Fault and Short Circuit Protection

Table 41.3 Maximum Zs for 0.2-5 Seconds disconnection

(a) Type B circuit-breakers to BS EN 60898 and the overcurrent characteristics of RCBOs to BS EN 61009

Rating (amperes)	3	6	10	16	20	25	32	40	50	63	80	100	125	I_n
Z_s (ohms)	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	$43.7/I_n$

(b) Type C circuit-breakers to BS EN 60898 and the overcurrent characteristics of RCBOs to BS EN 61009

Rating (amperes)	6	10	16	20	25	32	40	50	63	80	100	125	I_n
Z_s (ohms)	3.64	2.19	1.37	1.09	0.87	0.68	0.55	0.44	0.35	0.27	0.22	0.17	$21.9/I_n$

(c) Type D circuit-breakers to BS EN 60898 and the overcurrent characteristics of RCBOs to BS EN 61009

Rating (amperes)	6	10	16	20	25	32	40	50	63	80	100	125	I_n
Z_s (ohms)	1.92	1.15	0.72	0.57	0.46	0.36	0.29	0.23	0.18	0.14	0.11	0.09	$10.9/I_n$

For the above devices：

Type B	Type C	Type D
$43.7/I_n$	$21.9/I_n$	$10.9/I_n$

(a) Type B circuit-breakers to BS EN 60898 and the overcurrent characteristics of RCBOs to BS EN 61009

Rating (amperes)	3	6	10	16	20	25	32	40	50	63	80	100	125	I_n
Z_s (ohms)	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	$43.7/I_n$

(b) Type C circuit-breakers to BS EN 60898 and the overcurrent characteristics of RCBOs to BS EN 61009

Rating (amperes)	6	10	16	20	25	32	40	50	63	80	100	125	I_n
Z_s (ohms)	3.64	2.19	1.37	1.09	0.87	0.68	0.55	0.44	0.35	0.27	0.22	0.17	$21.9/I_n$

Fault and Short Circuit Protection

Table 41.3 Maximum Zs for 0.2-5 Seconds disconnection

(a) Type B circuit-breakers to BS EN 60898 and the overcurrent characteristics of RCBOs to BS EN 61009

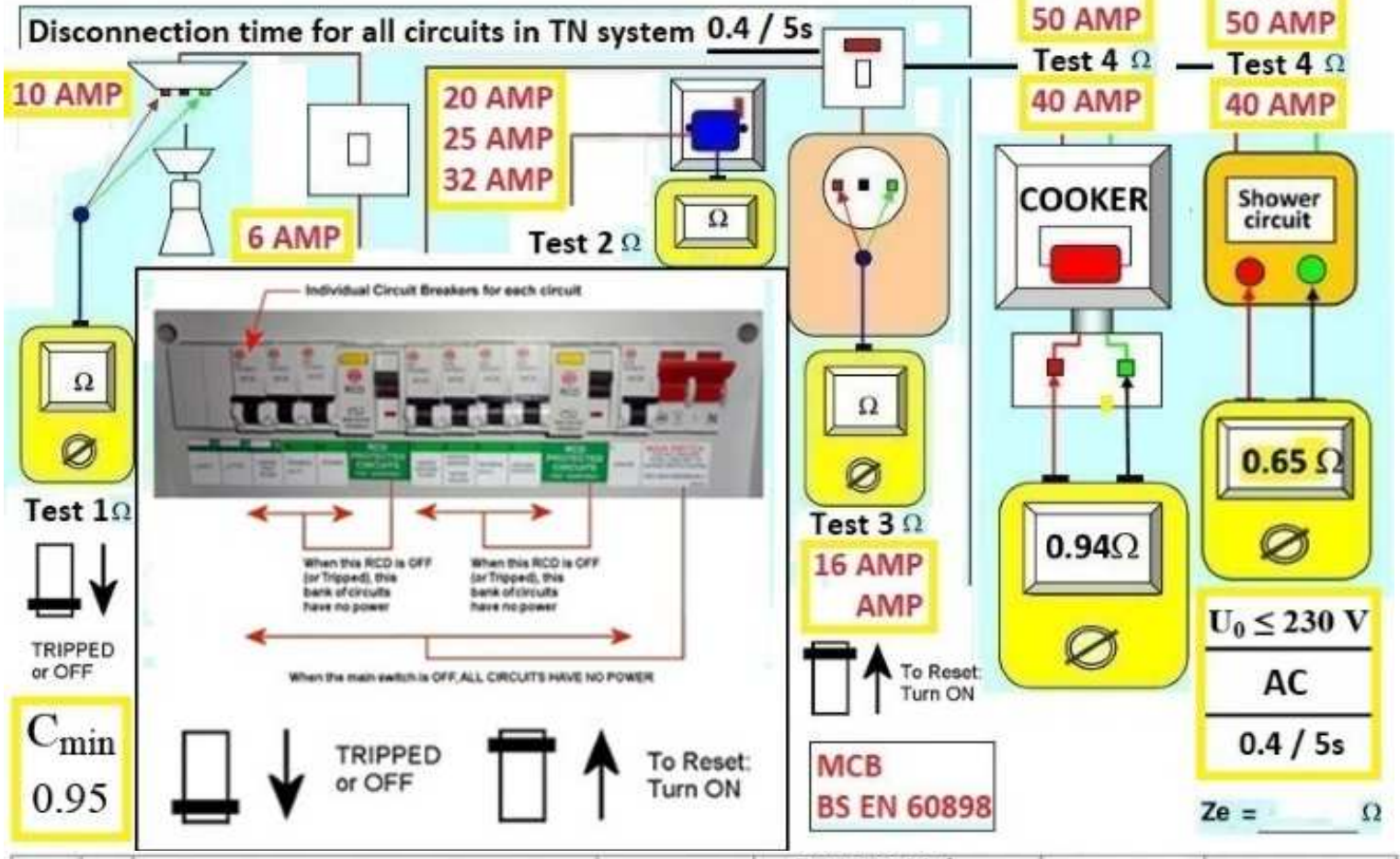
Rating (amperes)	3	6	10	16	20	25	32	40	50	63	80	100	125	I_n
Z_s (ohms)	14.57	7.28	4.37	2.73	2.19	1.75	1.37	1.09	0.87	0.69	0.55	0.44	0.35	$43.7/I_n$

