



# Innovation and standards working TOGETHER

ECA technical director **JIM O'NEIL** looks at how BS 7671 and innovation complement each other when it comes to electrical installations

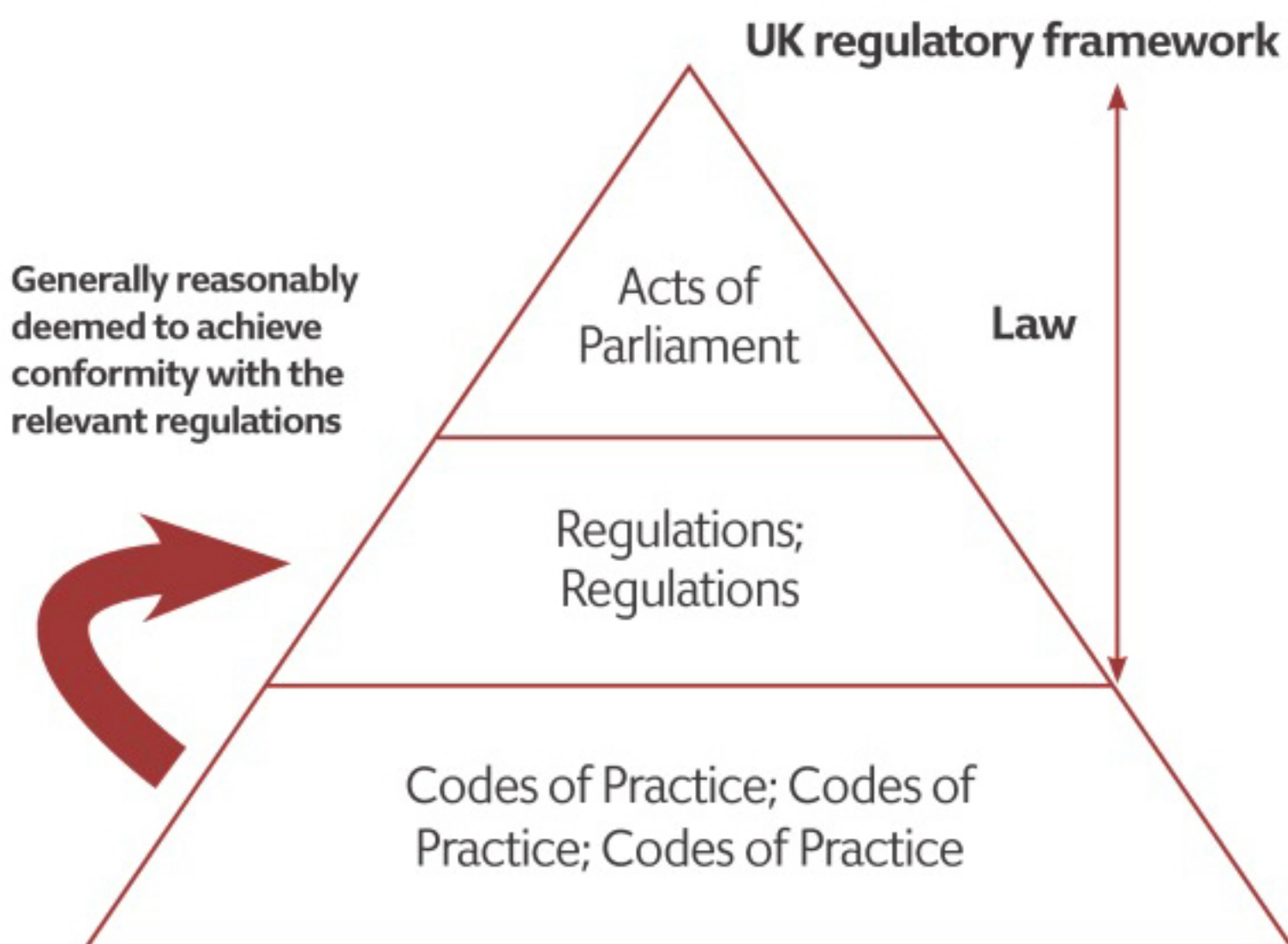
Does BS 7671 stifle innovation? In all honesty, that depends on a multitude of factors: what we mean by 'innovation'; whether 'innovation' is permissible when it comes to electrical installations; and what freedoms or constraints BS 7671 puts on designers and installers. And that's to mention only a few.

If we take innovation as either something new or different that's introduced, or the act of introducing new things or methods, we have to ask ourselves how that applies to our industry. It would be reasonable to assume that – in the context of electrical installation – this term covers the introduction of new products, methodologies and systems into the installation process.

And this begs the question of whether innovation is permissible. The answer to this depends on what the installer has to comply with. After all, without 'rules' there might otherwise be a free-for-all that, given the hazardous – sometimes fatally so – nature of electricity, may put lives and property at risk.

## Regulatory framework

In simple terms, one must comply with the law and – for the purposes of this discussion – this means Acts of Parliament and regulations enacted under these Acts of Parliament. Within many of the regulations in the UK, codes of practice (typically, British Standards) are cited as a means of reasonably achieving conformity with regulatory requirements. This then provides a 'regulatory framework' for activities associated with electrical installations, which can be illustrated graphically as follows:



**Innovation can – and, arguably, must – be applied in the context of this standard, but only alongside the application of 'good engineering judgement'**

The fundamental principles associated with electrical activities are safety to persons (shock risk) and the prevention of fire (life and property), and the principal regulatory framework covering electrical installations in the UK is the Electricity at Work (EaW) Regulations 1989. The regulations were made under the Health and Safety at Work etc Act 1974 (HSW Act). Within the EaW Regulations it states:

'...British Standard BS 7671 *Requirements for Electrical Installations* is also known as the IEE Wiring Regulations – they are non-statutory regulations. They "relate principally to the design, selection, erection, inspection and testing of electrical installations, whether permanent or temporary, in and about buildings generally and to agricultural and horticultural premises, construction sites and caravans and their sites". BS 7671 is a code of practice that is widely recognised and accepted in the UK and compliance with it is likely to achieve compliance with relevant aspects of the 1989 Regulations.'

