CABLE DESCRIPTION

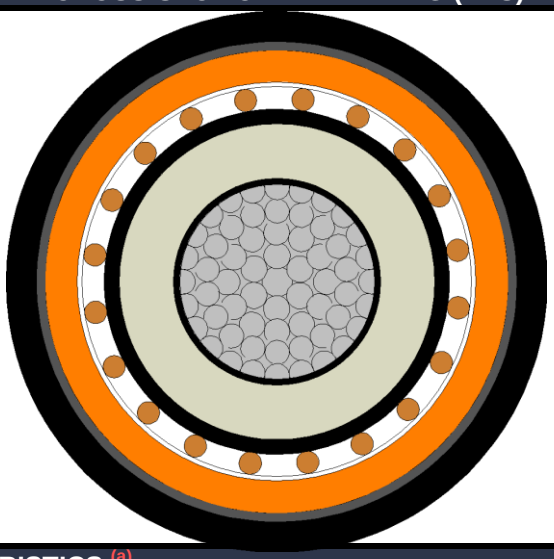
19/33kV 1 core 400mm² compacted aluminium conductor, Semi conductive XLPE conductor screen, XLPE insulated, Semi conductive XLPE insulation Screen, light duty plain annealed copper wire screen, Water blocking tape, 5V-90 PVC orange sheathed, black nylon jacketed, HDPE Outer black sheathed.

STANDARD	AS/NZS 1429.1 : 2006	Reference Number	CR202403051

PHYSICAL CHARACTERISTICS

Conductor Diameter			
	Nominal	(mm)	23.5
Insulation Thickness (Nominal)		(mm)	8.0
Diameter over Insulation			
	Nominal	(mm)	40.9
Overall Cable Diameter			
	Approx	(mm)	49.7
Cable Mass	Approx	(kg/km)	2,578
Minimum Bending Radius			
	During Installation	(mm)	1,431
	Installed	(mm)	954
Max. Pulling Tension	Stocking [f]	(kN)	6.0
	Conductor [f]	(kN)	20.0

CROSS-SECTIONAL DRAWING (NTS) [g]



ELECTRICAL CHARACTERISTICS [a]

Max. DC Resistance	@ 20˚C	(Ohm/km)	0.0778
	@ 90˚C	(Ohm/km)	0.0997
Max. AC Resistance @ 50Hz	@ 20˚C	(Ohm/km)	0.0798
	@ 90˚C	(Ohm/km)	0.101
Inductive Reactance @ 50Hz		(Ohm/km)	0.109
Star Inductance		(mH/km)	0.348
Capacitance per Core (Phase to Earth)		(µF/km)	0.282
Charging Current Per Phase		(A/km)	1.68
Maximum Design Stress		(kV/mm)	3.07
3 Phase Voltage Drop @ 50Hz & 90°C		(mV/A.m)	0.258
Zero Sequence Impedance @ 50Hz (R_o + jX_o) [c]	@ 20˚C	(Ohm/km)	1.02 + j 0.0557
	@ 90˚C	(Ohm/km)	1.30 + j 0.0557
Positive Sequence Impedance @ 50Hz (R_1 + jX_1)	@ 20˚C	(Ohm/km)	0.0798 + j0.109
	@ 90˚C	(Ohm/km)	0.101 + j0.109

CONTINUOUS CURRENT RATING [b]

Unenclosed in Air	(A)	611
Buried Direct	(A)	496
Buried in Ducts	(A)	471

SHORT CIRCUIT RATING

Metallic Screen [d]	(kA/1 Sec.)	3
Phase Conductor [e]	(kA/1 Sec.)	37.8

Carbon Footprint

Total CO2 emission	(kg/km)	26484

[a] Values given are calculated only.
[b] Based on 40°C ambient air temperature, not exposed to direct sunlight, burial depth of 0.8m, soil temperature of 25°C and soil thermal resistivity of 1.2°C.m/W. For single core cables, these are arranged in a trefoil formation "Touching". Screens solid point bonded (ie: bonded at both ends)
[c] Zero Sequence Impedance based on current return path through metallic screen only.
[d] Screen Short Circuit rating based on 80°C - 250°C temperature rise.
[e] Phase Conductor Short Circuit rating based on 90°C - 250°C temperature rise.
[f] To avoid exceeding maximum sidewall bearing pressure (SWBP) of 1450kg/m, maximum pulling tension (T) and minimum bending radius (R) indicated above may have to be reduced and increased respectively by using the formula SWBP (kg/m) = T (kN) / [0.0098 x R (m)].
[g] Colours are for illustration only and may not necessarily reflect actual colours in final product.