For the above devices：

Type B
$43.7/I_n$

BS7671:2008 17th EDITION 2015 (Amendments 1, 2 + 3) EARTH FAULT LOOP IMPEDANCE $Z_s \times I_a \leq U_0 \times C_{min}$

The results given below have been obtained from circuits in a domestic installation.
NB: Assumption that the cables are Twin with reduced CPC
and establishes whether or not the measured values are acceptable.



Test	0.4s / 5s	Circuit Description	BS7671 Value	BS7671 Value multiply by 0.8 3/4 Rule of Thumb	Measured Value	Satisfactory Yes / No
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	

3/4 or 0.8? The Max Zs values in the "BS7671" are prior to any correction factors allowing for things such as ambient temperature of conductors during fault condition. The Zs values in the "On-site-guide" are all 0.8 (80%) of the values in the "Regs Book"...this to my understanding is the 0.8 "Rule of Thumb" figure allowing suitable correction for temperature, generally used when testing your new installed work.

However, the BS7671 16th EDITION (No.1 2002 + No. 2 2004) GN3 Inspection & Testing (4th Edition) April 2006 Rule of thumb refers to a 3/4 Zs value..see page 56 of GN3, point 4) "rule of thumb figures"

GN3 also mentions allowances for unknown CPC conductor sizes.. which to my understanding is when tested unknown cables (e.g. PIR / EICR) although a ring may have a 2.5 with 1.5mm CPC at the fuse box / Consumer Unit. **Older wires with 1.0mm CPC may be present at other parts of the circuit!** So, a **3/4 or 75% Zs value gives and extra 5% margin of safety compared to the 80% on site guide values!** OSG...aimed at new work you are designing & installing (known cables) GN3...more aimed at other persons work, such as PIR (EICR) type, unknown cables sizes.

both '3/4' and '0.8' apply to 16th edition for example

32A type B 60898

16th = 1.50 OSG=1.20 (80% of 16th) 17th =1.44 (96% of 16th) **Cmin adjustment = 1.37Ω**

