# BS7671 2008:2015 3rd Amendment

## DNO Cut Out Fuses

| | | |
|---|---|---|
| BS1361 | Type I | 16.5kA |
| BS1361 | Type II | 33.0kA |
| BS88-3 | Type II | 31.5kA |

## DNO Maximum Ze

| | |
|---|---|
| TN-S | 0.80 Ω |
| TN-C-S | 0.35 Ω |
| TT | 21 Ω |

## 30mA RCD Maximum Trip Times with $U_0$=230V

| Description | Standard | Trip Times | Additional Protection |
|---|---|---|---|
| Main Switch (Isolator) | BS EN 60947-3 | N/A | N/A |
| RCD | BS EN 61008 | 300mS (0.3) | 40mS (0.04) |
| RCBO | BS EN 61009 | 300mS (0.3) | 40mS (0.04) |
| Circuit Breaker (types B,C & D) | BS EN 60898 | 0.4 or 5.0 Seconds | N/A |

## Main Protective Bonding Conductors

| Cable Length | 5M | 10M | 15M | 20M | 25M | 30M | 35M | 40M | 45M | 50M |
|---|---|---|---|---|---|---|---|---|---|---|
| 6mm² | 0.02Ω | 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 Ω |
| 10mm² | 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 |
| 16mm² | 0.01 Ω | 0.01 Ω | 0.02 Ω | 0.02 Ω | 0.03 Ω | 0.04 Ω | 0.04 Ω | 0.05 Ω | 0.05 Ω | 0.06 Ω |

## R1+R2 Values For 70˚C Thermoplastic Twin and Earth Cable

| Cable Length | 1M | 5M | 10M | 15M | 20M | 25M | 30M | 35M | 40M | 45M | 50M |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0/1.0 | 0.04 Ω | 0.18 Ω | 0.36 Ω | 0.54 Ω | 0.72 Ω | 0.91 Ω | 1.09 Ω | 1.27 Ω | 1.45 Ω | 1.63 Ω | 1.81 Ω |
| 1.5/1.0 | 0.03 Ω | 0.15 Ω | 0.30 Ω | 0.45 Ω | 0.60 Ω | 0.76 Ω | 0.91 Ω | 1.06 Ω | 1.21 Ω | 1.36 Ω | 1.51 Ω |
| 2.5/1.5 | 0.02 Ω | 0.10 Ω | 0.20 Ω | 0.29 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 | 0.01 Ω | 0.06 Ω | 0.12 Ω | 0.18 Ω | 0.24 Ω | 0.30 Ω | 0.36 Ω | 0.42 Ω | 0.48 Ω | 0.54 Ω | 0.60 Ω |
| 6.0/2.5 | 0.01 Ω | 0.05 Ω | 0.10 Ω | 0.16 Ω | 0.21 Ω | 0.26 Ω | 0.31 Ω | 0.37 Ω | 0.42 Ω | 0.47 Ω | 0.52 Ω |
| 10.0/4.0 | 0.01 Ω | 0.03 Ω | 0.06 Ω | 0.10 Ω | 0.13 Ω | 0.16 Ω | 0.19 Ω | 0.23 Ω | 0.26 Ω | 0.29 Ω | 0.32 Ω |

| Cable Length | 2 Core SWA (Armour used as CPC) | | | | | 3 Core SWA (3rd 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 | 0.03Ω | 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 |

Ω

## Max Zs 3rd Amendment with Cmin Taken Into Account-100% Values (Tab Zs)

| BSEN | 3A | 6A | 10A | 16A | 20A | 25A | 32A | 40A | 50A | 63A | 80A | 100A | 125A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60898 B | 14.57 | 7.28 | 4.37 | 2.73 | 2.19 | 1.75 | 1.37 | 1.09 | 0.87 | 0.69 | 0.55 | 0.44 | 0.35 |
| 60898 C | | 3.64 | 2.19 | 1.37 | 1.09 | 0.87 | 0.68 | 0.55 | 0.44 | 0.35 | 0.27 | 0.22 | 0.17 |
| 60898 D | | 1.82 | 1.09 | 0.68 | 0.55 | 0.44 | 0.34 | 0.27 | 0.22 | 0.17 | 0.14 | 0.11 | 0.09 |

## Max Zs 3rd Amendment with Cmin Taken Into Account-80% Values (Max Working Zs)

| BSEN | 3A | 6A | 10A | 16A | 20A | 25A | 32A | 40A | 50A | 63A | 80A | 100A | 125A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60898 B | 11.66 | 5.82 | 3.5 | 2.18 | 1.75 | 1.40 | 1.10 | 0.87 | 0.70 | 0.55 | 0.44 | 0.35 | 0.28 |
| 60898 C | | 2.91 | 1.75 | 1.10 | 0.87 | 0.70 | 0.54 | 0.44 | 0.35 | 0.28 | 0.22 | 0.17 | 0.14 |
| 60898 D | | 1.46 | 0.87 | 0.54 | 0.44 | 0.35 | 0.27 | 0.22 | 0.17 | 0.14 | 0.11 | 0.09 | 0.07 |

## Cable Calculations

Start by using the power law to obtain the design current *( Ib)*. Check the manufacturer's data plate to obtain the power consumption in watts. If the consumption is in kW then multiply by 1000 to get watts.

$$\frac{P}{V} = Ib$$

$Ca = Ambient\ Temp$

$Ci = Thermal\ Insulation$

$Cg = Grouping\ Factor$

$Cf = Fusing\ Factor$

Do cable factors need to be taken into account? If they do, then use the following formula to obtain a revised current required by the cable. This is the amount of current the cable needs to take *(It)*

$$\frac{In}{Ca\ x\ Ci\ x\ Cg\ x\ Cf} = It$$

Now pick your cable according to the It value obtained in the above step. Simply look at the current carrying capacities of the cables to ensure the cable picked can take more the *It* value obtained in the above step *(Iz)*

$$Ib \leq In \leq It \leq Iz$$

Finally Check the volt drop of the cable remembering that you can only lose up to 6.55V for a lighting circuit or 10.93V for power circuits. Use the following formula:

$$\frac{Mv\ x\ Ib\ x\ L}{1000} = Volt\ Drop$$