

CONSUMER UNIT 16 kA CONDITIONAL RATING APPLICATION



Origin of 16 kA single-phase prospective short-circuit current¹

BS 7671: 2018 IET Wiring Regulations 18th Edition Regulation 313.1 requires the prospective short-circuit current (PSCC) at the origin of the installation to be determined by calculation, measurement, enquiry or inspection.

PSCC information can be obtained by enquiry and should be provided free of charge by Distribution Network Operators (DNOs). Also, guidance on the estimation of maximum PSCC on the Low Voltage (LV) network and at the supply terminals is given in the Energy Networks Association publication Engineering Recommendation P25 Issue 2 2018².

P25 states that the maximum design value of the PSCC for single-phase 230 V supplies up to 100 A should be taken as 19.6 kA at the connection of the service to the LV distribution main cable. P25 clarifies that the value of 19.6 kA assumes zero metres of service cable/overhead line is connected. In practice, the service length will be greater than 2 metres, reducing the PSCC to less than 16 kA (BS 7671 Regulation 536.4.201 also refers); see Figure 1. This is the reason for the consumer unit 16 kA conditional rating test.

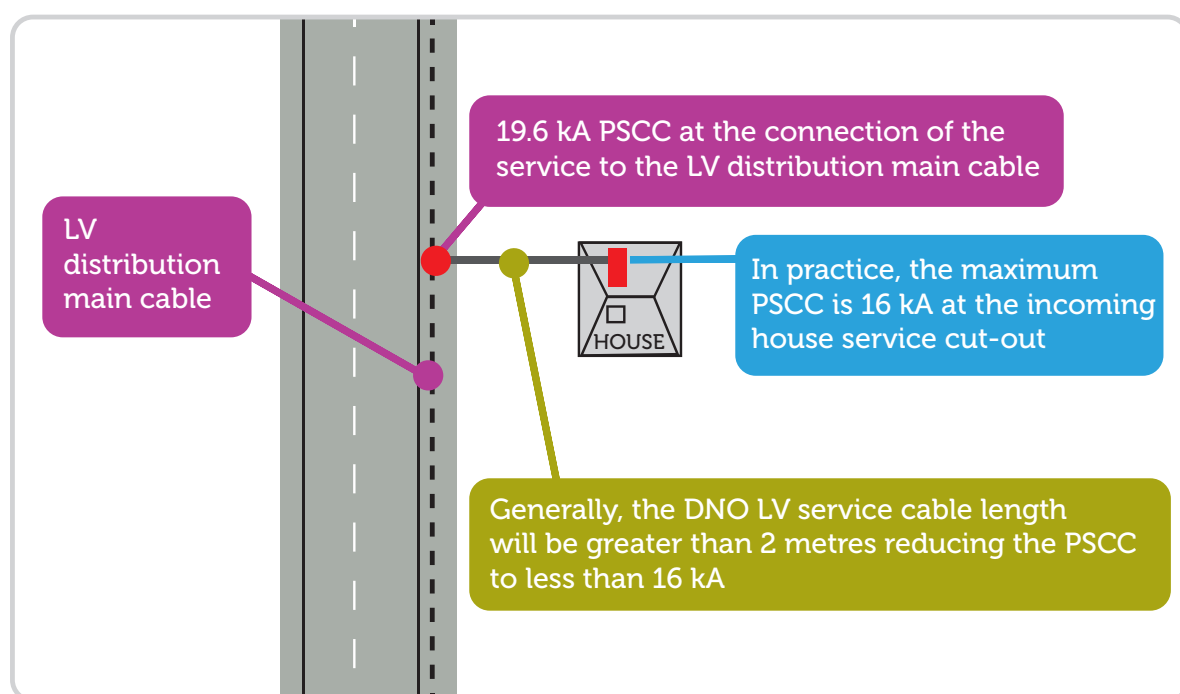


Figure 1: Principles of P25 single-phase PSCC guidance

Consumer Unit 16 kA conditional rating

P25 states that in practice, the service length will be greater than 2 metres, reducing the PSCC to less than 16 kA and therefore, the 16 kA conditional rating described in Annex ZB of BS EN 61439-3, for incoming service equipment, will satisfy design requirements. The designer should assume that the cut-out unit will contain a 100 A fuse-link to BS 88-3.

