MEDIUM VOLTAGE CABLES

Cu or Al - XLPE - Cu - PVC or PE
Three Core Cable
Unarmored - XLPE Insulation - IEC 60502-2

APPLICATION

Cable for power distribution and power supply stations used in Utility and Industrial applications, for rated voltages up to 18/30kV, Suitable for fixed installations, indoor or outdoor, in open air on cable trays, or underground in ducts or directly buried.

CABLE DESIGNATION

A: Cu / XLPE / Cu Tape screen / PVC or PE
B: Cu / XLPE / Cu Wire screen / PVC or PE
C: Al / XLPE / Cu Tape screen / PVC or PE
D: Al / XLPE / Cu Wire screen / PVC or PE

CONSTRUCTION CHARACTERISTICS

Conductor

Plain annealed Copper or Aluminium, circular, stranded, class 2 per IEC 60228.

Insulation

Semi-conductive screen over the conductor, XLPE (cross-linked polyethylene) insulation and
Semi-conductive screen over the insulation (strippable[1]), applied by simultaneous extrusion in just one operation.

Metallic Screen over each conductor

Copper wire screen – annealed copper wires helically wound and an equalising copper tape applied in an open counter-helix.
Or **Copper tape screen –** a copper tape, helically applied with overlap.
Screened conductors are stranded together with Cu Tape. A Poly Propylene tape is applied over this core.

Fillers

Extruded polymeric material.

Oversheath

Extruded PVC or PE.
Optionally, a Low Smoke Halogen Free thermoplastic compound can be used for cables with need for improved fire behaviour.

GENERAL CHARACTERISTICS

Construction and test standards	IEC 60228 IEC 60502-2
Rated voltage U_0/ U(Um)	3.6/6 (7.2) kV • 6/10 (12) kV • 8.7/15 (17.5) kV • 12/20 (24) kV • 18/30 (36) kV
Standard cross-section of wire screen (mm^2)	16 • 25 • 35
Test voltage	3.5 x Uo

Conductor maximum operating temperature	90°C
Maximum short-circuit temperature	250°C (t ≤ 5s)
Minimum bending radius – during installation (mm)	20 x d
Minimum bending radius – after installation (mm)	15 x d
Maximum pulling force over conductor (N)	Copper – 50 x S Aluminium – 30 x S
Flame retardant (for PVC oversheath)	IEC 60332-1-2 · EN 60332-1-2 (cable vertically mounted, length of charred cable ≤ 540 mm).
Fire retardant (for PVC oversheath. upon agreement)	IEC 60332-3-24 · EN 60332-3-24 (bunch of cables vertically mounted on a ladder, length of charred cable ≤ 2.5 cm

S – conductor cross-section (mm^2)
d – cable outer diameter (mm)

ELECTRICAL AND DIMENSIONAL CHARACTERISTICS

Copper conductor constructions

Voltage		Conductor cross-section	Diameter over insulation	Approx. outer diameter	Approx. weight B-PVC	Current carrying capacity		Cond. max. short-circuit current, t=1s	Max symmetrical short-circuit for 3 second	Cond. DC resistance @ 20°C	Inductance	Capacitance
U_0/ U (kV)	Um (kV)	(mm^2)	(mm)	(mm)	(kg/km)	In air (A)	Buried (A)	(kA)	(kA)	(Ω/km)	(mH/km)	(μF/km)
Copper conductor												
3.6/6	7.2	25	13.8	39	1820	142	132	3.6	2.0	0.7270	0.38	0.27
		35	14.8	40	2140	170	157	5.0	2.9	0.5240	0.36	0.30
		50	16.0	43	2640	204	186	7.1	4.1	0.3870	0.34	0.33
		70	17.6	47	3430	253	227	10	5.8	0.2680	0.32	0.38
		95	19.4	52	4380	304	270	13.6	7.8	0.1930	0.30	0.43
		120	20.8	55	5270	351	307	17.2	9.9	0.1530	0.29	0.48
		150	22.3	58	6230	398	344	21.4	12.3	0.1240	0.28	0.51
		185	23.8	63	7580	455	388	26.5	15.3	0.0991	0.28	0.54
		240	26.6	68	9460	531	447	34.3	19.8	0.0754	0.27	0.60
		300	28.6	74	11600	606	504	42.9	24.8	0.0601	0.26	0.63
		400	32.6	79	14350	696	570	57.2	33.0	0.0470	0.26	0.66
6/10	12	25	15.6	44	2080	145	133	3.6	2.0	0.7270	0.41	0.23
		35	16.6	45	2440	175	167	5.0	2.9	0.5240	0.39	0.25
		50	17.8	48	2940	210	200	7.1	4.1	0.3870	0.37	0.28
		70	19.4	52	3730	260	245	10	5.8	0.2680	0.35	0.31
		95	21.2	56	4740	320	295	13.6	7.8	0.1930	0.33	0.35
		120	22.6	60	5660	365	335	17.2	9.9	0.1530	0.32	0.38
		150	24.1	63	6640	415	375	21.4	12.3	0.1240	0.31	0.41
		185	25.8	67	7980	470	420	26.5	15.3	0.0991	0.30	0.45
		240	28.2	72	9890	560	485	34.3	19.8	0.0754	0.29	0.50
		300	30.4	77	11940	630	540	42.9	24.8	0.0601	0.28	0.54
		400	33.4	82	14600	696	645	57.2	33.0	0.0470	0.26	0.59