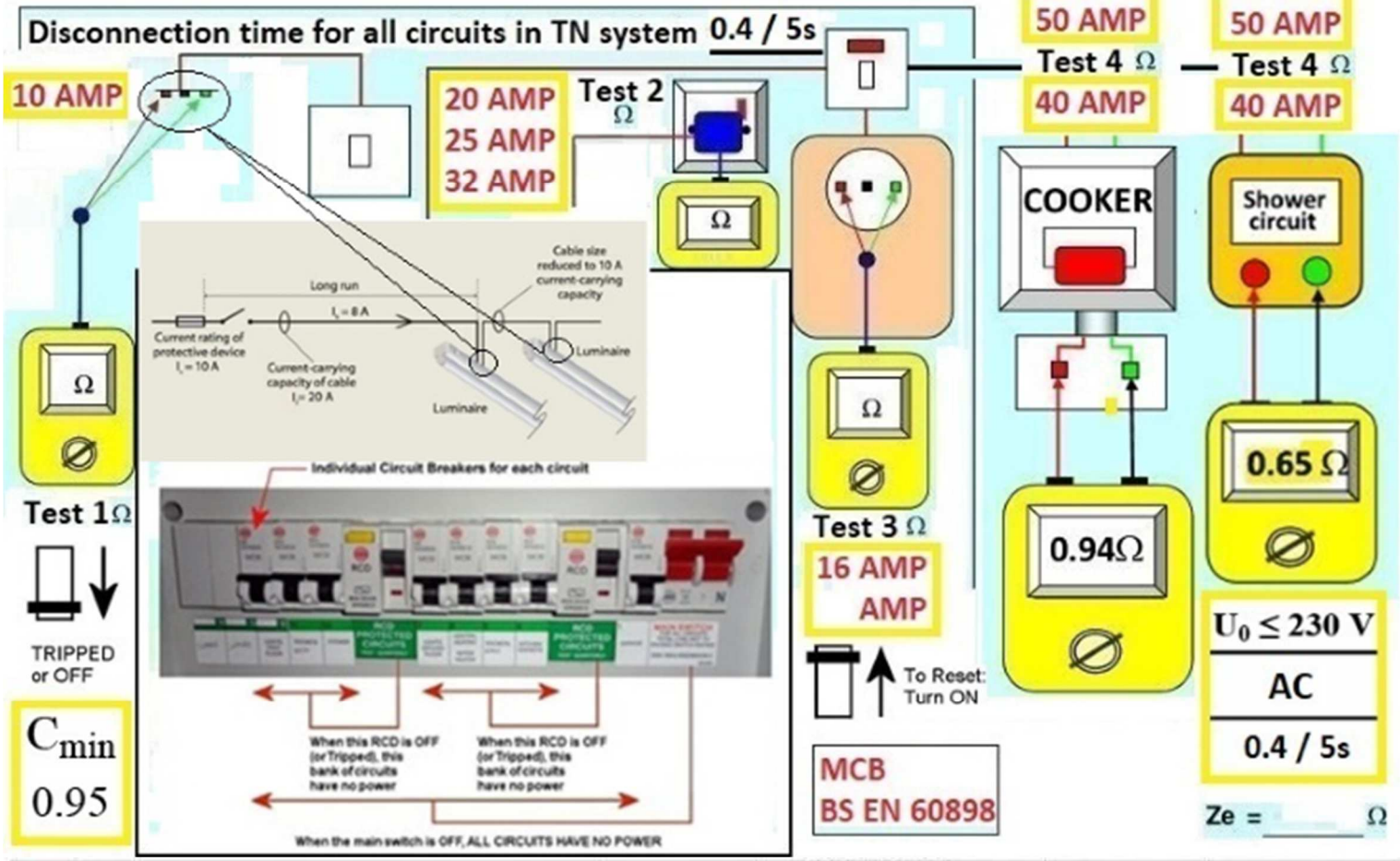
15A 3036 0.4sec

16th =2.67 OSG= 2.14 (80% of 16th) 17th =2.55 (96% of 16th) **Cmin adjustment = 2.43Ω**

$$Z_s(m) \leq 0.8 \times \frac{U_0 \times C_{min}}{I_a}$$

BS7671:2008 17th EDITION 2015 (Amendments 1, 2 + 3) EARTH FAULT LOOP IMPEDANCE $Z_s \times I_a \leq U_0 \times C_{min}$

The results given below have been obtained from circuits in a domestic installation.
NB: Assumption that the cables are Twin with reduced CPC
and establishes whether or not the measured values are acceptable.



Test	0.4s / 5s	Circuit Description	BS7671 Value	BS7671 Value multiply by 0.8 3/4 Rule of Thumb	Measured Value	Satisfactory Yes / No
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	

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BS7671:2008 17th EDITION 2015 (Amendments 1, 2 + 3) EARTH FAULT LOOP IMPEDANCE $Z_s \times I_a \leq U_0 \times C_{min}$

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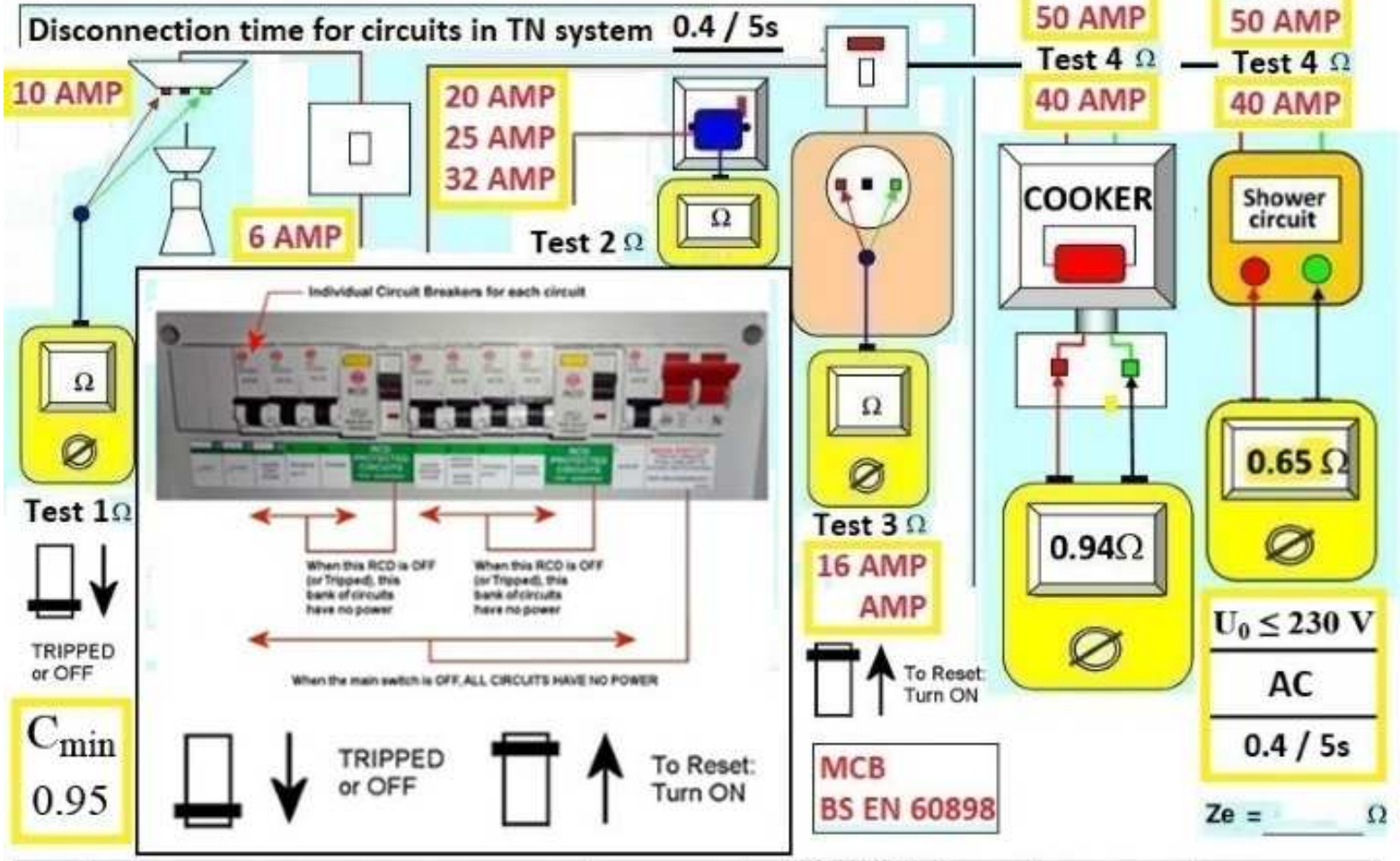