BS EN 61439-3 Annex ZB prescribes a specific conditional test arrangement relating to the use of an upstream BS 88-3 (formerly BS 1361 type II) 100 A fuse-link. This 16 kA conditional test verifies the performance of the incoming device, its connections, busbar, cable links, circuit-breakers, residual current operated circuit-breaker and any other item in the consumer unit not separately rated at 16 kA or higher. BS EN 61439-3 requires this rated conditional short-circuit current to be identified by the symbol I_{cc} and BS 7671 Regulation 536.4.201 references this symbol.

Summary of key points

1. The consumer unit 16 kA Annex ZB conditional rating relates to a specific installation arrangement. The maximum 16 kA PSCC being at the service cut-out and not at the consumer unit.
2. For fault currents lower than 16 kA, the consumer unit manufacturer can confirm its conditional short-circuit (I_{cc}) ratings e.g. for a consumer unit with 6 kA MCBs this could be given as:
 - a. For fault currents 6 kA to 16 kA Annex ZB arrangements apply coordinated with a BS 88-3 or BS 1361 type II upstream fuse-link.
 - b. For fault currents below 6 kA using the out-going overcurrent protective device only. In this scenario, the upstream fuse may be assumed to be in the circuit for reasons other than that of back-up protection³ of the consumer unit e.g. overcurrent protection for the meter tails.
3. The consumer unit 16 kA Annex ZB conditional rating does not automatically cover the use of other upstream back-up devices such as an miniature circuit-breaker or moulded case circuit-breaker. The use of short-circuit protective devices other than BS 88-3 or BS 1361 type II fuse-links must be verified accounting for the joule integral (I^2t), cut-off current, pre-arcing (I^2t) and take over current based on the fuse-link characteristics used for the 16 kA rating. Usually, this would need to be verified by test.
4. For installation supply arrangements differing from the maximum 16 kA PSCC at the fused service cut-out, a single-phase type A distribution board to BS EN 61439-3 should be specified with an appropriate conditional short-circuit rating (I_{cc}) for the PSCC at the distribution board incoming terminals.
5. A consumer unit can be used where the installation arrangements reflect the 16 kA conditional short-circuit rating for example, where the maximum prospective fault current is 16 kA at a Ryefield type distribution board incorporating a BS 88-3 or BS 1361 type II fuse-link supplying the consumer unit. Otherwise a type A distribution board to BS EN 61439-3 having a suitable short-circuit rating should be used.
6. BS EN 61439-3 scope is intended to be operated by ordinary persons principally in household or similar premises therefore; they can also be for use by instructed or skilled persons in commercial applications e.g. a single-phase type A or three-phase type B distribution board.

Notes

1. The term "short-circuit" where relevant, includes earth fault as noted in BS 7671 Chapter 53.
2. The guidance in this EREC may not be fully appropriate for interconnected-LV networks which are prevalent in certain regions of the UK; for example in London, Merseyside, Wirral, and North Wales. Suitable guidance should be obtained direct from DNOs operating in such regions. For interconnected-LV networks, the PSCC value should be obtained from the relevant DNO. Such information is normally readily available from the DNO's online library facility in respect of ENA EREC G81.
3. BS 7671 uses "back up protection" in terms of protection of a switch or residual current operated circuit-breaker by an overcurrent device and combined short-circuit protection as two overcurrent devices in series, resulting in a combined short-circuit current capability higher than one overcurrent device alone.



Rotherwick House
3 Thomas More Street
London E1W 1YZ

www.beama.org.uk