

Fault Loop Impedance values – no voltage

Table 3.2 Maximum values of resistances

Conductor size		Protective device rating	Circuit breaker									Fuses		
Active	Earth		Type B			Type C			Type D					
mm ²	mm ²	A	Maximum resistances Ω											
			R_{phe}	R_{ph}	R_e	R_{phe}	R_{ph}	R_e	R_{phe}	R_{ph}	R_e	R_{phe}	R_{ph}	R_e
1	1	6	6.16	3.08	3.08	3.30	1.65	1.65	2.00	1.00	1.00	7.38	3.69	3.69
1	1	10	3.70	1.85	1.85	2.00	1.00	1.00	1.20	0.60	0.60	4.12	2.06	2.06
1.5	1.5	10	3.70	1.85	1.85	2.00	1.00	1.00	1.20	0.60	0.60	4.12	2.06	2.06
1.5	1.5	16	2.32	1.16	1.16	1.24	0.62	0.62	0.76	0.38	0.38	2.00	1.00	1.00
2.5	2.5	16	2.32	1.16	1.16	1.24	0.62	0.62	0.74	0.37	0.37	2.00	1.00	1.00
2.5	2.5	20	1.86	0.93	0.93	1.00	0.50	0.50	0.60	0.30	0.30	1.36	0.68	0.68
4	2.5	25	1.50	0.43	1.07	0.80	0.23	0.57	0.48	0.14	0.34	1.00	0.24	0.76
4	2.5	32	1.17	0.45	0.72	0.62	0.24	0.38	0.37	0.14	0.23	0.83	0.32	0.51
6	2.5	40	0.93	0.27	0.66	0.50	0.15	0.35	0.30	0.09	0.21	0.62	0.18	0.44
10	4	50	0.76	0.22	0.54	0.40	0.11	0.29	0.24	0.07	0.17	0.47	0.13	0.34
16	6	63	0.60	0.16	0.44	0.32	0.09	0.23	0.19	0.05	0.14	0.36	0.10	0.26

NOTE —

- (1) The values, which have been rounded to two decimal places, are approximately 64% of the values given in table 3.1. This is due to the following:
 - (a) A reduction to 80% (0.8) due to a conductor temperature of 20 °C; and
 - (b) A further reduction as the length of circuits given in table B1 of AS/NZS 3000 was calculated using 80% (0.8) of supply voltage.

Therefore $0.8 \times 0.8 = 0.64$ (64%).
- (2) Resistances for active conductors (R_{pe}) and protective earthing conductors (R_e) are also provided.
- (3) The types of circuit breakers (Type B, C and D) are based on the types described in AS/NZS 60898.
- (4) Fuses based on AS 60269.1 were previously known as BS 88 type fuses.
- (5) When the nominal phase voltage of the electrical installation is not 230 V, Z_s may be determined by multiplying by a factor of $U_n/230$. For a nominal phase voltage of 240 V, the factor would be ≈ 1.04 .

3.6.4 Testing considerations

3.6.4.1 Supply connected

The earth fault-loop impedance should be measured using an instrument that has a facility for measuring and indicating low values of impedance.

NOTE —

- (1) Special training and advice should be obtained for measurement of earth fault-loop impedance on circuits from a supply source rated over 100 A. For example, readings of less than 0.2 Ω require system voltage to be constant (i.e. no cyclic load on the installation) and may require test lead length and fusing compensation and higher test currents.
Guidance is given in IEC 61557-3.
- (2) Earth continuity and resistance tests should be carried out on protective earthing conductors in accordance with 3.1 before measuring the earth fault-loop impedance.
- (3) It is preferable to measure the earth fault-loop impedance using the permanent network supply rather than a temporary supply.
- (4) The measuring circuit includes the impedance of the flexible test lead, which must be as supplied with the meter. If the meter leads are fused, the fuse resistance must be taken into account.

