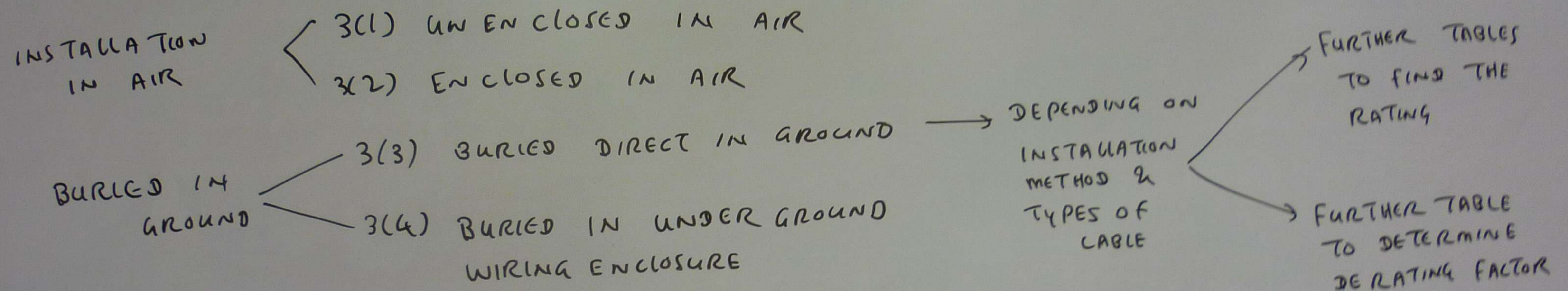


## SELECTION OF CABLE SIZE

AS 3008, PAGE 30 - 4 MAJOR TABLES

3(1), 3(2), 3(3), 3(4)



Pb SELECT THE SUITABLE TYPE OF CABLE AND VOLTAGE DROP FOR THE FOLLOWING CABLES



CIRCUIT	INSTALLATION METHOD & CABLE TYPE	PROTECTIVE DEVICE RATING	CONDUCTOR SIZE	ENV/A-M TABLE	Vc	LENGTH	Vd = $\frac{V_c L I}{1000}$
A	<p>3<math>\phi</math> SINGLE CORE CABLE (3-SINGLE CORES)</p> <p>ENCLOSED IN AIR</p> <p>V75 TPI CABLE</p> <p>TABLE 2(W) ROW 2</p> <p>SOLID STRANDED COPPER</p>	25A	4mm <sup>2</sup>	TABLE 41	9.71	42m	$V_d = \frac{9.71 \times 42 \times 25}{1000}$
B	<p>V75 TPI CABLE, 3<math>\phi</math> CABLE</p> <p>INSTALLED IN RIGID PVC CONDUIT</p> <p>THE BOILER IS SITUATED 56m FROM THE SWITCHBOARD</p> <p>TABLE 3(2) + INSULATION ROW</p>	40A	35mm <sup>2</sup>	TABLE 41	1.12	56m	$V_d = \frac{1.12 \times 56 \times 40}{1000}$
C	<p>SIX 240V 1000W FLOOD LIGHT</p> <p>V75 TPI INSTALLED ENCLOSED IN AIR</p> <p>1<math>\phi</math> 2 SINGLE CORE CABLE - ROW 1</p>	32A	4mm <sup>2</sup>	TABLE 4,5	11.2	46m	$V_d = \frac{11.2 \times 46 \times 32}{1000}$
D	<p>TWO SINGLE PHASE SOCKET OUTLETS INSTALLED ON A CIRCUIT PROTECTED BY C.B</p> <p>V75 TPI ENCLOSED IN AIR</p> <p>NON DOMESTIC INSTALLATION</p> <p>1<math>\phi</math> 2 SINGLE CORE CABLE - ROW 2</p>	32A	4mm <sup>2</sup>	TABLE 4,5	11.2	56m	$V_d = \frac{11.2 \times 56 \times 32}{1000}$