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Voltage		Conductor cross-section	Diameter over insulation	Approx. outer diameter	Approx. weight B-PVC	Current carrying capacity		Cond. max. short-circuit current, t=1s	Max symmetrical short-circuit for 3 second	Cond. DC resistance @ 20°C	Inductance	Capacitance
U_0/ U (kV)	Um (kV)	(mm^2)	(mm)	(mm)	(kg/km)	In air (A)	Buried (A)	(kA)	(kA)	(Ω/km)	(mH/km)	(μF/km)
Copper conductor												
8.7/15	17.5	25	17.8	49.0	2410	161	152	3.6	2.0	0.7270	0.42	0.18
		35	18.8	51.5	2770	195	180	5.0	2.9	0.5240	0.39	0.20
		50	20.0	54.5	3300	230	215	7.1	4.1	0.3870	0.37	0.22
		70	21.6	58.0	4120	285	280	10	5.8	0.2680	0.35	0.25
		95	23.4	62.0	5160	338	298	13.6	7.8	0.1930	0.34	0.28
		120	24.8	66.0	6070	388	340	17.2	9.9	0.1530	0.32	0.30
		150	26.3	68.5	7120	449	390	21.4	12.3	0.1240	0.31	0.32
		185	28.0	71.5	8480	505	437	26.5	15.3	0.0991	0.30	0.34
		240	30.4	78.0	10390	580	490	34.3	19.8	0.0754	0.29	0.38
		300	32.6	84.0	12520	610	545	42.9	24.8	0.0601	0.28	0.42
		400	35.6	90.5	15400	696	645	57.2	33.0	0.0470	0.27	0.46
12/20	24	35	21.2	56.0	3130	172	170	5.0	2.9	0.5240	0.43	0.17
		50	22.4	59.0	3680	205	200	7.1	4.1	0.3870	0.41	0.19
		70	24.0	63.0	4550	253	245	10.0	5.8	0.2680	0.37	0.21
		95	25.8	67.0	5620	307	293	13.6	7.8	0.1930	0.36	0.23
		120	27.2	70.5	6550	352	333	17.2	9.9	0.1530	0.34	0.25
		150	28.7	73.5	7590	396	373	21.4	12.3	0.1240	0.33	0.27
		185	30.4	78.0	9020	469	421	26.5	15.3	0.0991	0.32	0.28
		240	32.8	82.5	10950	549	486	34.3	19.8	0.0754	0.31	0.32
		300	35.0	88.5	13130	625	547	42.9	24.8	0.0601	0.30	0.35
18/30	36	50	27.8	75	5200	225	205	7.1	4.1	0.3870	0.45	0.14
		70	29.4	79	6110	275	250	10.0	5.8	0.2680	0.41	0.16
		95	31.2	83	7290	330	300	13.6	7.8	0.1930	0.39	0.18
		120	32.6	86	8300	380	335	17.2	9.9	0.1530	0.38	0.19
		150	34.1	90	9420	425	375	21.4	12.3	0.1240	0.36	0.20
		185	35.8	94	10940	485	420	26.5	15.3	0.0991	0.35	0.21
		240	38.2	99	12970	570	485	34.3	19.8	0.0754	0.34	0.24
		300	40.4	104	15270	640	540	42.9	24.8	0.0601	0.32	0.25

Current carrying capacity calculated considering the following conditions:
Maximum conductor temperature = 90°C
Cables in air: Ambient temperature = 30°C
Cables directly buried: Ground temperature = 15°C • Depth of laying = 0.5 m • Thermal resistivity of soil = 1.5 K.m/W

