Caledonian Medium Voltage Cables

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Technical Information

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Current Ratings

The current ratings given on the previous pages are based on the standard conditions of installation detailed bellows:

Maximum conductor temperature: 90°C
Maximum ambient temperature: In air 30°C
In ground 20°C
Ground thermal resistivity: 1.5K•m/W
Laying depth: 0.8m
Spacing between cable laid: In flat formation 2 times of cable overall diameter
In trefoil With cable touching

Where the site conditions differ from the standard conditions mentioned, it will be necessary to multiply the tabulated ratings by the actors given in the following tables. These factors are for variation in ambient ground temperature, soil thermal resistivity and depth of laying. Where more than one circuit is installed in close proximity, then will be necessary to derate further in accordance with the group rating factors given.

Rating Factors

Cables laid direct in ground:
Variation in ground temperature

Ground Temperature	15	20	25	30	35	40	45
Cabe Type	Rating Factor						
All Cables	1.00	0.97	0.93	0.89	0.86	0.82	0.76

Rating factor for depth of laying (To center of cable or trefoil group of cables)

Depth of laying	1.9/3.3KV (1.8/3KV) to 19/33KV (18/30KV) Cables	
m	Up to 300 mm²	Above 300 mm²
0.50	-	-
0.60	-	-
0.80	1.00	1.00
1.00	0.98	0.97
1.25	0.96	0.95
1.50	0.95	0.94
1.75	0.94	0.92
2.00	0.92	0.90
2.50	0.91	0.89
3.00 or more	0.90	0.88

Rating factor for variation in thermal resistivity of soil depth

Nom.Cross-Section Area	Soil thermal resistivity K.m/W						
	0.8	0.9	1.0	1.5	2.0	2.5	3.0
Single							
50	1.15	1.11	1.07	0.91	0.81	0.73	0.68
70	1.16	1.12	1.07	0.91	0.81	0.73	0.68
95	1.16	1.12	1.07	0.91	0.81	0.73	0.68
120	1.16	1.12	1.07	0.91	0.81	0.73	0.68
150	1.17	1.12	1.07	0.91	0.81	0.73	0.68
185	1.17	1.12	1.07	0.91	0.81	0.73	0.68
240	1.17	1.12	1.07	0.91	0.80	0.73	0.68
300	1.18	1.12	1.07	0.91	0.80	0.73	0.68
400	1.18	1.12	1.07	0.91	0.80	0.73	0.67
500	1.18	1.12	1.07	0.91	0.80	0.73	0.67
630	1.18	1.12	1.07	0.91	0.80	0.73	0.67
800	1.18	1.12	1.07	0.91	0.80	0.72	0.67
1000	1.18	1.12	1.07	0.91	0.80	0.72	0.67
Multicore							
16	1.12	1.08	1.05	0.93	0.84	0.77	0.72
25	1.13	1.09	1.05	0.93	0.83	0.77	0.71
35	1.13	1.09	1.06	0.92	0.83	0.76	0.71
50	1.13	1.09	1.06	0.92	0.83	0.76	0.71
70	1.14	1.09	1.06	0.92	0.83	0.75	0.70
95	1.14	1.09	1.06	0.92	0.83	0.75	0.70
120	1.14	1.10	1.06	0.92	0.82	0.75	0.69
150	1.14	1.10	1.06	0.92	0.82	0.75	0.69
185	1.14	1.10	1.06	0.92	0.82	0.74	0.69
240	1.15	1.10	1.07	0.92	0.82	0.74	0.69
300	1.15	1.10	1.07	0.92	0.82	0.74	0.69
400	1.15	1.10	1.07	0.92	0.82	0.74	0.69

Group rating factor for circuits of three single core cables. In trefoil and laid flat touching, horizontal formation (average values)

	No. of circuits	Spacing of circuits					
		Touching					
		Trefoil	Laid Flat	0.15m*	0.3m	0.45m	0.6m
1.9/3.3KV(1.8/3KV) to 12.7/22KV (12/20KV) Cables	2	0.78	0.80	0.81	0.85	0.88	0.90
	3	0.66	0.68	0.71	0.76	0.80	0.83
	4	0.59	0.62	0.65	0.72	0.76	0.80
	5	0.55	0.58	0.61	0.68	0.73	0.77
	6	0.52	0.55	0.58	0.66	0.72	0.76
19/33KV(18/30KV) Cables	2	0.79	0.81	0.81	0.85	0.88	0.90
	3	0.67	0.70	0.71	0.76	0.80	0.83
	4	0.62	0.65	0.65	0.72	0.76	0.80
	5	0.57	0.60	0.60	0.68	0.73	0.77
	6	0.54	0.57	0.57	0.66	0.70	0.76

*This configuration, at 0.15m spacing, may not be practical for the larger size cables.