DEVICE RATING	CONDUCTOR SIZE	TABLE	Vc	LENGTH	$V_d = \frac{V_c L I}{1000}$	VOLTAGE DROP	ACCEPTABILITY
75C) COL 15/17 90C) COL 15/17 110C) COL 17	4 mm <sup>2</sup>	ENCLOSED IN AIR TABLE 41 WIRING ENCLOSURE	9.71	42m	$V_d = \frac{9.71 \times 42 \times 25}{1000}$	10.19 V 3φ	5% of 415V $\frac{415}{20} = 20.75$ < 20.75 ACCEPTABLE
75C 3 J14 4 → 22 5 - COL 12	35 mm <sup>2</sup>	TABLE 41 WIRING ENCLOSURE COMPLETELY SURROUNDED BY INSULATION ↓ C.U.	1.12	56m	$V_d = \frac{1.12 \times 56 \times 40}{1000}$	2.5V 3φ	5% of 415V $\frac{415}{20} = 20.75$ < 20.75V ACCEPTABLE
75C 1, 5 COL 15 → 17 6 COL 11, 12	4 mm <sup>2</sup>	9.71 - 3φ $V_c = \frac{9.71}{0.866} \rightarrow 11.2$	11.2	48m	$V_d = \frac{11.2 \times 48 \times 32}{1000}$	16.5V 1φ	5% of 240V = $\frac{240 \times 5}{100} = 12V$ 16.5V > 12V UNACCEPTABLE
75C 16, 4, 5 16E5, COL 11, 12	4 mm <sup>2</sup>	9.71 3φ $V_c = \frac{9.71}{0.866} \rightarrow 11.2$	11.2	56m	$V_d = \frac{11.2 \times 56 \times 32}{1000}$	20V 1φ	5% of 240V = 12V 20V > 12V NOT ACCEPTABLE

SELECTION

TABLE 4, COL 15  
SELECT BIGGER SIZE  
6 mm<sup>2</sup> SELECT →  
10 mm<sup>2</sup>  
16

TABLE 4, COL 15  
SELECT BIGGER SIZE  
6 mm<sup>2</sup> →  
10 mm<sup>2</sup>



PROP

5% of 415V  
 $\frac{415}{20} = 20.75$   
 $< 20.75$  ACCEPTABLE

5% of 415V  
 $\frac{415}{20} = 20.75$   
 $< 20.75$  ACCEPTABLE

5% of 240V =  $\frac{240 \times 5}{100} = 12V$   
 $16.5V > 12V$   
 UNACCEPTABLE

5% of 240V = 12V  
 $20V > 12V$   
 NOT ACCEPTABLE

SELECTION

TABLE 4, COL 15  
SELECT BIGGER SIZE

6 mm <sup>2</sup>	SELECT	→ TABLE 41 → 6.49
10 mm <sup>2</sup>		→ 3.86
16		→ 2.43

TABLE 4, COL 15  
SELECT BIGGER SIZE

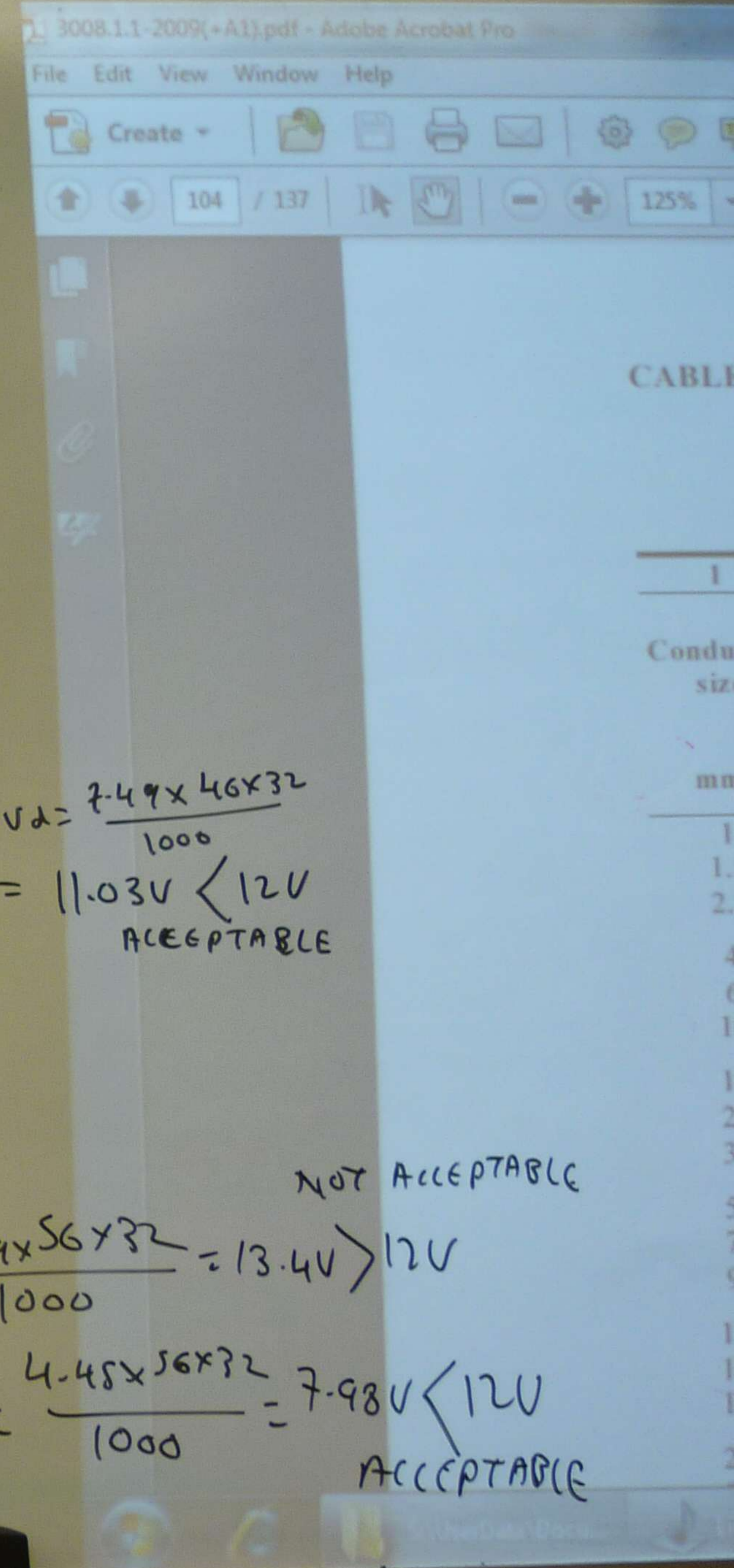
6 mm <sup>2</sup>	→ 6.49 → $\frac{6.49}{0.866} = 7.49$
10 mm <sup>2</sup>	→ 3.86 → $\frac{3.86}{0.866} = 4.45$

