

# High Voltage Copper, Wire and Tape Shield

XLPE Insulation, HDPE Jacket, 69 kV - 138 kV

**CME**<sup>®</sup>  
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:** Uncoated soft annealed copper, Class B or Class 2 filled stranding compacted round or segmental as per ASTM B496 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.

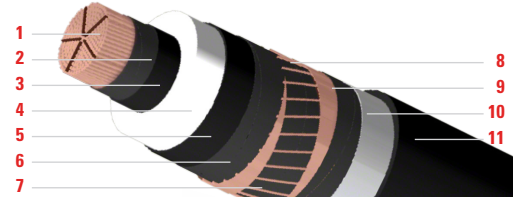
**6. Water Barrier:** Semiconducting water blocking tape, helically applied over the insulation shield.

**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** Copper, XLPE Insulated

Size	kcml	500	750	1000	1250	1500	1750	2000	2500	3000	3500	4000
<b>Conductor</b>												
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
<b>Insulation</b>												
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
<b>Shield</b>												
Number of Wires		29										
Size AWG		13										
<b>Complete Cable</b>												
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	3.4	4.3	5.2	6.2	7.0	8.0	8.8	10.8	12.4	14.2	15.8
Minimum Bending Radius	in	48	50	53	56	57	61	62	67	70	73	77
Maximum Pulling Tension	lb	4,000	6,000	8,000	10,000	12,000	14,000	16,000	20,000	24,000	28,000	32,000
<b>Electrical Stress @ U<sub>0</sub></b>												
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
<b>Short Circuit for 0.5 s</b>												
Conductor	kA	50.9	76.3	101.8	127.2	152.6	178.1	203.5	254.4	305.3	356.1	401.6
Shield	kA	14.1										
<b>Conductor Resistance</b>												
dc @ 20 °C	Ω/kft	0.021	0.014	0.011	0.009	0.007	0.006	0.005	0.004	0.004	0.003	0.003
dc @ 90 °C	Ω/kft	0.027	0.018	0.013	0.011	0.009	0.008	0.007	0.005	0.005	0.004	0.003
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
<b>Ampacity @ 90 °C (3 ft top of duct, 1 °C·m/W native, 20 °C Ambient, 75% if single-point or cross bonded)</b>												
Single Circuit Bank	A	669	831	971	1090	1187	1274	1349	1588	1737	1867	1982
Double Circuit Bank	A	561	691	799	896	971	1036	1090	1333	1453	1559	1651

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

**Technical Data**

# 115 kV Copper, XLPE Insulated

Size	kcml	750	1000	1250	1500	1750	2000	2500	3000	3500	4000
<b>Conductor</b>											
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
<b>Insulation</b>											
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
<b>Shield</b>											
Number of Wires		29									
Size AWG		13									
<b>Complete Cable</b>											
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	5.6	6.4	7.4	8.2	9.1	9.9	11.9	13.6	15.4	17.0
Minimum Bending Radius	in	66	67	68	70	72	74	78	80	83	87
Maximum Pulling Tension	lb	6,000	8,000	10,000	12,000	14,000	16,000	20,000	24,000	28,000	32,000
<b>Electrical Stress @ U<sub>0</sub></b>											
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
<b>Short Circuit for 0.5 s</b>											
Conductor	kA	76.3	101.8	127.2	152.6	178.1	203.5	254.4	305.3	356.1	401.6
Shield	kA	14.1									
<b>Conductor Resistance</b>											
dc @ 20 °C	Ω/kft	0.014	0.011	0.009	0.007	0.006	0.005	0.004	0.004	0.003	0.003
dc @ 90 °C	Ω/kft	0.018	0.013	0.011	0.009	0.008	0.007	0.005	0.005	0.004	0.003
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
<b>Ampacity @ 90 °C (3 ft top of duct, 1 °C·m/W native, 20 °C Ambient, 75% if single-point or cross bonded)</b>											
Single Circuit Bank	A	821	955	1069	1166	1250	1323	1599	1751	1886	2001
Double Circuit Bank	A	694	803	894	970	1037	1096	1318	1437	1541	1632

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

**Technical Data**

**138 kV** Copper, XLPE Insulated

Size	kcmil	750	1000	1250	1500	1750	2000	2500	3000	3500	4000
<b>Conductor</b>											
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
<b>Insulation</b>											
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
<b>Shield</b>											
Number of Wires		29									
Size AWG		13									
<b>Complete Cable</b>											
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	6.6	7.3	8.1	8.9	9.8	10.7	12.6	14.4	16.1	17.7
Minimum Bending Radius	in	75	75	76	77	79	80	83	86	89	92
Maximum Pulling Tension	lb	6,000	8,000	10,000	12,000	14,000	16,000	20,000	24,000	28,000	32,000
<b>Electrical Stress @ U<sub>0</sub></b>											
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
<b>Short Circuit for 0.5 s</b>											
Conductor	kA	76.3	101.8	127.2	152.6	178.1	203.5	254.4	305.3	356.1	401.6
Shield	kA	14.1									
<b>Conductor Resistance</b>											
dc @ 20 °C	Ω/kft	0.014	0.011	0.009	0.007	0.006	0.005	0.004	0.004	0.003	0.003
dc @ 90 °C	Ω/kft	0.018	0.013	0.011	0.009	0.008	0.007	0.005	0.005	0.004	0.003
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
<b>Ampacity @ 90 °C (3 ft top of duct, 1 °C·m/W native, 20 °C Ambient, 75% if single-point or cross bonded)</b>											
Single Circuit Bank	A	820	950	1058	1155	1241	1317	1589	1738	1871	1986
Double Circuit Bank	A	691	799	885	961	1036	1090	1310	1428	1532	1621

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:

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

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

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