

Sizing of protective conductors by selection

Regulation Group 543.1 of BS 7671 requires that a protective conductor other than protective bonding conductor is sized either by calculation or selection. This guide covers the sizing of protective conductors by selection, which uses Table 54.7 of BS 7671, as explained later.

It should be noted, however, that where the choice of the csa of the line conductors has been determined by considerations of short-circuit current, or where the earth fault current is expected to be less than the short-circuit current, the csa of the protective conductor must be calculated.

Lower limits of csa

Certain lower limits apply to the csa of a protective conductor. The size of the protective conductor used must be not less than the appropriate limiting value (see below) and not less than that determined by selection (see later).

Where a protective conductor is not: an integral part of a cable (such as a 'twin & earth' cable or an armoured cable); or formed by conduit, ducting or trunking; or contained in an enclosure formed by a wiring system, the csa of the protective conductor is to be not less than 2.5 mm² copper equivalent if protection against mechanical damage is provided (such as by a sheath), and not less than 4 mm² copper equivalent if protection against mechanical damage is not provided.

Where PME conditions apply, a protective conductor used as an earthing conductor must have a csa not less than that required by Regulation 544.1.1 for a main protective bonding conductor of the installation (refer to NICEIC Pocket Guide 13).

A protective conductor buried in the ground must have a csa not less than required for an earthing conductor by Table 54.1 of BS 7671.

Selecting the size of the protective conductor

The process of selection uses the csa (S) of the associated line conductor and Table 54.7 of BS 7671. (Data reproduced below in part.) Where the protective conductor is common to several circuits, its csa should be based on the csa of the largest line conductor of the circuits. Where selection produces a non-standard size, a conductor having the nearest larger standard csa should be used.

Data from TABLE 54.7 of BS 7671

Minimum csa of protective conductor in relation to the csa of associated line conductor.

Minimum csa of the corresponding protective conductor (mm ²)	CSA of line conductor S (mm ²)		
	A	B	
	S ≤ 16	16 < S ≤ 35	S > 35
	A	S	16
	B	$\frac{k_1}{k_2} \times S$	$\frac{k_1}{k_2} \times 16$
			$\frac{S}{2}$
			$\frac{k_1}{k_2} \times \frac{S}{2}$

The csa of the protective conductor must be not less than required by Row A or Row B of the above table, as applicable.

Row A should be used where the protective conductor is of the same material as the associated line conductor.

Row B should be used where the protective conductor is not of the same material as the associated line conductor.

¹ Regulation 543.1.1

² Regulation 543.1.2