

High Voltage Aluminum, Wire and Tape Shield

XLPE Insulation, HDPE Jacket, 69 kV - 138 kV

CME[®]
wire and cable

A Viakable Company

Features

True triple vertical extrusion system for optimum insulation concentricity, and excellent electric field control.

Dry cure process.

Closed handling of raw materials system to eliminate any contact with ambient, until extrusion process ends.

Low dielectric losses.

Metallic shield for ground connection.

Sunlight resistant jacket.

Application

Transmission and distribution circuits, in cities with high load densities. Also, for Industrial and Commercial installations.

May be installed in wet or dry locations indoors or outdoors in conduit and underground ducts.

Standards

IEC 60840: Power cables with extruded insulation for rated voltages above 30 kV up to 150 kV.

AEIC CS9: Specifications for extruded insulation power cables and their accessories rated above 46 kV through 345 kV.

ICEA S-108-720: Standard for extruded insulation power cables rated above 46 kV to 345 kV.

Specifications

Operating (maximum) voltage:

- 69 kV (72.5 kV), 115 kV (123 kV) or 138 kV (145 kV)

Maximum conductor operation temperatures:

Wet and dry locations

- Normal: 90 °C
- Emergency: 105 °C
- Short Circuit: 250 °C

Engineering Information

1. Conductor: 1350-H19 Aluminum, Class B or Class 2 filled stranding compacted round or segmental as per ASTM B400 or IEC 60228.

Sizes: 500 kcmil up to 4000 kcmil.

On request, unfilled conductor.

2. Semiconducting Tape: A semiconducting tape may be applied helically with an overlap, as required.

3. Conductor Shield: Semiconducting cross-linked polyethylene.

4. Insulation: High quality, heat, moisture, ozone and corona resistant, cross-linked polyethylene (XLPE).

5. Insulation Shield: Semiconducting cross-linked polyethylene.

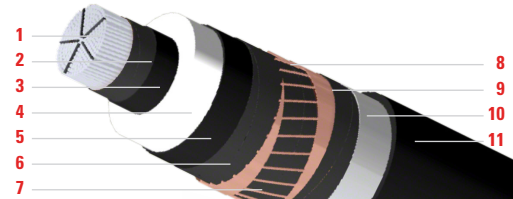
6. Water Barrier: Semiconducting water blocking tape, helically applied over the insulation shield.

7-9. Metallic Shield: Solid, annealed uncoated copper wires per ASTM B3, helically applied and uniformly spaced. A copper tape helically applied over the copper wires, with open helix and water blocking tape.

10. Radial Moisture Barrier: A smooth aluminum laminated tape longitudinally applied and bonded to outer jacket.

Jacket: Black high density polyethylene (HDPE) sunlight resistant thermoplastic compound.

On request, semiconducting PE layer.