ALUMINIUM CONDUCTOR CONSTRUCTIONS

Voltage		Conductor cross-section	Diameter over insulation	Approx. outer diameter	Approx. weight B-PVC	Current carrying capacity ♣		Cond. max. short-circuit current, t=1s	Max symmetrical short-circuit for 3 second	Cond. DC resistance @ 20°C	Inductance ♣	Capacitance
U_0/ U (kV)	Um (kV)	(mm^2)	(mm)	(mm)	(kg/km)	In air (A)	Buried (A)	(kA)	(kA)	(Ω/km)	(mH/km)	(μF/km)
Aluminium conductor												
3.6/6	7.2	25	13.8	39	1340	110	103	2.4	1.3	1.2000	0.38	0.27
		35	14.8	40	1480	135	130	3.3	1.9	0.8680	0.36	0.30
		50	16.0	43	1720	160	155	4.7	2.7	0.6410	0.35	0.33
		70	17.6	47	2110	200	190	6.6	3.8	0.4430	0.32	0.38
		95	19.4	52	2550	240	225	9.0	5.1	0.3200	0.30	0.42
		120	20.8	55	2960	280	260	11.3	6.5	0.2530	0.29	0.47
		150	22.3	58	3400	315	290	14.2	8.1	0.2060	0.29	0.51
		185	23.8	63	3960	360	325	17.5	10.0	0.1640	0.28	0.55
		240	26.6	68	4780	425	340	22.7	13.0	0.1250	0.27	0.60
		300	28.6	74	5750	485	405	28.3	16.3	0.1000	0.26	0.63
		400	32.6	79	7050	545	451	37.8	21.8	0.0778	0.26	0.66
6/10	12	25	15.6	44	1600	110	111	2.4	1.3	1.2000	0.40	0.22
		35	16.6	45	1770	135	130	3.3	1.9	0.8680	0.39	0.24
		50	17.8	48	2030	160	155	4.7	2.7	0.6410	0.37	0.26
		70	19.4	52	2410	200	190	6.6	3.8	0.4430	0.34	0.30
		95	21.2	56	2910	240	225	9.0	5.1	0.3200	0.32	0.33
		120	22.6	60	3350	280	260	11.3	6.5	0.2530	0.31	0.37
		150	24.1	63	3810	315	290	14.2	8.1	0.2060	0.30	0.39
		185	25.8	67	4360	360	325	17.5	10.0	0.1640	0.29	0.43
		240	28.2	72	5210	425	370	22.7	13.0	0.1250	0.28	0.47
		300	30.4	77	6070	485	425	28.3	16.3	0.1000	0.27	0.53
		400	33.4	82	7300	562	487	37.8	21.8	0.0778	0.26	0.59
8.7/15	17.5	25	17.8	49.0	1920	110	110	2.4	1.3	1.2000	0.43	0.18
		35	18.8	51.5	2100	135	130	3.3	1.9	0.8680	0.41	0.19
		50	20.0	54.0	2400	160	155	4.7	2.7	0.6410	0.39	0.21
		70	21.6	58.0	2810	200	190	6.6	3.8	0.4430	0.36	0.24
		95	23.4	61.5	3330	240	225	9.0	5.1	0.3200	0.34	0.27
		120	24.8	65.5	3770	280	260	11.3	6.5	0.2530	0.33	0.29
		150	26.3	68.5	4290	315	290	14.2	8.1	0.2060	0.32	0.31
		185	28.0	72.0	4880	360	325	17.5	10.0	0.1640	0.31	0.34
		240	30.4	77.5	5710	425	370	22.7	13.0	0.1250	0.30	0.37
		300	32.6	84.0	6660	485	425	28.3	16.3	0.1000	0.29	0.42
		400	35.6	90.5	8100	562	487	37.8	21.8	0.0778	0.27	0.46

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Voltage		Conductor cross-section	Diameter over insulation	Approx. outer diameter	Approx. weight B-PVC	Current carrying capacity		Cond. max. short-circuit current, t=1s	Max symmetrical short-circuit for 3 second	Cond. DC resistance @ 20°C	Inductance	Capacitance
U_0/ U (kV)	Um (kV)	(mm^2)	(mm)	(mm)	(kg/km)	In air (A)	Buried (A)	(kA)	(kA)	(Ω/km)	(mH/km)	(μF/km)
Aluminium conductor												
12/20	24	35	21.2	56.0	2450	136	132	3.3	1.9	0.8680	0.43	0.17
		50	22.4	58.5	2760	162	156	4.7	2.7	0.6410	0.41	0.18
		70	24.0	62.5	3230	200	190	6.6	3.8	0.4430	0.38	0.21
		95	25.8	66.5	3790	242	227	9.0	5.1	0.3200	0.36	0.23
		120	27.2	70.5	4240	278	259	11.3	6.5	0.2530	0.34	0.25
		150	28.7	73.5	4750	313	289	14.2	8.1	0.2060	0.33	0.27
		185	30.4	78.0	5410	358	328	17.5	10.0	0.1640	0.32	0.29
		240	32.8	82.5	6270	422	379	22.7	13.0	0.1250	0.31	0.32
		300	35.0	88.5	7250	481	427	28.3	16.3	0.1000	0.30	0.35
18/30	36	50	27.8	75	4280	175	160	4.7	2.7	0.6410	0.45	0.16
		70	29.4	79	4800	215	195	6.6	3.8	0.4430	0.43	0.17
		95	31.2	83	5960	260	230	9.0	5.1	0.3200	0.41	0.19
		120	32.6	86	5990	295	265	11.3	6.5	0.2530	0.39	0.20
		150	34.1	90	6580	335	295	14.2	8.1	0.2060	0.38	0.22
		185	35.8	94	7320	380	330	17.5	10.0	0.1640	0.36	0.23
		240	38.2	99	8290	445	380	22.7	13.0	0.1250	0.35	0.25
		300	40.4	104	9390	480	444	28.3	16.3	0.1000	0.32	0.26

Current carrying capacity calculated considering the following conditions:
Maximum conductor temperature = 90°C
Cables in air: Ambient temperature = 30°C
Cables directly buried: Ground temperature = 15°C • Depth of laying = 0.5 m • Thermal resistivity of soil = 1.5 K.m/W