BS 7671:2008 Amendment 3:2015 – *Requirements for electrical Installations (IET Wiring Regulations Seventeenth Edition)* is the latest iteration of what might popularly be known as the 'bible' for the practising electrical design engineer and installer. The statement within the EaW regulations is 'mirrored' in the 'Note by the Health and Safety Executive' at the beginning of the standard. It says – in essence – that compliance with the standard is likely to achieve conformity with the EaW regulations, this being the requirement that must be complied with under law.

Because the standard is cited within the EaW regulations, there are very few instances where engineers will depart from the requirements of BS 7671. They can, therefore, be described – by and large – as a prescriptive (that is, dictatorial) standard.

## Deviations

A question that often arises about the design and erection of electrical installations – particularly when considering new products and systems – is: is it permissible to depart from the stipulations of the standard? An examination of BS 7671 reveals the following clause:

### 133.5 New Materials and Inventions

Where the use of a new material or invention leads to departures from the regulations, the resulting degree of safety of the installation shall be not less than that obtained by compliance with the regulations. Such use is to be noted on the Electrical Installation Certificate specified in Part 6.

Part 6 of BS 7671 (Inspection and Testing) in turn refers to Appendix 6 (Model Forms for Certification

and Reporting), and in the both the model form for 'Electrical Installation Certificate' and 'Minor Electrical Installation Works Certificate' (both of which are concerned with initial verification) space is provided to record departures from BS7671, citing regulations 120.3 (fundamental principles) and 133.5.

On the face of it, then, using new products and systems is simply a case of recording the departure on the 'completion certificate', however the key consideration (citing regulation 133.5) is: *'...the resulting degree of safety of the installation shall be not less than that obtained by compliance with the regulations...'*. This, then, requires a degree of good engineering judgement to be exercised by the designer or installer to ensure that the fundamental principles of the standard are met (or exceeded).

'Good engineering judgement' is essential if technological developments are to be incorporated, as without this, our 'wiring rules' might possibly still be citing re-wireable fuses instead of miniature circuit-breakers, and rubber-insulated cables instead of PVC and LSOH cables.

## Engineering judgement

An example in recent years would be the introduction, in the middle to late 1990s, of prefabricated wiring systems. At the time, there were neither installation methodologies available within BS7671 or an applicable British Standard that existed for these systems. Engineering judgement consisted of ensuring that individual components (conductors, cable sheaths, plugs, sockets and installation methodologies) each met a relevant product standard or equivalence. Where none existed, tests were commissioned in reputable test establishments, by modular wiring system manufacturers, at potential client instruction, to ensure that the components met an equivalent standard. In this way, engineers were able to exercise judgement that these systems (taken as a whole) met the requirements of BS7671 and the legal requirements of the EaW regulations.

A departure from BS7671 still had to be recorded. However, this was done with the confidence that reasonable judgement had been exercised to ensure that the fundamental principles of BS7671 had been met. In parallel, work commenced on the development of a British Standard, which resulted – in 2009 – in the publication of BS8488:2009 – *Prefabricated wiring systems intended for permanent connection in fixed installations: Specification*. As can be seen, BS8488 did not come into existence until some 15 years after these systems had initially begun to be used. The purpose behind the migration to pre-fabricated wiring systems was to enable off-site manufacture and pre-assembly, saving time – and cost – on site.

## Consumer units

Another example, pertinent to issues raised in the third amendment of BS7671:2008, relates to the new requirement for consumer units to be



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constructed of non-flammable materials (metal). This regulation has been introduced because of the increasing number of fires in domestic premises that have been attributable to overheating (loose connections) within the consumer unit. The intent of the regulation is to contain a fire within the non-flammable consumer unit for an appropriate time, without spreading to adjacent structures, thus allowing occupants a sufficient time to escape or to deal with the contained fire.

This measure, in engineering language, is referred to as a mitigation or control measure. Understand the problem and put forward a solution to mitigate or control that problem.

Technology exists that can detect overheating at individual RCBO circuit connections by means of thermal links that, on rising temperature (much lower than that required to initiate a fire) introduce a simulated earth fault, thus tripping the RCBO – removing the load and, hence, the heating effect.

This technology, applied to consumer units with RCBOs, introduces a mitigation or control measure at least equal to that of non-flammable enclosures and can, therefore, be applied using considered judgement that it meets – or exceeds – the fundamental principles detailed in BS7671. A departure is required to be recorded on the completion certificate.

This is one example of where innovation and BS7671 can work together. Innovation can – and, arguably, must – be applied in the context of this standard, but only alongside the application of 'good engineering judgement' when it comes to the use of new and innovative products and systems. Yes, a departure must be recorded, but this should not deter clients, insurers, designers and installers from thinking outside the box – as long as they can provide documentary evidence to illustrate how the fundamental principles of BS7671 are being upheld or, indeed, bettered. [ECAtoday](#)