Test	0.4s / 5s	Circuit Description	BS7671 Value	BS7671 Value multiply by 0.8 3/4 Rule of Thumb	Measured Value	Satisfactory Yes / No
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	

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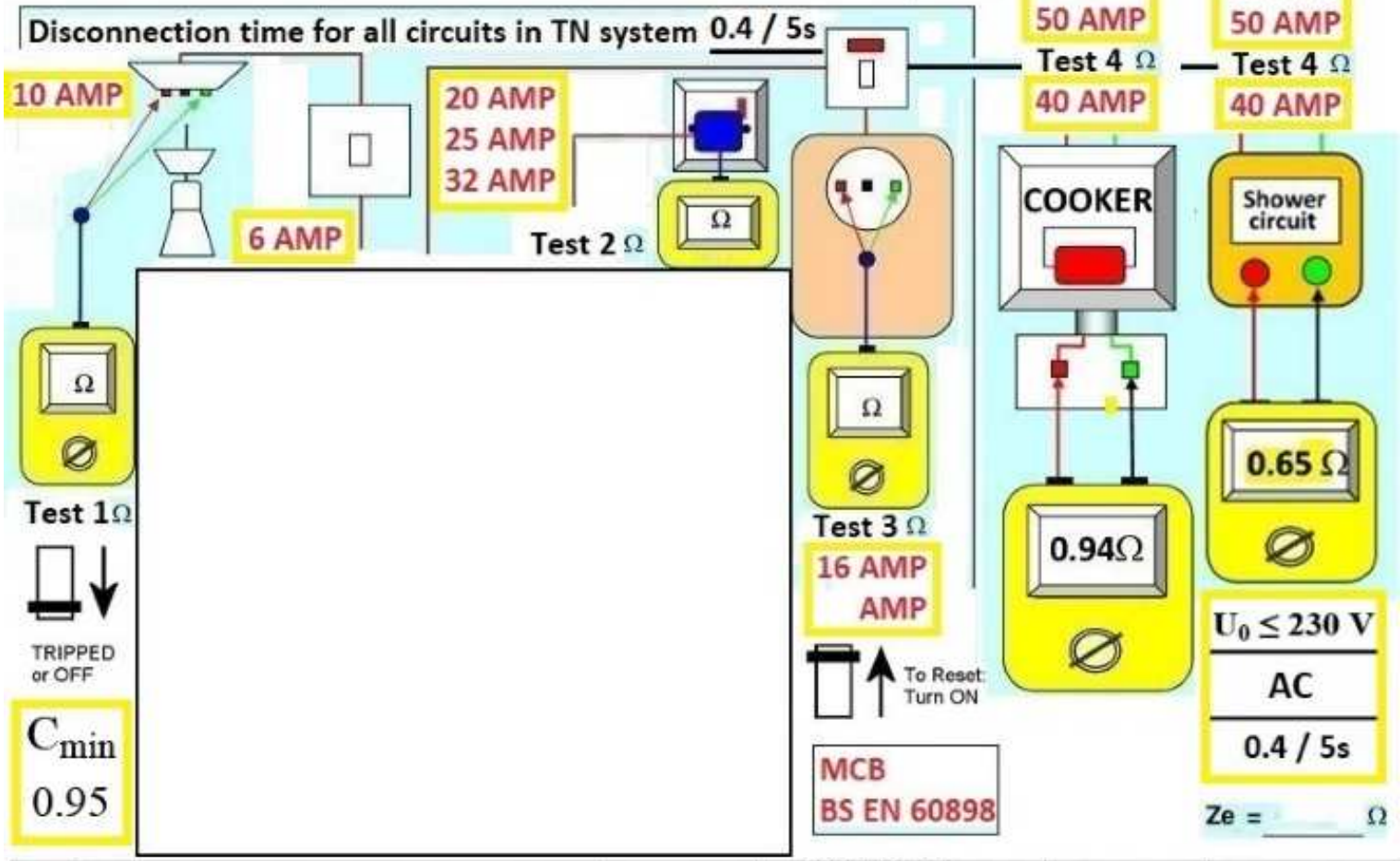

Test	0.4s / 5s	Circuit Description	BS7671 Value	BS7671 Value multiply by 0.8 3/4 Rule of Thumb	Measured Value	Satisfactory Yes / No
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	

