Volt Drop Table

Current carrying capacities and associated voltage drops for twin and multicore P.V.C insulated cables, non-armoured (copper conductors).

BS6006 & BS6346

Conductor operating temperature 70°C

Conductor cross sectional area	Installation methods A to C† of table 9A ('enclosed')				Installation methods E to H of table 9A ('Clipped direct')				Installation method K of table 9A ('Defined conditions')			
	One twin cable. With or without protective conductor single phase a/c. Or d/c.		One three-core cable, with or without protective conductor, or one four core cable phase one		One twin cable. With or without protective conductor single phase a.c. Or d.c.		One three-core cable, with or without protective conductor, or one four core cable phase one		One twin cable. With or without protective conductor single phase a.c. or d.c.		One three-core cable, with or without protective conductor, or one four core cable phase one	
	Current carrying capacity	Volt drop per amp per metre	Current carrying capacity	Volt drop per amp per metre	Current carrying capacity	Volt drop per amp per metre	Current carrying capacity	Volt drop per amp per metre	Current carrying capacity	Volt drop per amp per metre	Current carrying capacity	Volt drop per amp per metre
1	2	3	4	5	6	7	8	9	10	11	12	13
mm²	A	mV	A	mV	A	mV	A	mV	A	mV	A	mV
1.0	14	42	12	37	16	42	13	37				
1.5	18	28	16	24	20	28	17	24				
2.5	24	17	21	15	28	17	24	15				
4	32	11	29	9.2	36	11	32	9.2				
6	40	7.1	36	6.2	46	7.1	40	6.2				
10	53	4.2	49	3.7	64	4.2	53	3.7				
16	70	2.7	62	2.3	85	2.7	70	2.3				
25	79	1.8	70	1.6	108	1.8	90	1.6	114	1.8	95	1.6
35	98	1.3	86	1.1	132	1.3	115	1.1	139	1.3	122	1.1
50					163	0.92	140	0.81	172	0.92	148	0.81
						Ac / Dc				**Ac / Dc**		
70					207	0.65/0.64	176	0.57	218	0.65/0.64	186	0.57
95					251	0.48/0.46	215	0.42	265	0.48/0.46	227	0.42
120					290	0.40/0.36	251	0.34	306	0.40/0.36	265	0.34
150					330	0.32/0.25	287	0.29	348	0.32/0.25	302	0.29
185					380	0.29/0.23	330	0.24	400	0.29/0.23	348	0.24
240					450	0.25/0.18	392	0.20	474	0.25/0.18	413	0.20
300					520	0.23/0.14	450	0.18	548	0.23/0.14	474	0.18
400					600	0.22/0.11	520	0.17	632	0.22/0.11	548	0.17

† For installation Method C, the tabulated values are applicable only to the range up to and including 35mm². For larger sizes in this installation method, see ERA report 69-30. For cables in ducts in the floor of a building, the ERA ratings must be adjusted by the appropriate factor for the ambient temperature.

The current carrying capacities in columns 6 and 8 are applicable to flexible cables to BS 6004 Table 1(b) where the cables are used in fixed installations.

Correction Factors

For Ambient Temperature

Ambient temperature	25°C	35°C	40°C	45°C	50°C	55°C	60°C	65°C
Correction factor	1.06	0.94	0.87	0.79	0.71	0.61	0.50	0.35

Technical Information

Sample Formulae for the Volt Drop Table

FORMULA = LENGTH X VOLT DROP X AMPS = VOLT DROP OVER LENGTH			
1.0 mm TWIN CABLE FORMULA = 42 MV PER AMP PER METER			
10 metres at 5 amp with 1.0mm twin =	10 x 5 x 42 =	2100 mv / 1000	2.1 volts
20 metres at 5 amp with 1.0mm twin =	20 x 5 x 42 =	4200 MV / 1000	4.2 volts
30 metres at 5 amp with 1.0mm twin =	30 x 5 x 42 =	6300 MV / 1000	6.3 volts
50 metres at 5 amp with 1.0mm twin =	50 x 5 x 42 =	10500 MV / 1000	10.5 volts
75 metres at 5 amp with 1.0mm twin =	75 x 5 x 42 =	15750 MV / 1000	15.7 volts
100 metres at 5 amp with 1.0mm twin =	100 x 5 x 42 =	21000 MV / 1000	21 volts
1.5 mm TWIN CABLE FORMULA = 28 MV PER AMP PER METER			
10 metres at 5 amp with 1.5mm twin =	10 x 5 x 28 =	1400 MV / 1000	1.4 volts
20 metres at 5 amp with 1.5mm twin =	20 x 5 x 28 =	2800 MV / 1000	2.8 volts
30 metres at 5 amp with 1.5mm twin =	30 x 5 x 28 =	4200 MV / 1000	4.2 volts
50 metres at 5 amp with 1.5mm twin =	50 x 5 x 28 =	7000 MV / 1000	7.0 volts
75 metres at 5 amp with 1.5mm twin =	75 x 5 x 28 =	10500 MV / 1000	10.5 volts
100 metres at 5 amp with 1.5mm twin =	100 x 5 x 28 =	14000 MV / 1000	14.0 volts
2.5 mm TWIN CABLE FORMULA + 18mv PER AMP PER METER			
10 metres at 5 amp with 2.5mm twin =	10 x 5 x 17 =	850 MV / 1000	0.85 volts
20 metres at 5 amp with 2.5mm twin =	20 x 5 x 17 =	1700 MV / 1000	1.7 volts
30 metres at 5 amp with 2.5mm twin =	30 x 5 x 17 =	2500 MV / 1000	2.5 volts
50 metres at 5 amp with 2.5mm twin =	50 x 5 x 17 =	4250 MV / 1000	4.2 volts
75 metres at 5 amp with 2.5mm twin =	75 x 5 x 17 =	6375 MV / 1000	6.3 volts
100 metres at 5 amp with 2.5mm twin =	100 x 5 x 17 =	8500 MV / 1000	8.5 volts

