

Useful Information for BS7671:2008 Electrical Form filling

Cutout fuses

B.S.	Type	PSCC
BS1361	Type I	16.5 kA
BS1361	Type II	33.0 kA
BS88	Part 6	16.5 kA

Maximum Z_e values supplied by RECs

System	Max.
TN-C-S	0.35 Ω
TN-S	0.8 Ω
TT	21 Ω

Estimation of PSCC/ Z_e at intake (origin)

Length of supply cable (m)	16mm ² copper		25mm ² copper	
	PSCC (kA)	Z_e (Ω)	PSCC (kA)	Z_e (Ω)
5	10	0.02	12	0.02
10	7.8	0.03	9.3	0.025
15	6.0	0.04	7.4	0.03
20	4.9	0.05	6.2	0.04
25	4.1	0.06	5.3	0.045
30	3.5	0.07	4.6	0.05
40	2.7	0.09	3.6	0.07

30mA RCD Maximum trip times and Z_s values at U_o of 230v

Type	$\times 1$	$\times 5$	Z_s
BSEN 61008 BSEN 61009	$\leq 300\text{mS}$ (0.3 s)	$\leq 40\text{mS}$ (0.04 s)	1667 Ω
BSEN 61008 delay S BSEN 61009 delay S	130-500mS (0.13 – 0.5s)	40-150mS (0.04 – 0.15s)	

BS and BS(EN) numbers for switchgear

ITEM DESCRIPTION	DESIGNATION
Isolator (Main switch)	BS EN 60947-3
RCD (Residual Current Device)	BS EN 61008
RCBO (Residual Current Circuit Breaker with Overcurrent Protection)	BS EN 61009
MCB (Miniature Circuit Breaker)	BS EN 60898 (B,C & D)

Continuity of Main Equipotential Bonding Conductors

Length Cable	5m	10m	15m	20m	25m	30m	35m	40m	45m	50m
6mm ²	0.02 Ω	0.03 Ω	0.05 Ω	0.06 Ω	0.08 Ω	0.09 Ω	0.11 Ω	0.13 Ω	0.14 Ω	0.16
10 mm ²	0.01 Ω	0.02 Ω	0.03 Ω	0.04 Ω	0.05 Ω	0.06 Ω	0.06 Ω	0.07 Ω	0.08 Ω	0.09 Ω

R1 + R2 values reproduced from Table 10.1 On-Site Guide

Values for the most commonly used Twin & Earth per metre are (from OSG Table 10.1) :

Cable	1m	5m	10m	15m	20m	25m	30m	35m	40m	45m	50m
1.0/ 1.0	0.036	0.18 Ω	0.36 Ω	0.54 Ω	0.72 Ω	0.9 Ω	1.09 Ω	1.27 Ω	1.45 Ω	1.63 Ω	1.81 Ω
2.5/ 1.5	0.02 Ω	0.10 Ω	0.20 Ω	0.30 Ω	0.39 Ω	0.49 Ω	0.59 Ω	0.68 Ω	0.78 Ω	0.88 Ω	0.98 Ω
4.0/ 1.5	0.017	0.08 Ω	0.17 Ω	0.25 Ω	0.33 Ω	0.42 Ω	0.50 Ω	0.58 Ω	0.67 Ω	0.75 Ω	0.84 Ω
6.0/ 2.5	0.01 Ω	0.05 Ω	0.1 Ω	0.15 Ω	0.21 Ω	0.26 Ω	0.31 Ω	0.37 Ω	0.42 Ω	0.47 Ω	0.52 Ω
10/ 4.0	0.006	0.03 Ω	0.06 Ω	0.09 Ω	0.13 Ω	0.16 Ω	0.19 Ω	0.22 Ω	0.26 Ω	0.29 Ω	0.32 Ω

R1 + R2 values for SWA cables (Single phase applications e.g sub-mains)

2 core SWA (Steel Armouring used as CPC)						3 core SWA (Third core used as CPC)					
Cable	5m	10m	15m	20m	25m	Cable	5m	10m	15m	20m	25m
1.5	0.11 Ω	0.23 Ω	0.34 Ω	0.46 Ω	0.57 Ω	1.5	0.12 Ω	0.24 Ω	0.36 Ω	0.48 Ω	0.61 Ω
2.5	0.08 Ω	0.16 Ω	0.25 Ω	0.33 Ω	0.41 Ω	2.5	0.07 Ω	0.15 Ω	0.22 Ω	0.30 Ω	0.37 Ω
4.0	0.06 Ω	0.12 Ω	0.18 Ω	0.24 Ω	0.30 Ω	4.0	0.05 Ω	0.09 Ω	0.14 Ω	0.18 Ω	0.23 Ω
6.0	0.05 Ω	0.10 Ω	0.15 Ω	0.20 Ω	0.25 Ω	6.0	0.03 Ω	0.06 Ω	0.09 Ω	0.12 Ω	0.15 Ω
10.0	0.03 Ω	0.07 Ω	0.10 Ω	0.13 Ω	0.17 Ω	10.0	0.02 Ω	0.04 Ω	0.05 Ω	0.07 Ω	0.09 Ω