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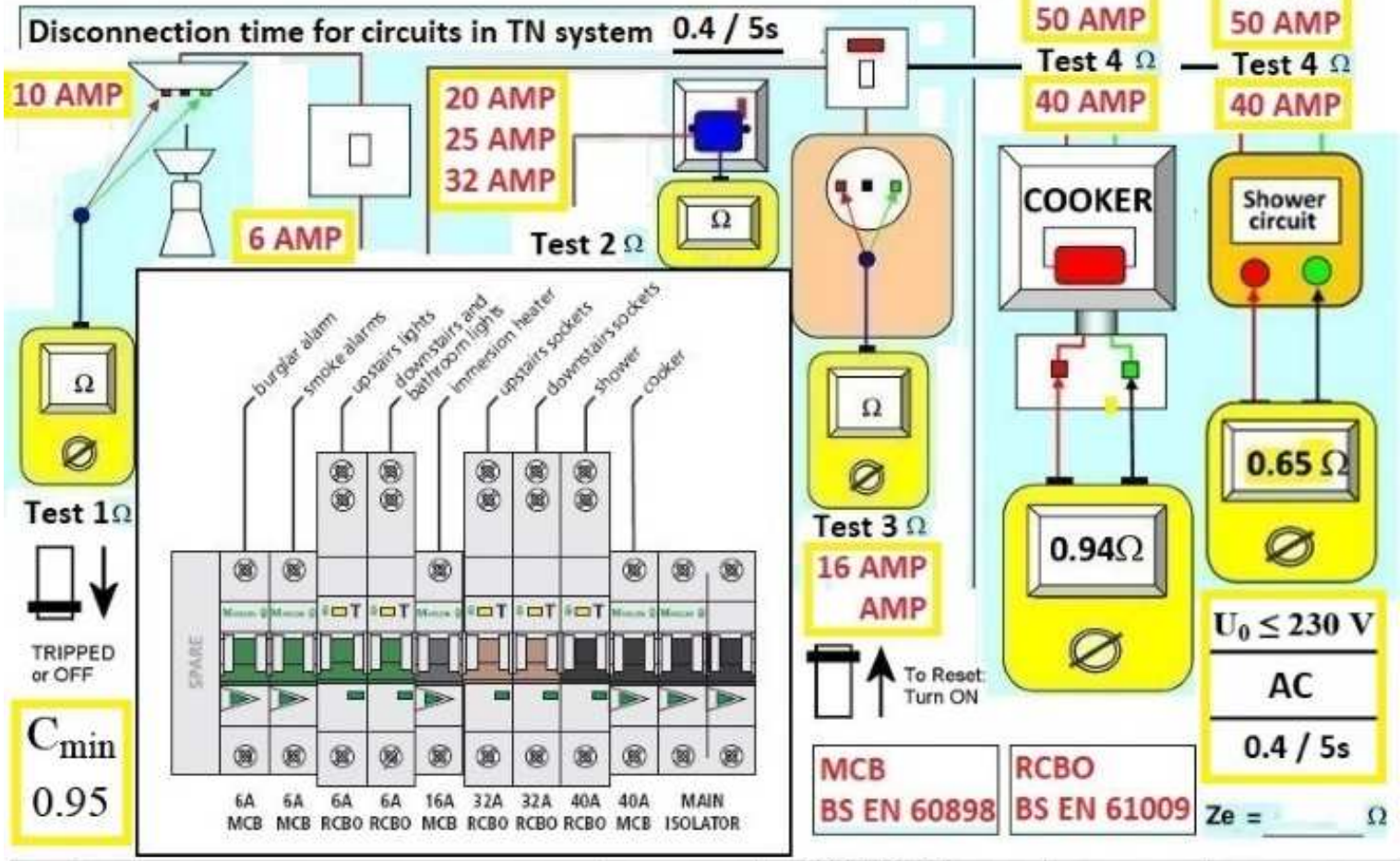

C_{min} 0.95

Test	0.4s / 5s	Circuit Description	BS7671 Value	BS7671 Value multiply by 0.8 3/4 Rule of Thumb	Measured Value	Satisfactory Yes / No
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	

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BS7671:2008 17th EDITION 2015 (Amendments 1, 2 + 3) EARTH FAULT LOOP IMPEDANCE $Z_s \times I_a \leq U_0 \times C_{min}$