Group rating factor for multicore cables in horizontal formation (average values)

	No. of cables in group	Spacing				
		Touching	0.15m	0.3m	0.45m	0.6m
1.9/3.3KV(1.8/3KV) to 12.7/22KV (12/20KV) Cables	2	0.80	0.85	0.89	0.90	0.92
	3	0.68	0.75	0.80	0.84	0.86
	4	0.62	0.70	0.77	0.80	0.84
	5	0.57	0.66	0.73	0.78	0.81
	6	0.55	0.63	0.71	0.76	0.80
19/33KV(18/30KV) Cables	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
	5	0.59	0.63	0.70	0.75	0.79
	6	0.56	0.60	0.68	0.74	0.78

Cables laid direct in single way ducts:
(The term “ducts” applies to single earthenware, fibre or plastic pipes).

Variation in ground temperature

Ground Temperature	15	20	25	30	35	40	45
Cabe Type	Rating Factor						
All Cables	1.00	0.97	0.93	0.89	0.86	0.82	0.76

Rating factor for depth of laying (To center of cable or trefoil group of cables)

Depth of Laying	600/1000V cables		1900/3300V to 19000/33000V cables	
m	Single Core	Multicore	Single Core	Multicore
0.50	1.00	1.00	-	-
0.60	0.98	0.99	-	-
0.80	0.95	0.97	1.00	1.00
1.00	0.93	0.96	0.98	0.99
1.25	0.90	0.95	0.95	0.97
1.50	0.89	0.94	0.93	0.96
1.75	0.88	0.94	0.92	0.95
2.00	0.87	0.93	0.90	0.95
2.50	0.86	0.92	0.89	0.93
3.00 or more	0.85	0.91	0.88	0.92

Rating factor for variation in thermal resistivity of soil depth

Nom.Cross-Section Area mm²	Soil thermal resistivity K.m/W						
	0.8	0.9	1.0	1.5	2.0	2.5	3.0
Single Core							
50	1.08	1.06	1.04	0.94	0.87	0.82	0.77
70	1.09	1.06	1.04	0.94	0.87	0.81	0.76
95	1.09	1.06	1.04	0.94	0.87	0.81	0.76
120	1.10	1.07	1.04	0.94	0.86	0.80	0.75
150	1.10	1.07	1.04	0.94	0.86	0.80	0.75
185	1.10	1.07	1.04	0.93	0.86	0.79	0.75
240	1.11	1.07	1.05	0.93	0.86	0.79	0.74
300	1.11	1.08	1.05	0.93	0.85	0.79	0.74
400	1.11	1.08	1.05	0.93	0.85	0.78	0.73
500	1.11	1.08	1.05	0.93	0.85	0.78	0.73
630	1.12	1.08	1.05	0.93	0.84	0.78	0.72
800	1.12	1.09	1.05	0.93	0.84	0.77	0.72
1000	1.13	1.09	1.05	0.93	0.84	0.77	0.71
Multicore							
16	1.04	1.03	1.02	0.97	0.92	0.88	0.85
25	1.05	1.03	1.02	0.96	0.92	0.88	0.84
35	1.05	1.03	1.02	0.96	0.92	0.87	0.83
50	1.05	1.03	1.02	0.96	0.91	0.87	0.83
70	1.05	1.04	1.02	0.96	0.91	0.86	0.82
95	1.06	1.04	1.02	0.96	0.91	0.86	0.82
120	1.06	1.04	1.03	0.95	0.90	0.85	0.81
150	1.06	1.04	1.03	0.95	0.90	0.85	0.80
185	1.07	1.05	1.03	0.95	0.89	0.84	0.80
240	1.07	1.05	1.03	0.95	0.89	0.84	0.79
300	1.07	1.05	1.03	0.95	0.88	0.83	0.78
400	1.07	1.05	1.03	0.95	0.88	0.83	0.78

Group rating factor for circuits of three single core cables
In trefoil single way ducts, horizontal formation (average values)

	No. of circuits	Spacing		
		Touching	0.45m	0.60m
1.9/3.3KV(1.8/3KV) to 12.7/22KV(12/20KV) Cables	2	0.85	0.88	0.90
	3	0.75	0.80	0.83
	4	0.70	0.76	0.80
	5	0.67	0.73	0.77
	6	0.64	0.71	0.76
19/33KV(18/30KV) Cables	2	0.85	0.88	0.90
	3	0.76	0.80	0.83
	4	0.71	0.76	0.80
	5	0.67	0.73	0.77
	6	0.65	0.71	0.76