Ratings information

Rating factors – 1.9/3.3kV to 19/33kV, single and three core cables, armoured or unarmoured

1. Cables buried direct in the ground:

Variation in ground temperature							
Ground temperature °C	10	15	20	25	30	35	40
Rating factor	1.11	1.07	1.03	1.00	0.97	0.93	0.89

Variation in thermal resistivity of soil		Values of 'g' °C m/W							
Nominal area of conductor mm²		0.8	0.9	1.0	1.2	1.5	2.0	2.5	3.0
Rating factor									
Single core cables	Up to 150	1.16	1.11	1.07	1.00	0.91	0.81	0.73	0.67
	From 185 - 400	1.17	1.12	1.07	1.00	0.90	0.80	0.72	0.66
	Above 400	1.18	1.13	1.08	1.00	0.90	0.79	0.71	0.65
Three core cables	Up to 16	1.09	1.06	1.04	1.00	0.95	0.87	0.79	0.74
	From 25 - 150	1.14	1.10	1.07	1.00	0.93	0.84	0.76	0.70
	From 185 - 400	1.16	1.11	1.07	1.00	0.92	0.82	0.74	0.68

Variation in depth of laying		
*Depth of laying m	Up to 300 mm²	Above 300 mm²
0.8	1	1
1	0.98	0.97
1.25	0.96	0.95
1.5	0.95	0.94
1.75	0.94	0.92
2	0.92	0.90
2.5	0.91	0.89
3.0 or more	0.90	0.88

*Measured to centre of cable or trefoil group of cables.

Variation in depth of laying		
*Depth of laying m	Up to 300 mm²	Above 300 mm²
0.8	1	1
1	0.98	0.97
1.25	0.96	0.95
1.5	0.95	0.94
1.75	0.94	0.92
2	0.92	0.90
2.5	0.91	0.89
3.0 or more	0.90	0.88

*Measured to centre of cable or trefoil group of cables.

Group rating factors for circuits of three single core cables, in trefoil touching, horizontal formation			Circuit spacing – metres			
Voltage range of cables	No. of circuits	Touching	0.15*	0.30	0.45	0.60
From 1.9/3.3kV to 12.7/22kV	2	0.78	0.81	0.85	0.88	0.90
	3	0.66	0.71	0.76	0.80	0.83
	4	0.60	0.65	0.72	0.76	0.80
19/33kV	2	0.79	0.81	0.85	0.88	0.90
	3	0.67	0.71	0.76	0.80	0.83
	4	0.62	0.65	0.72	0.76	0.80

*These spacings may not be possible for some of the larger diameter cables.

Group rating factors for three core cables, in horizontal formation			Circuit spacing – metres			
Voltage range of cables	No. of circuits in group	Touching	0.15*	0.30	0.45	0.60
From 1.9/3.3kV to 12.7/22kV	2	0.80	0.85	0.89	0.90	0.92
	3	0.69	0.75	0.80	0.84	0.86
	4	0.63	0.70	0.77	0.80	0.84
19/33kV	2	0.80	0.83	0.87	0.89	0.91
	3	0.70	0.73	0.78	0.82	0.85
	4	0.64	0.68	0.74	0.78	0.82

*These spacings may not be possible for some of the larger diameter cables.

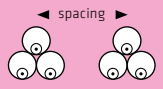
2. Cables in singleway ducts, buried direct in the ground:

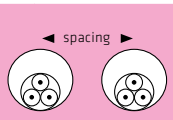
Variation in ground temperature							
Ground temperature °C	10	15	20	25	30	35	40
Rating factor	1.11	1.07	1.03	1.00	0.97	0.93	0.89

Variation in thermal resistivity of soil		Values of 'g' °C m/W							
Nominal area of conductor mm²		0.8	0.9	1.0	1.2	1.5	2.0	2.5	3.0
		Rating factor							
Single core cables	Up to 150	1.10	1.07	1.05	1.00	0.94	0.87	0.81	0.75
	From 185 - 400	1.11	1.08	1.06	1.00	0.94	0.86	0.79	0.73
	Above 400	1.13	1.09	1.06	1.00	0.93	0.84	0.77	0.70
Three core cables	Up to 16	1.05	1.04	1.03	1.00	0.97	0.92	0.87	0.83
	From 25 - 150	1.07	1.05	1.03	1.00	0.96	0.90	0.85	0.78
	From 185 - 400	1.09	1.06	1.04	1.00	0.95	0.87	0.82	0.76