Maximum Permissible Values (in Ω) of Loop Impedance (Z_s) as permitted by BS7671:2008

Protective device (MCB/ Fuse)	Disconnection time (s)	Rating of Protective Device															
		5A	6A	10	15A	16A	20A	25A	30A	32A	40A	45A	50A	60A	63A	80A	100A
BS EN 60898 Type B	0.4 & 5	9.20	7.67	4.60	3.07	2.87	2.30	1.84	1.60	1.44	1.15	1.03	0.92		0.73	0.57	0.46
BS EN 60898 Type C	0.4 & 5		3.83	2.30		1.44	1.15	0.92		0.72	0.57		0.46		0.36	0.29	0.23
BS EN 60898 Type D	0.4 & 5		1.92	1.15		0.72	0.57	0.46		0.36	0.29		0.23		0.18	0.14	0.11
BS 1361 Cartridge Fuse	0.4	10.45			3.28		1.70		1.15			0.60					
	5	16.4			5.00		2.80	0.96	1.84	0.70		0.96		0.70		0.50	0.36
BS 88-2 , BS 88-6 HBC fuse	0.4		8.52	5.11		2.70	1.77	1.44		1.04	0.82		0.60				
	5		13.5	7.42		4.18	2.91	2.30		1.84	1.35		1.04		0.82	0.57	0.42

Note: BS EN 60898 MCB values also relate to BS EN 61009 RCBO s

Maximum Values of Loop Impedance (Z_s) for comparison with test readings based on 80% of maximum values above (as per Appendix 14)

Protective device (MCB/ Fuse)	Disconnection time (s)	Rating of Protective Device															
		5A	6A	10	15A	16A	20A	25A	30A	32A	40A	45A	50A	60A	63A	80A	100A
BS EN 60898 Type B	0.4 & 5	7.36	6.14	3.68	2.46	2.30	1.84	1.47	1.28	1.15	0.92	0.82	0.74		0.58	0.46	0.37
BS EN 60898 Type C	0.4 & 5		3.06	1.84		1.15	0.92	0.74		0.58	0.46		0.37		0.29	0.23	0.18
BS EN 60898 Type D	0.4 & 5		1.54	0.92		0.58	0.46	0.37		0.29	0.23		0.18		0.14	0.11	0.09
BS 1361 Cartridge Fuse	0.4	8.36			2.62		1.36		0.92			0.48					
	5	13.12			4.00		2.24	0.77	1.47	0.56		0.77		0.56		0.40	0.29
BS 88 HBC fuse	0.4		6.82	4.09		2.16	1.42	1.15		0.83	0.66		0.48				
	5		10.8	5.94		3.34	2.33	1.84		1.47	1.08		0.83		0.66	0.46	0.34

Note: BS EN 60898 MCB values also relate to BS EN 61009 RCBO s

Maximum Values of Loop Impedance (Z_s) for 110v (U_0 of 55v), e.g. reduced low voltage systems

Protective device (MCB/ Fuse)	Disconnection Time-	Rating of Protective Device															
		5A	6A	10	15A	16A	20A	25A	30A	32A	40A	45A	50A	60A	63A	80A	100A
BS EN 60898 Type B	5	7.36	1.83	1.10		0.69	0.55	0.44		0.34	0.28		0.22		0.17	0.14	0.11
BS EN 60898 Type C	5		0.92	0.55		0.34	0.28	0.22		0.17	0.14		0.11		0.09	0.07	0.05
BS EN 60898 Type D	5		0.47	0.28		0.18	0.14	0.11		0.09	0.07		0.06		0.04	0.04	0.03
BS 88-2.2 , 88-6 fuse	5		3.20	1.77		1.00	0.69	0.55		0.44	0.32		0.25		0.20	0.14	0.10

Note: BS EN 60898 MCB values also relate to BS EN 61009 RCBO s

Maximum Values of Loop Impedance (Z_s) for 110v, for comparison with test readings based on 80% of maximum values above.

Protective device (MCB/ Fuse)	Disconnection Time-	Rating of Protective Device															
		5A	6A	10	15A	16A	20A	25A	30A	32A	40A	45A	50A	60A	63A	80A	100A
BS EN 60898 Type B	5	7.36	1.83	1.10		0.69	0.55	0.44		0.34	0.28		0.22		0.17	0.14	0.11
BS EN 60898 Type C	5		0.92	0.55		0.34	0.28	0.22		0.17	0.14		0.11		0.09	0.07	0.05
BS EN 60898 Type D	5		0.47	0.28		0.18	0.14	0.11		0.09	0.07		0.06		0.04	0.04	0.03
BS 88-2.2 , 88-6 fuse	5		3.20	1.77		1.00	0.69	0.55		0.44	0.32		0.25		0.20	0.14	0.10

Note: BS EN 60898 MCB values also relate to BS EN 61009 RCBO s