Technical Data

69 kV Aluminum, XLPE Insulated

| Size | kcmil | 500 | 750 | 1000 | 1250 | 1500 | 1750 | 2000 | 2500 | 3000 | 3500 | 4000 | |
|---|-------|-------|-------|-------|-------|-------|--------|-----------|--------|--------|--------|--------|--|
| Conductor | | | | | | | | | | | | | |
| Shape | | Round | | | | | | Segmental | | | | | |
| Number of Strands | | 37 | 61 | 61 | 61 | 61 | 85 | 85 | 305 | 305 | 305 | 305 | |
| Conductor Diameter | in | 0.74 | 0.91 | 1.06 | 1.21 | 1.31 | 1.48 | 1.57 | 1.78 | 1.95 | 2.12 | 2.28 | |
| Insulation | | | | | | | | | | | | | |
| Insulation Thickness | mil | 380 | 360 | 340 | 330 | 320 | 320 | 310 | 310 | 300 | 300 | 300 | |
| Insulation OD | in | 1.57 | 1.71 | 1.82 | 2.02 | 2.09 | 2.27 | 2.34 | 2.55 | 2.70 | 2.87 | 3.03 | |
| Shield | | | | | | | | | | | | | |
| Number of Wires | | 29 | | | | | | | | | | | |
| Size AWG | | 13 | | | | | | | | | | | |
| Complete Cable | | | | | | | | | | | | | |
| Approximate Outside Diameter | in | 2.33 | 2.46 | 2.57 | 2.74 | 2.81 | 2.99 | 3.06 | 3.28 | 3.43 | 3.60 | 3.76 | |
| Approximate Net Weight | lb/ft | 2.4 | 2.7 | 3.0 | 3.5 | 3.8 | 4.2 | 4.5 | 5.3 | 5.9 | 6.6 | 7.2 | |
| Minimum Bending Radius | in | 48 | 50 | 53 | 56 | 57 | 61 | 62 | 67 | 70 | 73 | 77 | |
| Maximum Pulling Tension | lb | 3,000 | 4,000 | 6,000 | 7,500 | 9,000 | 10,500 | 12,000 | 15,000 | 18,000 | 21,000 | 24,000 | |
| Electrical Stress @ U₀ | | | | | | | | | | | | | |
| Conductor Shield | kV/mm | 5.8 | 5.8 | 5.8 | 5.8 | 5.9 | 5.8 | 5.9 | 5.8 | 5.9 | 5.8 | 5.8 | |
| Insulation Shield | kV/mm | 3.0 | 3.3 | 3.6 | 3.9 | 4.1 | 4.1 | 4.3 | 4.4 | 4.6 | 4.6 | 4.6 | |
| Short Circuit for 0.5 s | | | | | | | | | | | | | |
| Conductor | kA | 33.3 | 49.9 | 66.5 | 83.2 | 99.8 | 116.4 | 133.0 | 166.3 | 199.6 | 232.8 | 262.6 | |
| Shield | kA | 14.1 | | | | | | | | | | | |
| Conductor Resistance | | | | | | | | | | | | | |
| dc @ 20 °C | Ω/kft | 0.035 | 0.023 | 0.017 | 0.014 | 0.012 | 0.010 | 0.009 | 0.007 | 0.006 | 0.005 | 0.005 | |
| dc @ 90 °C | Ω/kft | 0.045 | 0.030 | 0.022 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 | 0.008 | 0.006 | 0.006 | |
| Capacitance | pF/ft | 53.1 | 63.8 | 74.7 | 88.3 | 95.7 | 105.4 | 113.4 | 125.5 | 139.1 | 149 | 158.5 | |
| Charging Current | A/kft | 0.80 | 0.96 | 1.12 | 1.33 | 1.44 | 1.58 | 1.70 | 1.88 | 2.09 | 2.24 | 2.38 | |
| Ampacity @ 90 °C (3 ft top of duct, 1 °C-m/W native, 20 °C Ambient, 75% if single-point or cross bonded) | | | | | | | | | | | | | |
| Single Circuit Bank | A | 524 | 656 | 769 | 867 | 954 | 1033 | 1104 | 1307 | 1432 | 1543 | 1641 | |
| Double Circuit Bank | A | 440 | 547 | 637 | 713 | 781 | 842 | 895 | 1095 | 1206 | 1296 | 1376 | |

The above data are approximate and subject to normal manufacturing tolerances.