1φ  
 $\frac{6.49}{0.866} = 7.49V = 11.03V < 12V$   
 ACCEPTABLE

$V_d = \frac{7.49 \times 46 \times 32}{1000}$

$V_d = \frac{7.49 \times 56 \times 32}{1000} = 13.4V > 12V$   
 NOT ACCEPTABLE

$V_d = \frac{4.45 \times 56 \times 32}{1000} = 7.98V < 12V$   
 ACCEPTABLE





### THREE-PHASE VOLTAGE DROP ( $V_d$ ) AT 50 Hz

CABLE TYPES: SINGLE-CORE INSULATED AND SHEATHED COPPER CONDUCTORS, LAID FLAT TOUCHING OR IN A WIRING ENCLOSURE

Conductor size mm <sup>2</sup>	Three-phase voltage drop ( $V_d$ ) at 50 Hz, mV/A.m									
	Conductor temperature, °C									
	45		60		75		90		110	
	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.
1	40.3	—	42.5	—	44.7	—	46.8	—	49.7	—
1.5	25.9	—	27.3	—	28.6	—	30.0	—	31.9	—
2.5	14.1	—	14.9	—	15.6	—	16.4	—	17.4	—
4	8.77	—	9.24	—	9.71	—	10.2	—	10.8	—
6	5.86	—	6.18	—	6.49	—	6.81	—	7.23	—
10	3.49	—	3.68	—	3.86	—	4.05	—	4.30	—
16	2.20	—	2.32	—	2.43	—	2.55	—	2.71	—
25	1.40	—	1.47	—	1.55	—	1.62	—	1.72	—
35	1.02	—	1.07	—	1.12	—	1.18	—	1.25	—
50	0.763	—	0.801	—	0.840	—	0.878	—	0.929	—
70	0.545	—	0.571	—	0.597	—	0.623	—	0.657	—
95	0.413	—	0.431	—	0.449	—	0.467	—	0.491	—
120	0.345	—	0.358	—	0.371	—	0.385	—	0.403	—
150	0.299	0.299	0.309	—	0.319	—	0.330	—	0.344	—
185	0.262	0.261	0.270	0.269	0.277	0.277	0.285	0.285	0.296	0.296
240	0.230	0.224	0.235	0.230	0.240	0.236	0.245	0.242	0.252	0.250