Fault Loop Impedance values – 240v

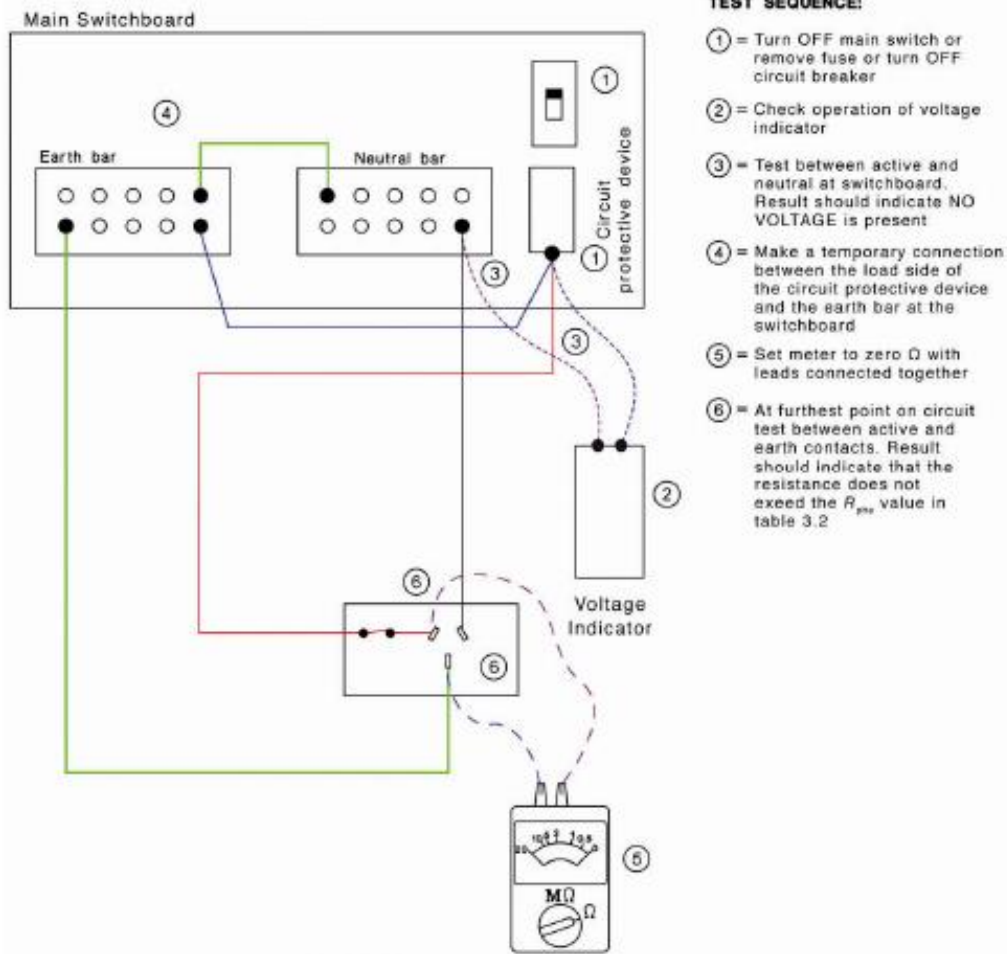
Table 3.1 Maximum values of earth fault-loop impedance (Z_s) at 230 v a.c.

Protective device rating	Circuit-breakers			Fuses	
	Type B	Type C	Type D		
A	Disconnection times				
	0.4 s			0.4 s	5 s
	Maximum earth fault-loop impedance Z_s Ω				
6	9.58	5.11	3.07	11.50	15.33
10	5.75	3.07	1.84	6.39	9.20
16	3.59	1.92	1.15	3.07	5.00
20	2.88	1.53	0.92	2.09	3.59
25	2.30	1.23	0.74	1.64	2.71
32	1.80	0.96	0.58	1.28	2.19
40	1.44	0.77	0.46	0.96	1.64
50	1.15	0.61	0.37	0.72	1.28
63	0.91	0.49	0.29	0.55	0.94
80	0.72	0.38	0.23	0.38	0.68
100	0.58	0.31	0.18	0.27	0.48
125	0.46	0.25	0.15	0.21	0.43
160	0.36	0.19	0.12	0.16	0.30
200	0.29	0.15	0.09	0.13	0.23
NOTE —					
(1) The impedance values are based on a normal operating temperature of 75 °C for the conductors when they are carrying maximum current. If there is no load on the electrical installation being tested, the values are reduced to 80% (based on a conductor temperature of 20 °C).					
(2) The types of circuit breakers (Type B, C and D) are based on the types described in AS/NZS 60898.1.					
(3) Fuses based on AS 60269.1 were previously known as BS 88 type fuses.					
(4) When the nominal phase voltage of the electrical installation is not 230 V, Z_s may be determined by multiplying by a factor of $U_0/230$. For a nominal phase voltage of 240 V, the factor would be ≈ 1.04 .					
(5) Five second disconnection times are not shown for circuit breakers as they are intended to operate in the instantaneous trip zone.					

3.6.3.2 Supply not connected

When tested in accordance with 3.6.4.2, the total resistance (R_{pho}) of the active and protective earthing conductors of an individual circuit which forms part of the earth fault-loop shall not exceed the values shown in table 3.2.

The values in table 3.2 were calculated using the d.c. resistance values for conductors at 20 °C as specified in AS/NZS 1125 and the maximum lengths of circuits given in table B1 of AS/NZS 3000.



NOTE — Numbers indicate test sequence.

Figure 3.22 — Measurement of an individual circuit earth fault-loop impedance (supply not connected)