Technical Data

115 kV Aluminum, XLPE Insulated

| Size | kcmil | 750 | 1000 | 1250 | 1500 | 1750 | 2000 | 2500 | 3000 | 3500 | 4000 |
|---|-------|-------|-------|-------|-------|--------|--------|-----------|--------|--------|--------|
| Conductor | | | | | | | | | | | |
| Shape | | Round | | | | | | Segmental | | | |
| Number of Strands | | 61 | 61 | 61 | 61 | 85 | 85 | 305 | 305 | 305 | 305 |
| Conductor Diameter | in | 0.91 | 1.06 | 1.21 | 1.31 | 1.48 | 1.57 | 1.78 | 1.95 | 2.12 | 2.28 |
| Insulation | | | | | | | | | | | |
| Insulation Thickness | mil | 730 | 680 | 630 | 610 | 590 | 580 | 570 | 550 | 540 | 540 |
| Insulation OD | in | 2.46 | 2.51 | 2.63 | 2.68 | 2.82 | 2.89 | 3.08 | 3.21 | 3.36 | 3.52 |
| Shield | | | | | | | | | | | |
| Number of Wires | | 29 | | | | | | | | | |
| Size AWG | | 13 | | | | | | | | | |
| Complete Cable | | | | | | | | | | | |
| Approximate Outside Diameter | in | 3.21 | 3.26 | 3.35 | 3.41 | 3.54 | 3.61 | 3.81 | 3.94 | 4.09 | 4.25 |
| Approximate Net Weight | lb/ft | 4.0 | 4.2 | 4.7 | 4.9 | 5.3 | 5.6 | 6.4 | 7.0 | 7.7 | 8.4 |
| Minimum Bending Radius | in | 66 | 67 | 68 | 70 | 72 | 74 | 78 | 80 | 83 | 87 |
| Maximum Pulling Tension | lb | 4,000 | 6,000 | 7,500 | 9,000 | 10,500 | 12,000 | 15,000 | 18,000 | 21,000 | 24,000 |
| Electrical Stress @ U₀ | | | | | | | | | | | |
| Conductor Shield | kV/mm | 5.8 | 5.8 | 5.9 | 5.9 | 5.9 | 5.9 | 5.8 | 5.9 | 5.9 | 5.8 |
| Insulation Shield | kV/mm | 2.3 | 2.6 | 3.0 | 3.2 | 3.4 | 3.5 | 3.6 | 3.8 | 4.0 | 4.0 |
| Short Circuit for 0.5 s | | | | | | | | | | | |
| Conductor | kA | 49.9 | 66.5 | 83.2 | 99.8 | 116.4 | 133.0 | 166.3 | 199.6 | 232.8 | 262.6 |
| Shield | kA | 14.1 | | | | | | | | | |
| Conductor Resistance | | | | | | | | | | | |
| dc @ 20 °C | Ω/kft | 0.023 | 0.017 | 0.014 | 0.012 | 0.010 | 0.009 | 0.007 | 0.006 | 0.005 | 0.005 |
| dc @ 90 °C | Ω/kft | 0.030 | 0.022 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 | 0.008 | 0.006 | 0.006 |
| Capacitance | pF/ft | 38.5 | 44.5 | 53.2 | 57.2 | 64.0 | 67.6 | 75.1 | 82.8 | 89.5 | 94.8 |
| Charging Current | A/kft | 0.96 | 1.11 | 1.33 | 1.43 | 1.60 | 1.69 | 1.88 | 2.07 | 2.24 | 2.37 |
| Ampacity @ 90 °C (3 ft top of duct, 1 °C·m/W native, 20 °C Ambient, 75% if single-point or cross bonded) | | | | | | | | | | | |
| Single Circuit Bank | A | 651 | 762 | 859 | 946 | 1023 | 1093 | 1324 | 1453 | 1568 | 1668 |
| Double Circuit Bank | A | 549 | 639 | 718 | 787 | 848 | 903 | 109 | 1192 | 1282 | 1360 |

The above data are approximate and subject to normal manufacturing tolerances.

Technical Data

138 kV Aluminum, XLPE Insulated

| Size | kcmil | 750 | 1000 | 1250 | 1500 | 1750 | 2000 | 2500 | 3000 | 3500 | 4000 |
|---|-------|-------|-------|-------|-------|--------|--------|-----------|--------|--------|--------|
| Conductor | | | | | | | | | | | |
| Shape | | Round | | | | | | Segmental | | | |
| Number of Strands | | 61 | 61 | 61 | 61 | 85 | 85 | 305 | 305 | 305 | 305 |
| Conductor Diameter | in | 0.91 | 1.06 | 1.21 | 1.31 | 1.48 | 1.57 | 1.78 | 1.95 | 2.12 | 2.28 |
| Insulation | | | | | | | | | | | |
| Insulation Thickness | mil | 970 | 890 | 810 | 790 | 760 | 740 | 710 | 700 | 680 | 670 |
| Insulation OD | in | 2.94 | 2.93 | 2.99 | 3.04 | 3.16 | 3.21 | 3.36 | 3.51 | 3.64 | 3.78 |
| Shield | | | | | | | | | | | |
| Number of Wires | | 29 | | | | | | | | | |
| Size AWG | | 13 | | | | | | | | | |
| Complete Cable | | | | | | | | | | | |
| Approximate Outside Diameter | in | 3.69 | 3.68 | 3.71 | 3.77 | 3.88 | 3.93 | 4.09 | 4.24 | 4.37 | 4.51 |
| Approximate Net Weight | lb/ft | 5.0 | 5.1 | 5.4 | 5.7 | 6.1 | 6.3 | 7.1 | 7.8 | 8.5 | 9.1 |
| Minimum Bending Radius | in | 75 | 75 | 76 | 77 | 79 | 80 | 83 | 86 | 89 | 92 |
| Maximum Pulling Tension | lb | 4,000 | 6,000 | 7,500 | 9,000 | 10,500 | 12,000 | 15,000 | 18,000 | 21,000 | 24,000 |
| Electrical Stress @ U₀ | | | | | | | | | | | |
| Conductor Shield | kV/mm | 5.9 | 5.9 | 5.9 | 5.9 | 5.8 | 5.9 | 5.9 | 5.8 | 5.9 | 5.9 |
| Insulation Shield | kV/mm | 1.9 | 2.3 | 2.7 | 2.8 | 3.0 | 3.1 | 3.4 | 3.5 | 3.7 | 3.8 |
| Short Circuit for 0.5 s | | | | | | | | | | | |
| Conductor | kA | 49.9 | 66.5 | 83.2 | 99.8 | 116.4 | 133.0 | 166.3 | 199.6 | 232.8 | 262.6 |
| Shield | kA | 14.1 | | | | | | | | | |
| Conductor Resistance | | | | | | | | | | | |
| dc @ 20 °C | Ω/kft | 0.023 | 0.017 | 0.014 | 0.012 | 0.010 | 0.009 | 0.007 | 0.006 | 0.005 | 0.005 |
| dc @ 90 °C | Ω/kft | 0.030 | 0.022 | 0.018 | 0.015 | 0.013 | 0.011 | 0.009 | 0.008 | 0.006 | 0.006 |
| Capacitance | pF/ft | 32.3 | 37.3 | 44.7 | 47.6 | 53.1 | 56.3 | 63.5 | 68.5 | 74.5 | 79.7 |
| Charging Current | A/kft | 0.97 | 1.12 | 1.34 | 1.43 | 1.59 | 1.69 | 1.91 | 2.06 | 2.24 | 2.39 |
| Ampacity @ 90 °C (3 ft top of duct, 1 °C·m/W native, 20 °C Ambient, 75% if single-point or cross bonded) | | | | | | | | | | | |
| Single Circuit Bank | A | 648 | 756 | 853 | 939 | 1015 | 1079 | 1305 | 1430 | 1543 | 1641 |
| Double Circuit Bank | A | 540 | 637 | 712 | 777 | 842 | 896 | 1079 | 1178 | 1225 | 1300 |