16X32  
12V  
TABLE

NOT ACCEPTABLE

13.4V > 12V

7.98V < 12V

ACCEPTABLE



**TABLE 41**  
**THREE-PHASE VOLTAGE DROP ( $V_d$ ) AT 50 Hz**

**CABLE TYPES:** SINGLE-CORE INSULATED AND SHEATHED COPPER CONDUCTORS, LAID FLAT TOUCHING OR IN A WIRING ENCLOSURE

Conductor size mm <sup>2</sup>	Three-phase voltage drop ( $V_d$ ) at 50 Hz, mV/A.m									
	Conductor temperature, °C									
	45		60		75		90		110	
	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.	Max.	0.8 p.f.
1	40.3	—	42.5	—	44.7	—	46.8	—	49.7	—
1.5	25.9	—	27.3	—	28.6	—	30.0	—	31.9	—
2.5	14.1	—	14.9	—	15.6	—	16.4	—	17.4	—
4	8.77	—	9.24	—	9.71	—	10.2	—	10.8	—
6	5.86	—	6.18	—	6.49	—	6.81	—	7.23	—
10	3.49	—	3.68	—	3.86	—	4.05	—	4.30	—
16	2.20	—	2.32	—	2.43	—	2.55	—	2.71	—
25	1.40	—	1.47	—	1.55	—	1.62	—	1.72	—
35	1.02	—	1.07	—	1.12	—	1.18	—	1.25	—
50	0.763	—	0.801	—	0.840	—	0.878	—	0.929	—
70	0.545	—	0.571	—	0.597	—	0.623	—	0.657	—
95	0.413	—	0.431	—	0.449	—	0.467	—	0.491	—
120	0.345	—	0.358	—	0.371	—	0.385	—	0.403	—
150	0.299	0.299	0.309	—	0.319	—	0.330	—	0.344	—

46x32  
 < 12V  
 ACCEPTABLE

NOT ACCEPTABLE  
 = 13.4V > 12V

x32  
 = 7.98V < 12V  
 ACCEPTABLE



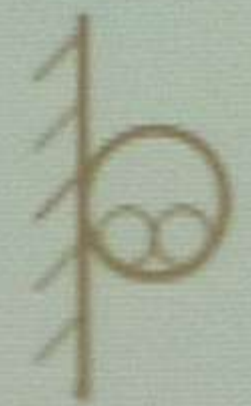





TABLE 4 (continued)

Conductor size mm <sup>2</sup>	Current-carrying capacity, A																													
	14		15		16		17		18		19		20		21		22		23		24		25		26		27		28	
	Enclosed		Thermal insulation				Buried direct		Underground wiring enclosure																					
	Wiring enclosure in air		Partially surrounded by thermal insulation		Completely surrounded by thermal insulation																									
	Cu		Al	Cu	Al	Cu	Al	Cu	Al	Cu		Al	Cu	Al	Cu		Al	Cu	Al	Cu		Al	Cu	Al	Cu		Al	Cu	Al	
	Solid/Stranded	Flexible								Solid/Stranded	Flexible				Solid/Stranded	Flexible				Solid/Stranded	Flexible				Solid/Stranded	Flexible				
1	13	14	—	11	—	6	—	18	—	18	19	—	21	—	18	19	—	21	—	18	19	—	21	—	18	19	—	21	—	
1.5	18	18	—	14	—	8	—	23	—	23	23	—	26	—	23	23	—	26	—	23	23	—	26	—	23	23	—	26	—	
2.5	24	24	—	20	—	12	—	32	—	32	31	—	36	—	32	31	—	36	—	32	31	—	36	—	32	31	—	36	—	
4	32	31	—	25	—	16	—	41	—	41	40	—	47	—	41	40	—	47	—	41	40	—	47	—	41	40	—	47	—	
6	41	40	—	33	—	20	—	52	—	52	50	—	58	—	52	50	—	58	—	52	50	—	58	—	52	50	—	58	—	
10	54	54	—	44	—	27	—	69	—	69	68	—	77	—	69	68	—	77	—	69	68	—	77	—	69	68	—	77	—	
16	70	69	54	56	43	36	28	122	95	80	87	69	99	77	80	87	69	99	77	80	87	69	99	77	80	87	69	99	77	

NOT ACCEPTABLE  
 $V > 12V$   
 $7.98V < 12V$   
 ACCEPTABLE



**SCHEDULE OF INSTALLATION METHODS FOR CABLES DEEMED TO HAVE THE SAME CURRENT-CARRYING CAPACITY AND CROSS-REFERENCES TO APPLICABLE DERATING TABLES—ENCLOSED**