Variation in depth of laying	Rating factors	
*Depth of Laying m	Single core	Multicore
0.8	1	1
1	0.98	0.99
1.25	0.95	0.97
1.5	0.93	0.96
1.75	0.92	0.95
2	0.90	0.94
2.5	0.89	0.93
3.0 or more	0.88	0.92

*Measured to centre of cable or trefoil group of cables.

Group rating factors for single core cables in single way ducts, laid in trefoil touching, horizontal formation			Circuit spacing – metres		
Voltage range of cables	No. of circuits	Touching	0.45	0.60	
From 1.9/3.3kV to 12.7/22kV	2	0.85	0.88	0.90	
	3	0.75	0.80	0.83	
	4	0.70	0.76	0.80	
19/33kV	2	0.85	0.88	0.90	
	3	0.76	0.80	0.83	
	4	0.71	0.76	0.80	

Group rating factors for three core cables in singleway ducts, in horizontal formation			Circuit spacing – metres		
Voltage range of cables	No. of ducts in group	Touching	0.30	0.45	0.60
From 1.9/3.3kV to 12.7/22kV	2	0.88	0.91	0.93	0.94
	3	0.80	0.84	0.87	0.89
	4	0.75	0.81	0.84	0.87
19/33kV	2	0.87	0.89	0.92	0.93
	3	0.78	0.82	0.85	0.87
	4	0.73	0.78	0.82	0.85

3. Cables installed in free air:

Variation in ambient air temperature								
Ambient air temperature °C	15	20	25	30	35	40	45	50
Rating factor	1.26	1.20	1.15	1.10	1.05	1.00	0.94	0.88

Grouping of cables in air:

Derating is not necessary if the following minimum clearance between adjacent circuits can be maintained

1 The horizontal clearance is not less than twice the diameter of an individual cable.
2 The vertical clearance is not less than four times the diameter of an individual cable.
3 Where the number of circuits is more than three, they are installed in a horizontal plane.

General information

AS 1018	Partial discharge measurements
AS/NZS 1026	Electric cables – Impregnated paper insulated for working voltages up to and including 19/33 (36)kV
AS/NZS 1125	Conductors in insulated electric cables and flexible cords
AS/NZS 1429.1	Electric cables – Polymeric insulated Part 1: electric cables for working voltages 1.9/3.3 (3.6)kV up to and including 19/33 (36)kV
AS/NZS 1660	Test methods for electric cables, cords and conductors
AS 1931	High-voltage testing techniques
AS/NZS 2857	Timber drums for insulated electric cables and bare conductors
AS/NZS 2893	Electric cables – lead and lead alloy sheaths – composition
AS/NZS 3008	Electrical installations – selection of cables
AS/NZS 3808	Insulating and sheathing materials for electric cables
AS/NZS 3863	Galvanized mild steel wire for armouring cables
AS 3983	Metal drums for insulated electric cables and bare conductors
AS/NZS 4026	Electric cables – for underground residential distribution systems
IEC 754-2	Test on gases evolved during combustion of electric cables, Part 2: Determination of degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity
IEC 60287	Electric cables – calculation of the current rating
IEC 60332-1	Tests on electric and optical fibre cables under fire conditions, Part 1: Test for vertical flame propagation for a single insulated wire or cable
IEC 60332-3	Tests on electric cables under fire conditions, Part 3: Test for vertical flame spread of vertically-mounted bunched wires or cables
IEC 60502-2	Power cables with extruded insulation and their accessories for rated voltages from 1kV (Um = 1.2kV) up to 30kV (Um = 36kV) - Part 2: Cables for rated voltages from 6kV (Um = 7.2kV) up to 30kV (Um = 36kV)
IEC 60949	Calculation of thermally permissible short-circuit currents, taking into account non-adiabatic heating effects
IEC 60986	Short-circuit temperature limits of electric cables with a rated voltages from 6kV (Um = 7.2kV) up to 30kV (Um = 36kV)
IEC 61034	Measurement of smoke density of cables burning under defined conditions