The above data are approximate and subject to normal manufacturing tolerances.

Technical Data

Notes

In this publication, conductor sizes are given in kcmil.

According to the best practice in industry, when using pulling eyes attached to phase conductors, the maximum mechanical pulling tension that can be applied to each conductor or group of conductors being installed in ducts, should not be higher than 6,000 lbf.

Doing calculations of cable pulling tensions prior to each installation, increases the possibilities of a safe and secure operation.

Installation conditions taken as reference for ampacity calculations are:

1. One and two three phase circuits, cables in underground buried ducts, one cable per duct, flat parallel configuration with a distance between duct centers of twice the OD of each cable.
2. 75% Load Factor.
3. Single point or cross bonded shield grounding connection.
4. Ambient Ground Temperature, $T_a = 20\text{ }^\circ\text{C}$.
5. Deep to top of ducts, 3 ft.
6. Ground Thermal Resistivity: $1\text{ }^\circ\text{C}\cdot\text{m}/\text{W}$.

For this publication, ampacity values were calculated according to the available best engineering practice (per IEC 60287). However, they should be considered as reference values only, applicable to the conditions described below.

For other cases, correction factors can be applied as follows:

| | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|------|
| Deep, m | 1.0 | 1.2 | 1.3 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 |
| Factor | 1.03 | 1.01 | 1.00 | 0.98 | 0.95 | 0.93 | 0.91 | 0.89 | 0.88 | 0.87 | 0.86 |
| Soil Thermal Resistivity (°C) | 0.8 | 1.0 | 1.2 | 1.5 | 2.0 | 2.5 | | | | | |
| Factor | 1.09 | 1.00 | 0.93 | 0.85 | 0.75 | 0.67 | | | | | |
| Soil Temperature (°C) | 10 | 15 | 20 | 25 | 30 | 35 | 40 | | | | |
| Factor | 1.07 | 1.04 | 1.00 | 0.96 | 0.92 | 0.88 | 0.84 | | | | |
| Temperature Correction Factor | | | | | | | | | | | |
| Distance Between Centers mm | 400 | 600 | 800 | 1000 | | | | | | | |
| 1 circuit | 1.00 | 1.00 | 1.00 | 1.00 | | | | | | | |
| 2 circuit | 0.79 | 0.83 | 0.87 | 0.89 | | | | | | | |
| 3 circuit | 0.70 | 0.75 | 0.78 | 0.81 | | | | | | | |
| 4 circuit | 0.64 | 0.70 | 0.74 | 0.78 | | | | | | | |

Only nominal dimensions are included in this publication. For accessory selection, please contact our Sales Department.



Technical Data

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