Group rating factor for multicore cables in single way ducts, horizontal formation (average values)

	No. of ducts in group	Spacing			
		Touching	0.30m	0.45m	0.60m
1.9/3.3KV(1.8/3KV) to 12.7/22KV(12/20KV) Cables	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
	5	0.71	0.77	0.82	0.85
	6	0.69	0.75	0.80	0.84
19/33KV(18/30KV) Cables	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
	5	0.69	0.75	0.79	0.83
	6	0.67	0.73	0.78	0.82

Cables laid direct in free air:
Variation in air temperature

Ground Temperature	25	30	35	40	45	50	55
Cabe Type	Rating Factor						
Cable Type up to 3.3KV	1.02	1.00	0.96	0.91	0.87	0.82	0.76
6.6KV or Above	1.00	0.95	0.91	0.86	0.80	0.75	0.69

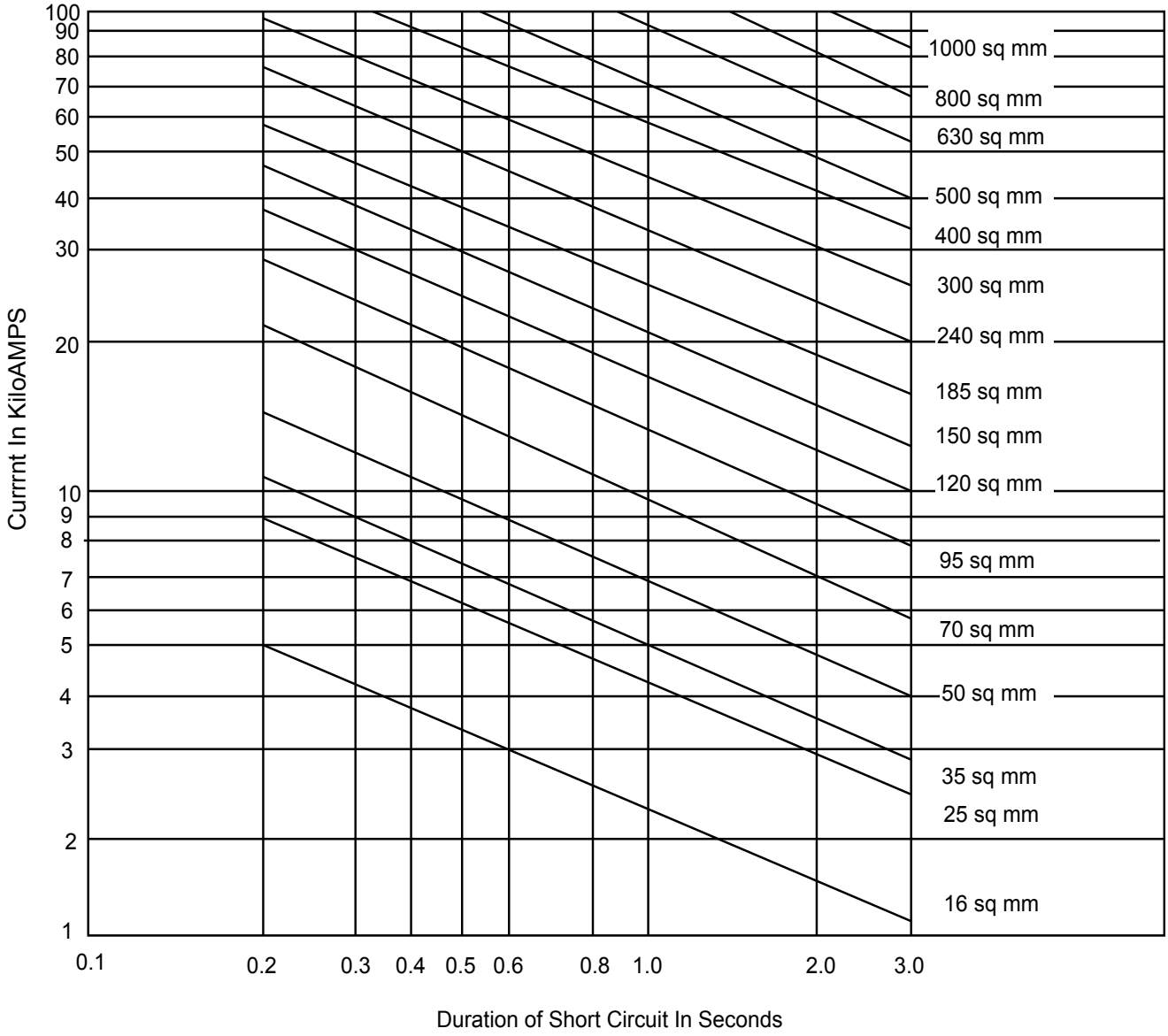
Effect of grouping cables

No reduction in rating is necessary where there is free circulation of air around the circuits providing that:

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

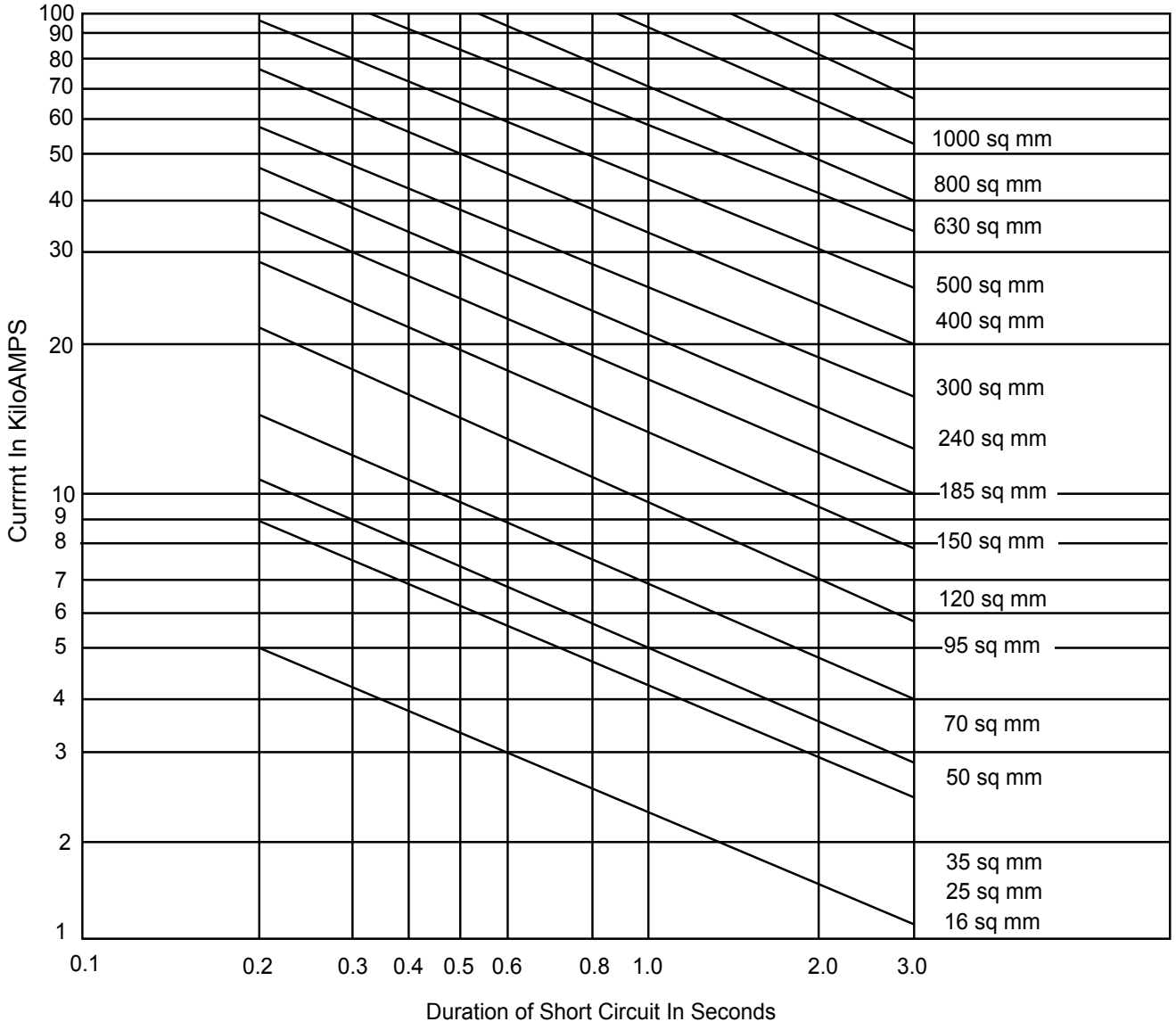
Short Circuit Ratings

Short circuit rating –Copper conductor current in kiloamps



Basis:
1. Cable fully located at start of short circuit. (Conductor temperature: 90°C)
2. Conductor temperature at end of short circuit: 250°C

