91	0,87	0,82	0,76	0,71	0,65	0,58	0,50

Coefficients of IEC 60364-5-52 standard don't apply because they have not been calculated at conductor temperature of 150 °C. Due to this, they have been calculated with the formula:

$$\sqrt{\frac{T_{c(max)} - T}{T_{c(max)} - T_{ref}}}$$

All terms in °C,

- T_{c(max)} is the maximum conductor temperature (150°C)
- T is the temperature which we want the correction factor
- T_{ref} is the temperature which ampacity is calculated (30°C).

CORRECTION FACTORS FOR CABLES GROUPING OF SEVERAL CIRCUITS

Cables position (in contact)	Number of circuits										Method
	1	2	3	4	5	6	7	8	9	>9	
One layer on perforated tray horizontal or vertical	1,00	0,88	0,82	0,77	0,75	0,73	0,73	0,72	0,72	Without additional correction factor	Methods E and F

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.