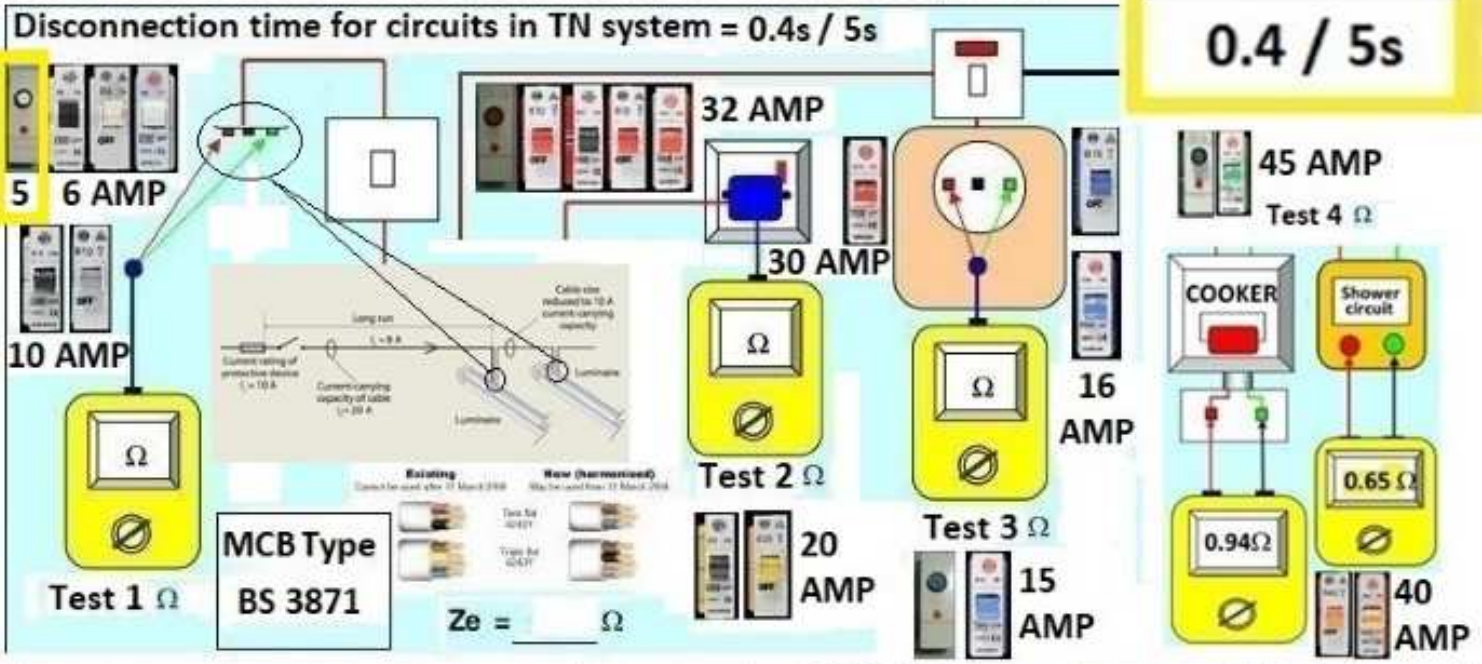
Ze = _____ Ω

The results given below have been obtained from circuits in a domestic installation.

NB: Assumption that the cables are Twin with reduced CPC and establishes whether or not the measured values are acceptable.

C_{min}
0.95

$U_0 \leq 230$ V
AC
0.4 / 5s



Test	0.4s / 5s	Circuit Description	BS7671 Value	BS7671 Value multiply by 0.8 3/4 Rule of Thumb	Measured Value	Satisfactory Yes / No
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	

3/4 or 0.8? The Max Zs values in the "BS7671" are prior to any correction factors allowing for things such as ambient temperature of conductors during fault condition. The Zs values in the "On-site-guide" are all 0.8 (80%) of the values in the "Regs Book"...this to my understanding is the 0.8 "Rule of Thumb" figure allowing suitable correction for temperature, generally used when testing your new installed work.

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both '3/4' and '0.8' apply to 16th edition for example

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16th = 1.50 OSG=1.20 (80% of 16th) 17th =1.44 (96% of 16th) **Cmin adjustment = 1.37Ω**

15A 3036 0.4sec

16th =2.67 OSG= 2.14 (80% of 16th) 17th =2.55 (96% of 16th) **Cmin adjustment = 2.43Ω**

$$Z_s(m) \leq 0.8 \times \frac{U_0 \times C_{min}}{I_a}$$

BS7671:2008 17th EDITION 2015 (Amendments 1, 2 + 3) EARTH FAULT LOOP IMPEDANCE $Z_s \times I_a \leq U_0 \times C_{min}$

Ze = _____ Ω

The results given below have been obtained from circuits in a domestic installation.