1	2	3	4	5	6
Item No.	Cable details (see Note 1)	Reference drawing (see Note 2)	Current-carrying capacity table reference	Methods of installation for cables deemed to have the same current-carrying capacity (See Note 3)	Derating table for more than one circuit
1	Two single-core cables		Tables 4 and 5 Columns 15 to 17  Table 6 Columns 11 and 12	Cables in wiring enclosures installed in— (a) air; (b) plaster, cement render, masonry or concrete in a wall or floor; (c) a concrete slab on or above the surface of the ground; or (d) a ventilated trench. Cables installed in— (a) a wiring enclosure on a wall; or (b) an enclosed trench with a removable cover.	22
2	Three single-core cables		Tables <del>7</del> and <del>8</del> Columns 15 to 17  Table 9 Columns 11 and 12		
3	Two single-core cables	 	Tables 4 and 5 Columns 18 and 19  Table 6 Column 13	Cables enclosed or unenclosed— (a) partially surrounded by thermal insulation material; or (b) in an enclosed trench.	22
4	Three single-core	 	Tables 7 and 8 Columns 18 and 19		

NOT ACCEPTABLE  
> 12V

98V < 12V  
ACCEPTABLE



## DERATING FACTOR

WHEN MULTIPLE CIRCUITS ARE RUNNING IN THE SAME CONDUIT (OR) TRUNKS, THE DERATING FACTOR IS UTILIZED TO INCREASE THE CURRENT CARRYING CAPACITY AND ALTER THE CONDUCTOR SIZE.

ph THE MAXIMUM DEMAND CURRENT OF A SUB MAIN IN A NON DOMESTIC INSTALLATION IS CALCULATED TO BE 120 AMP. THE SELECTED CABLE IS 4 WIRE NON ARMoured V<sub>90</sub> INSULATED AND SHEATHED CIRCULAR COPPER CONDUCTOR.

INSTALLATION OF THE CABLE PLACE IS CLIPPED DIRECTLY TO AN INTERNAL WALL WITH FOUR OTHER CIRCUITS ALL TOUCHING, OPEN TO AIR AND PROTECTED BY CIRCUIT BREAKER.

LENGTH = 50m



V<sub>90</sub>

COPPER

4 CORE

OPEN

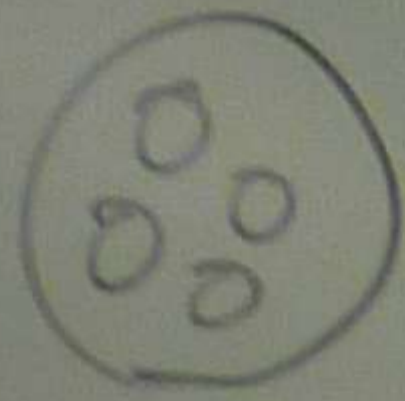
CL

AIR

3 CORES CL

CLIPPED





4 CORE → 3φ - 3 ACTIVE → 3 CORE

V<sub>90</sub>  
COPPER

OPEN TO AIR - UN ENCLOSED  
CLIPPED TO INTERNAL WALL

AIR — TABLE 3(1) - UN ENCLOSED ✓  
TABLE 3(2) - ENCLOSED

3 CORES CABLE → ROW 10, 11  
→ ROW 13

CLIPPED DIRECTLY TO WALL

TABLE 13 | 14 → COL 5 → 7  
TABLE 15 → COL 4-5

75°C  
90°C ← V<sub>90</sub>  
110°C

DERATING  
TABLE 22

→ TABLE 13, COL 5

RATED CURRENT = 120A

$$\frac{120}{0.85} = 141A \approx 160A$$

TABLE 14 - COL 5 → 160A → 50mm<sup>2</sup>

WITH FOUR OTHER CIRCUITS - 5  
CLIPPED TO WALL → SIN



ACTIVE → 3 CORE

UN ENCLOSED  
INTERNAL WALL

1) — UN ENCLOSED ✓

2) — ENCLOSED

10, 11

13

TABLE 13 | 14 → COL 5 → 7

TABLE 15 → COL 4-5

75°C  
90°C  
110°C

DERATING  
TABLE 22

TABLE 13, COL 9.