MINIATURE CIRCUIT BREAKERS FOR USE IN CONJUNCTION WITH MOTOR STARTERS AND TRANSFORMERS

Motor starters
In general miniature circuit breakers can give only short circuit protection to motor loads due to high starting currents which may be encountered: typically 3 to 12 times full load current (FLC)

Assumptions
The tables give recommended mcb ratings for motors up to 37kW based on the following assumptions:

Direct on-line starting
starting current = 7 x FLC
run up time =
6 seconds, motors < 3 kW
10 seconds, motors < 22 kW
running currents = average values only
(individual manufacturers figures may vary)
four pole motors i.e. speed approx.
1500 rev/min.

For Higher inertia loads i.e. hoists and fans run up times maybe considerably longer than those assumed above. The rating of the mcb must take account of the greater run-up time and starting current. The required mcb rating can be determined by reference to time/current curves (consult us)

Star/ delta starting
Since, during the changeover from star to delta, a high current surge in the order of DOL values may be met, the mcb rating selected should be the same as that recommended for DOL starting

Table 2-1 phase 240V AC DOL starting

KW	Hp	Running	C60H	C60HC	C60HD	NC100C	NC100D
0.12	0.166	0.55	2	1	1		
0.18	0.25	0.7	2	1	1		
0.25	0.33	0.87	2	2	1		
0.37	0.5	1.35	4	2	2		
0.55	0.75	1.55	4	2	2		
0.75	1	1.93	6	4	2		
1.1	1.5	2.5	6	4	4		
1.5	2	3.5	10	5	6		
2.2	3	4.8	16	10	10	10	10
3	4	6.4	16	16	10	16	10
3.75	5	7.8	20	20	16	20	16
4	5.5	8.1	25	20	16	20	16
5.5	7.5	11	25	25	16	25	16
7.5	10	14.4	32	25	20	25	20
9.33	12.5	17.3	40	32	20	32	20
11	15	21	50	40	25	40	25
13	17.5	25	63	50	32	50	32
15	20	28	63	50	40	50	40
18.5	25	35		63	50	63	50
22	30	40		63	50	63	50
30	40	54			63	80	63
37	50	65.5				100	80

Table 2-1 phase 240V AC DOL starting

KW	Hp	Running	C60H	C60HC	C60HD	NC100C	NC100D
0.12	0.166	0.95	2	2	1		
0.18	0.25	1.5	4	2	2		
0.25	0.33	1.7	6	2	2		
0.37	0.5	3	10	6	4		
0.55	0.75	4.5	16	10	6	10	
0.75	1	5.5	16	16	10	16	10
1.1	1.5	8.5	20	20	16	20	16
1.5	2	10.5	25	25	20	25	20
2.2	3	15.5	32	32	25	32	25
3	4	20	40	40	32	40	32
3.75	5	24	50	50	40	50	40
5.5	7.5	34	63	63	50	63	50
6.3	8.5	36.5		63	63	63	63
7.5	10	45			63	80	63
11	15	66.5				100	80

	VA	Primary in (A)	C60H	C60HC	C60HD	NC100C	NC100D
Transformers High inrush currents are also produced when transformers are switched on. Typically 10-15 times full load current. **Assumptions** The tables give recommended mcb ratings for single phase transformers up to 12500 VA and three phase transformers up to 30000 VA on the following formula. **Mcb rating** 15 x normal current of transformer min instantaneous tripping cc efficient of mcb	500	0.7	4	2	1		
	750	1.04	6	4	2		
	1000	1.39	6	4	2		
	2000	2.78	10	10	6	10	
	5000	6.95	32	16	10	16	10
	10000	13.89	50	32	20	32	20
	15000	20.84		50	32	50	32
	20000	27.78		53	40	63	40
	25000	34.73			50	80	50
	30000	41.67			63	80	63
	Table 4 - 1 phase transformers 240V AC supply						
	VA	**Primary in (A)**	**C60H**	**C60HC**	**C60HD**	**NC100C**	**NC100D**
	50	0.21	1				
	100	0.42	2	1	1		
	250	1.04	6	4	2		
	500	2.08	10	6	4		
	1000	4.17	20	10	10	10	10
	2500	10.42	40	25	16	25	16
	5000	20.84		50	32	50	32
	10000	41.67			63	80	63

Ohms Law

IF YOU KNOW	NEED TO KNOW
VOLTS ÷ RESISTANCE	= AMPS
VOLTS ÷ AMPS	= RESISTANCE
VOLTS x AMPS	= WATTS
WATTS ÷ AMPS	= VOLTS
WATTS ÷ VOLTS	= AMPS
AMPS x RESISTANCE	= VOLTS

CABLE LENGTH RESISTANCE	x	CURRENT DRAWN	=	VOLT DROP
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Ohms		AMPS OR M/AMPS		