Short circuit rating –Aluminium conductor current in kiloamps



Basis:

1. Cable fully located at start of short circuit. (Conductor temperature: 90°C)
2. Conductor temperature at end of short circuit: 250°C

Armour fault current

Nom. Cross-Section Area mm²	Aluminium Wire Armoured Cables					Steel Wire Armoured Cables				
	3.8/6.6 (3.6/6) KV	6.35/11 (6/12) KV	8.7/15 KV	12.7/22 (12/20) KV	18/30 (19/33) KV	3.8/6.6 (3.6/6) KV	6.35/11 (6/12) KV	8.7/15 KV	12.7/22 (12/20) KV	18/30 (19/33) KV
25						7370	10160	11510		
35						7800	10830	11960	13090	
50	6150	6660	7340	7860	12010	10380	11290	12640	13770	21500
70	6660	7170	7860	10680	12810	11290	12190	13540	14670	22580
95	7170	7690	10410	11210	13350	12190	13320	14450	19710	24010
120	7520	8030	10940	11750	13880	13090	14220	15350	20790	25090
150	8030	10680	11480	12280	18350	13770	14900	16030	21860	25810
185	10680	11480	12280	12810	19190	14900	15800	21860	23300	27240
240	11750	12280	13060	13880	20020	16480	21860	23660	25090	29030
300	12550	13080	13880	18770	21690	22580	23660	25090	26520	30830
400	13880	14150	19190	20020	22940	25090	25810	27240	28670	
500	19190	19610	20440	21690	24610					
630	21270	21270	22530	23360	26280					
800	23360	23360	24610	25450	28790					
1000	25450	25450	26700	27530	30870					

Wire screen

Nom.Cross-Section Area	Maximum DC resistance at 20°C	Short Circuit Rating
mm²	Ohm/km	A
16	1.19	2040
25	0.759	3200
35	0.542	4480

Copper wire applied helically or tape screen applied individually to each screened core, or collectively over laid up provide an earth fault current path.

Product Range of Medium Voltage Cable

Standard	Voltage	Size(sq mm)	No. of Cores
BS 6622/BS 7835	3.8/6.6KV	25-630	Single
BS 6622/BS 7835	6.35/11KV	25-630	Single
BS 6622/BS 7835	8.7/15KV	25-630	Single
BS 6622/BS 7835	12.7/22KV	35-630	Single
BS 6622/BS 7835	19/33KV	50-630	Single
BS 6622/BS 7835	3.8/6.6KV	25-400	Three
BS 6622/BS 7835	6.35/11KV	25-400	Three
BS 6622/BS 7835	8.7/15KV	25-400	Three
BS 6622/BS 7835	12.7/22KV	35-400	Three
BS 6622/BS 7835	19/33KV	35-400	Three
IEC 60502	1.8/3KV	10-1000	Single
IEC 60502	3.6/6KV	10-1000	Single
IEC 60502	6/10KV	16-1000	Single
IEC 60502	8.7/15KV	25-1000	Single
IEC 60502	12/20KV	25-1000	Single
IEC 60502	18/30KV	50-1000	Single
IEC 60502	21/35KV	50-400	Single
IEC 60502	26/35KV	50-400	Single
IEC 60502	1.8/3KV	10-630	Three
IEC 60502	3.6/6KV	10-630	Three
IEC 60502	6/10KV	16-630	Three
IEC 60502	8.7/15KV	25-500	Three
IEC 60502	12/20KV	35-500	Three
IEC 60502	18/30KV	50-500	Three
IEC 60502	21/35KV	50-400	Three
IEC 60502	26/35KV	50-400	Three
VDE 0276	1.8/3KV	25-800	Single
VDE 0276	3.6/6KV	25-800	Single
VDE 0276	6/10KV	25-800	Single
VDE 0276	8.7/15KV	25-800	Single
VDE 0276	12/20KV	25-800	Single
VDE 0276	18/30KV	25-800	Single
VDE 0276	1.8/3KV	25-400	Three
VDE 0276	3.6/6KV	25-400	Three
VDE 0276	6/10KV	25-400	Three
VDE 0276	8.7/15KV	25-400	Three
VDE 0276	12/20KV	35-400	Three
VDE 0276	18/30KV	50-400	Three