

BS 7671:2018 – The IET Wiring Regulations 18th Edition

BS 7671, Requirements for electrical installations is better known by its subtitle, the IET Wiring Regulations. The Standard is harmonized with International and European electrical safety standards so when they change, BS 7671 must be updated to suit. It's not always a direct adoption of requirements, but generally the technical intent of changes have to be taken on board.

The current 18th Edition was introduced in July 2018 and comes into force on the 1st January 2019, leaving a 6 month grace period for people to get used to it. It is important to note that the changes are not retrospective, so will only apply to new installations (including temporary ones) being designed or erected from January. It does not apply to existing installations or tours, although some of the new technologies might be worth considering for the safety of buildings and equipment.

There is a summary of the changes on the IET website at <https://electrical.theiet.org/bs-7671/18th-edition-changes/> and here follows a summary of interesting ones that have a bearing on our industry.

Chapter 41 – Protection against electric shock

Currently Table 41.1 requires circuits under 32 A to have a disconnection time of 0.4 seconds. This is being increased to 63 A, which for installations using miniature circuit breakers is not a problem as the operating time is the same. Circuits using fuses though might need to be looked at.

Regulation 411.3.3 requires the use of 30 mA RCDs to provide additional protection against the risk of electric shock. It has been revised and now applies to socket-outlets with a rated current not exceeding 32 A and it's notable that it does not distinguish between final or distribution circuits, nor single or three-phase. This could prove problematical for installations which use 32 A sockets for connections to other distribution units or dimmers, or for tour busses for example.

There is an exception to omit RCD protection where, other than a dwelling, a documented risk assessment determines that RCD protection is not necessary. Before writing a risk assessment though, remember that there is also a requirement to ensure adequate selectivity to avoid unwanted tripping, which in many instances may be sufficient as a work-around. Notably, the EU Harmonization document from which we derive our requirements only requires this measure on sockets used by 'ordinary unskilled persons', crucial words omitted in the UK implementation. In a similar vein, there's a new Regulation 411.3.4 which requires, within domestic (household) premises, additional protection by an RCD with a rated residual operating current not exceeding 30 mA shall be used for final circuits supplying luminaires. I've included it here for reference as Chinese-whispers often omit the salient details – i.e. household premises.

There is a new Regulation group (419) aimed at providing protection where automatic disconnection according to Regulation 411.3.2 is not feasible, such as electronic equipment with limited short-circuit current (e.g. UPS, other electronic inverters or power processing equipment).

A new type of protective device debuts in this update – the Arc Fault Disconnection Device (AFDD). These are clever devices that can identify arcing in a circuit and will provide protection for insidious faults like cable damage or equipment failure where there's not enough current flowing to operate other protection such as circuit breakers, but enough to start a fire. They work by looking at the

harmonic spectrum of the current and identifying certain frequencies that are characteristic of an arc, rather than a load.

Currently they are recommended in final circuits where there's a heightened risk of fire or the effects thereof – sleeping accommodation, locations storing flammable substances or installations at risk of fire such as old wooden buildings for example.

Part 5 – Selection and erection

One area that has caused a lot of excitement especially on social media is the need to protect against the premature collapse of cables in the event of a fire. This requirement has origins in a horrible accident in which two firemen became entangled in cables while searching a smoke-filled high rise building and perished some years back. The regulation has for the last three or so years required cable in escape routes to be suitably protected, such as by using metal cable supports. There was a lot of debate about what constituted an 'escape route' as it may not always be obvious – for example the aisle of an auditorium could be classed as such, as could the ramp off a stage at a festival. For this reason regulation 521.10.202 has been updated and now requires *cables to be adequately supported against their premature collapse in the event of a fire*. This now applies throughout the installation and not just in escape routes.

This requirement should be taken in the context of its origin. Cables along a wall, in floor ducts, risers, over a festival stage or similar are not likely to be encountered by firemen crawling through the smoke-filled building, so don't need additional measures to be taken. For temporary systems where a risk is perceived, adequate measures could include looping cables inside the odd chord of a truss or laying on top of box truss for example. Like all these things there is a proportional approach to be taken for the risk presented.

Energy efficiency was a hot topic in the draft for the 18th Edition and constituted a whole new Part 8. After much debate the salient aspects have been introduced in a new Appendix 17, with the original content becoming another standard (BS IEC 60364-8-1) to be published at some point in 2018. The Appendix suggests designers implement energy efficient measures including selecting and erecting supply transformers in choice locations, oversizing cable to reduce losses, introduce controls to ensure energy use was monitored and mitigated and so on. While laudable objectives, I suspect sadly that many will end up being 'value-engineered' out in many tightly contested construction budgets.

Surge protection

Surge Protection Devices (SPDs) are not a new introduction to BS 7671, but the relevant Section in BS 7671 has been substantially revised. SPDs made more of an impact in Amendment 3 of the 17th Edition, but included the fatal words "Where an installation is supplied by a low voltage system containing no overhead lines, no additional protection against overvoltage of atmospheric origin is necessary if the impulse withstand voltage of equipment is in accordance with Table 44.3". No overhead lines? Hmm, that sounds like my festival/theatre show/venue/ etc; ergo no problem.

But the original AQ criteria (conditions of external influence for lightning), used for determining if protection against transient overvoltages was needed, is no longer included in BS 7671. Instead, protection against transient overvoltages **has to be provided** where the consequence caused by overvoltage (see Regulation 443.4)

- (a) results in serious injury to, or loss of, human life, or
- (b) results in interruption of public services/or damage to and cultural heritage, or

- (c) results in interruption of commercial or industrial activity, or
- (d) affects a large number of co-located individuals.

It pays to read all of the regulation though. The scope of regulation 443 requires the protection of electrical installations against transient overvoltages of *atmospheric* origin transmitted by the supply distribution system, including direct strikes to the supply system, and against switching overvoltages generated by the equipment within the installation.

For most events operating off generators, there's no switching artefacts in the HV network and for cables lying on the ground, there's little prospect of any atmospheric effects. So is protection required? Probably not. For performance venues such as theatres, halls or conference centres, it's a different story. Given that they are supplied from the public distribution, the need for SPDs in the installation is most likely to be required. There is a note though that switching artefacts in the installation are likely to be negligible compared to those generated via operations on the HV network, so an SPD at source may be all that is required. However, remember that the 18th Edition is not retrospective, so it will only apply to new installations, refurbishments or similar.

There are a good few more changes many of which don't affect our industry unless you have electric vehicles, own a medical location or have inland navigation vessels, but to be sure it's worth a quick read of the IET summary given earlier.