RATED CURRENT = 120A

$$\frac{120}{0.85} = 141A \approx 160A$$

TABLE 14 — COL 5 → 160A → 50mm<sup>2</sup>

WITH FOUR OTHER CIRCUITS — 5 CIRCUITS

CLIPPED TO WALL → SINGLE LAYER → TOUCHING ON WALL

5 CIRCUITS  
↓  
Row 3 → 0.85



CIRCUITS

WAL LAYER → TOUCHING  
ON WALL

5 CIRCUITS

Row 3 → 0.85

$$V_c = ?$$

W/ENCLOSED TABLE 40

90°C

$$50 \text{ mm}^2 \rightarrow 0.872$$

$$V_d = \frac{V_c L I}{1000} = \frac{0.872 \times 50 \times 141}{1000}$$

$$= 6.14 \text{ V} < 20.75 \text{ V}$$

ACCEPTABLE



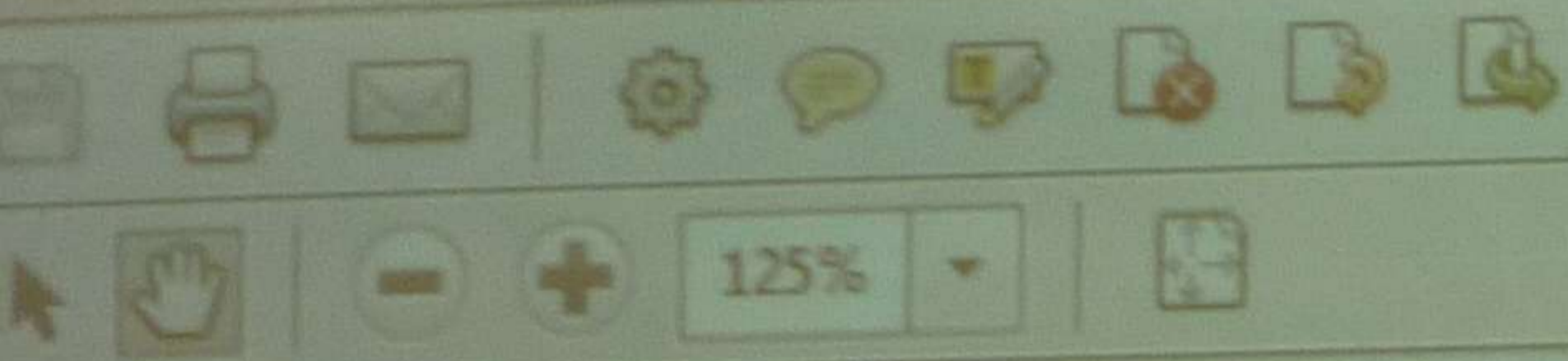


TABLE 3(1) (continued)

1	2	3	4	5	6
Item No.	Cable details (see Note 2)	Reference drawing (see Note 3)	Current-carrying capacity table reference	Methods of installation for cables deemed to have the same current-carrying capacity (See Notes 4, 5 and 6)	Derating table
9	Two-core cables		Tables 10 and 11 (see Note 5) Columns 2 to 4  Table 12 Columns 2 and 3	Cables with minimum spacings in air as shown and installed— (a) spaced from a wall or vertical surface; (b) supported on ladders, racks, perforated or unperforated trays, cleats or hangers; (c) in a switchboard or similar enclosure; or	  24
10	Three-core cables		Tables 13 and 14 (see Note 5) Columns 2 to 4  Table 15 Columns 2 and 3		
11			Table 15 Columns 2 and 3		
12	Two-core cables		Tables 10 and 11 (see Note 4) Columns 5 to 7	Cables installed— (a) clipped direct to a wall, floor, ceiling or similar surface; (b) buried directly in concrete or	



TABLE 13

CURRENT-CARRYING CAPACITIES

CABLE TYPES: THREE-CORE AND FOUR-CORE (See Note 1)  
 INSULATION TYPE: THERMOPLASTIC (See Note 2)  
 MAXIMUM CONDUCTOR TEMPERATURE: 75°C  
 REFERENCE AMBIENT TEMPERATURE: 40°C IN AIR, 25°C IN GROUND

Conductor size mm <sup>2</sup>	Current-carrying capacity, A											
	Unenclosed						Enclosed					
	Spaced		Touching		Exposed to sun		Wiring enclosure in air					
Cu		Al		Cu		Cu		Al		Cu		Al
	Solid/ Stranded	Flexible		Solid/ Stranded	Flexible	Al	Solid/ Stranded	Flexible	Al	Solid/ Stranded	Flexible	Al
1	13	13	—	12	13	—	9	10	—	11	11	—
1.5	16	17	—	15	16	—	12	12	—	14	14	—
2.5	23	22	—	22	21	—	17	16	—	20	19	—
4	31	30	—	29	28	—	23	22	—	25	24	—
6	40	38	—	37	36	—	29	28	—	33	32	—
10	54	54	—	51	51	—	39	38	—	44	43	—