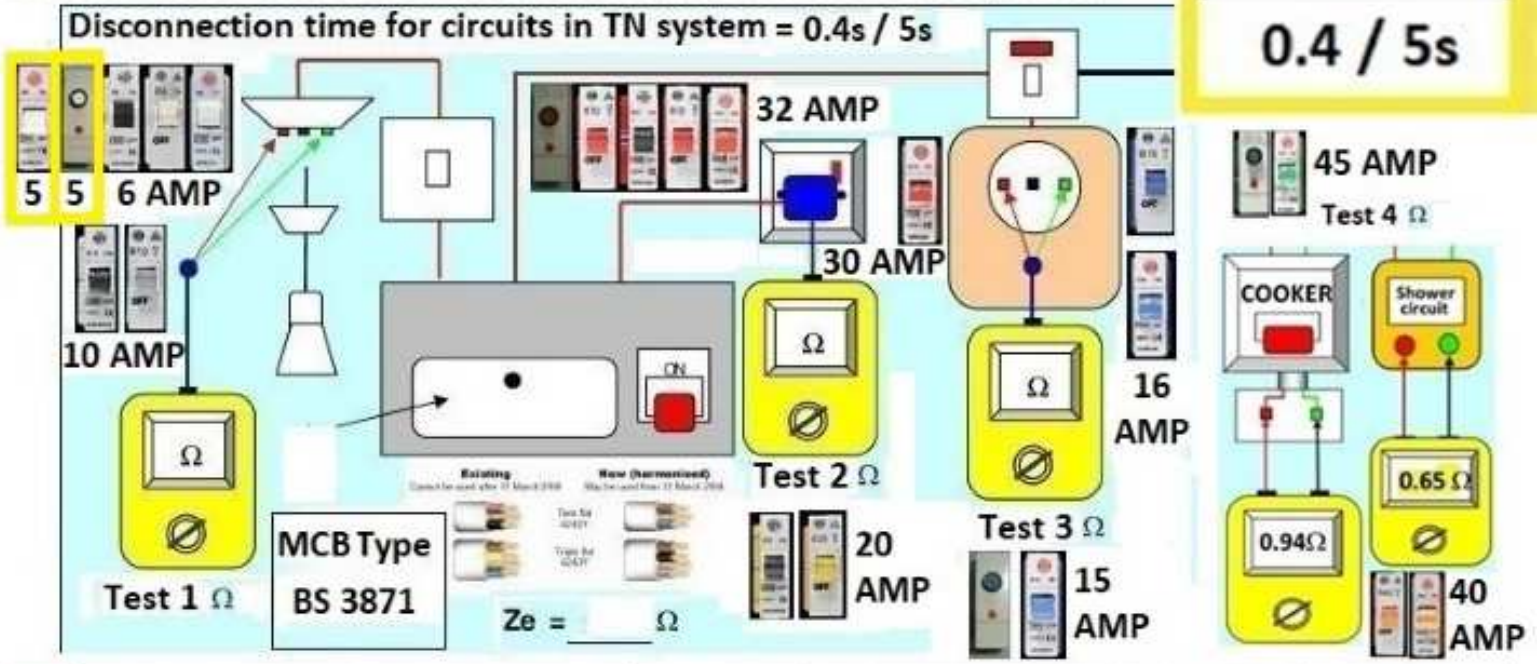
NB: Assumption that the cables are Twin with reduced CPC and establishes whether or not the measured values are acceptable.

C_{min} 0.95

$U_0 \leq 230$ V

AC

0.4 / 5s



Test	0.4s / 5s	Circuit Description	BS7671 Value	BS7671 Value multiply by 0.8 3/4 Rule of Thumb	Measured Value	Satisfactory Yes / No
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	

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15A 3036 0.4sec

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$$Z_s(m) \leq 0.8 \times \frac{U_0 \times C_{min}}{I_a}$$

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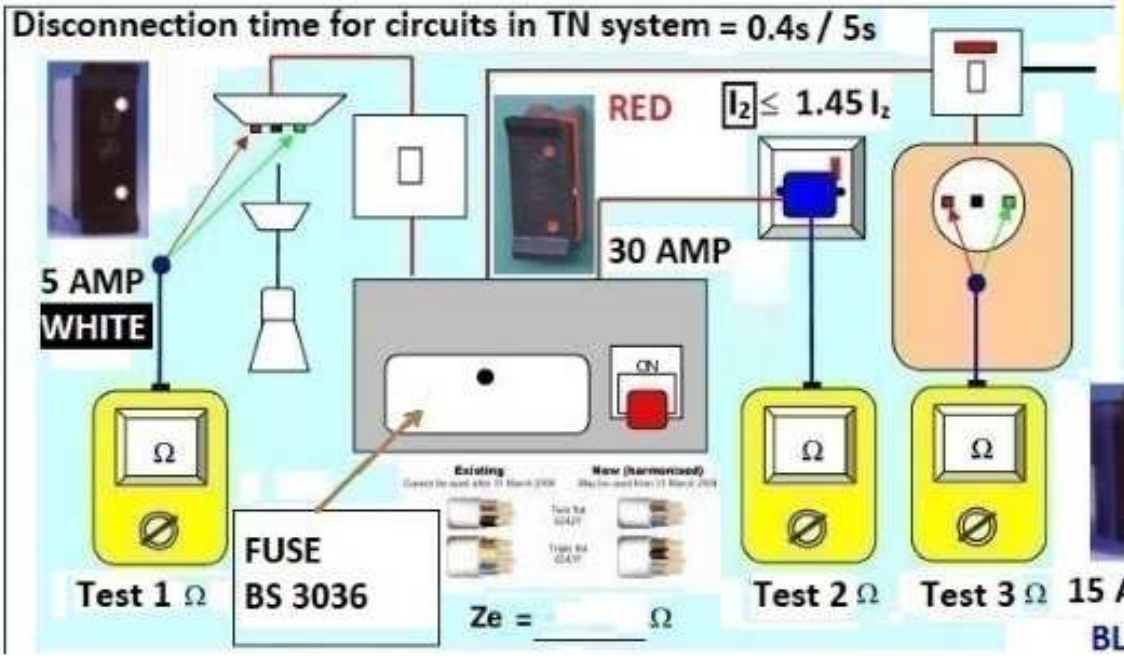
Ze = _____ Ω

The results given below have been obtained from circuits in a domestic installation.

NB: Assumption that the cables are Twin with reduced CPC and establishes whether or not the measured values are acceptable.

C_{min}
0.95

$U_0 \leq 230$ V
AC
0.4 / 5s



Test	0.4s / 5s	Circuit Description	BS7671 Value	BS7671 Value multiply by 0.8 3/4 Rule of Thumb	Measured Value	Satisfactory Yes / No
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	

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15A 3036 0.4sec

16th =2.67 OSG= 2.14 (80% of 16th) 17th =2.55 (96% of 16th) **Cmin adjustment = 2.43Ω**

$$Z_s(m) \leq 0.8 \times \frac{U_0 \times C_{min}}{I_a}$$

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Ze = _____ Ω

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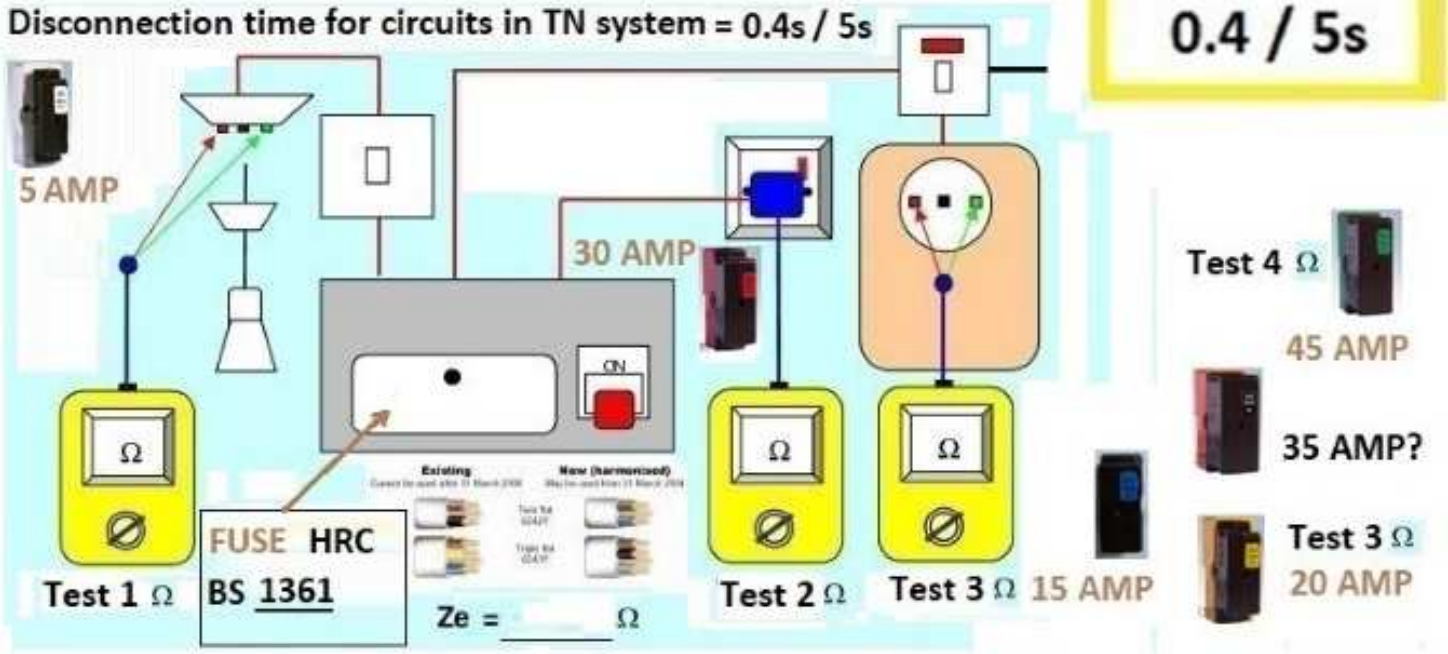
NB: Assumption that the cables are Twin with reduced CPC and establishes whether or not the measured values are acceptable.

C_{min}
0.95

$U_0 \leq 230$ V
AC
0.4 / 5s

Disconnection time for circuits in TN system = 0.4s / 5s



Test	0.4s / 5s	Circuit Description	BS7671 Value	BS7671 Value multiply by 0.8 3/4 Rule of Thumb	Measured Value	Satisfactory Yes / No
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	
			Ω	Ω	Ω	

3/4 or 0.8? The Max Zs values in the "BS7671" are prior to any correction factors allowing for things such as ambient temperature of conductors during fault condition. The Zs values in the "On-site-guide" are all 0.8 (80%) of the values in the "Regs Book"...this to my understanding is the 0.8 "Rule of Thumb" figure allowing suitable correction for temperature, generally used when testing your new installed work.

However, the BS7671 16th EDITION (No.1 2002 + No. 2 2004) GN3 Inspection & Testing (4th Edition) April 2006 Rule of thumb refers to a 3/4 Zs value..see page 56 of GN3, point 4) "rule of thumb figures"

GN3 also mentions allowances for unknown CPC conductor sizes.. which to my understanding is when tested unknown cables (e.g. PIR / EICR) although a ring may have a 2.5 with 1.5mm CPC at the fuse box / Consumer Unit. **Older wires with 1.0mm CPC may be present at other parts of the circuit!** So, a **3/4 or 75% Zs value gives and extra 5% margin of safety compared to the 80% on site guide values!** OSG...aimed at new work you are designing & installing (known cables) GN3...more aimed at other persons work, such as PIR (EICR) type, unknown cables sizes.

both '3/4' and '0.8' apply to 16th edition for example

32A type B 60898

16th = 1.50 OSG=1.20 (80% of 16th) 17th =1.44 (96% of 16th) **Cmin adjustment = 1.37 Ω**

15A 3036 0.4sec

16th =2.67 OSG= 2.14 (80% of 16th) 17th =2.55 (96% of 16th) **Cmin adjustment = 2.43 Ω**

$$Z_s(m) \leq 0.8 \times \frac{U_0 \times C_{min}}{I_a}$$