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- Mythbusters #8: “Socket-outlets must be protected by a 30 mA RCD.”

Mythbusters #8: “Socket-outlets must be protected by a 30 mA RCD.”

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Mythbusters returns to cover socket-outlets, this time regarding 30 mA RCDs.

Well, as this is a myth buster column, there are no prizes for guessing that this statement is not actually true. While many circuits do require such protection, it is also very common to find (for example) sockets-outlets to BS EN 60309 (also known as ‘commando’, ‘industrial’ or ‘ceeform’ depending on what industry you work in) with quite high ratings such as 63 A or even 125 A protected as such.

One can understand the rationale perhaps used by a designer – it is a socket-outlet for mobile equipment, extension leads etc. which may get damaged and pose a risk. Therefore a 30 mA RCD is a logical choice to provide suitable protection. Or is it?

The first question is to consider what the load(s) actually are. Most readers would struggle to come up with many *single* items of current using equipment rated at over 32 A that are mobile and designed to connect to such supplies. Generally, the larger supplies often are used to power a distribution circuit such as that in a mobile unit, temporary distribution board or a distribution unit in a 19" rack housing IT equipment, for example. These will often have 30 mA protection already fitted to the final circuits.

BS 7671:2018+A2:2022 introduced changes to the requirements for socket-outlets as follows:

411.3.3 *Additional requirements for socket-outlets and for the supply of mobile equipment for use outdoors*

In AC systems, additional protection by means of an RCD with a rated residual operating current not exceeding 30 mA shall be provided for:

socket-outlets with a rated current not exceeding 32 A in locations where they are liable to be used by persons of capability BA1, BA3 or children (BA2, BA3),

socket-outlets with a rated current not exceeding 32 A in other locations, and

mobile equipment with a rated current not exceeding 32 A for use outdoors.

An exception to (ii) but not (i) or (iii) is permitted where a suitably documented risk assessment undertaken with the involvement of a skilled person (electrically) determines that RCD protection is not necessary.

NOTE 1: For the purpose of this exception, an ordinary person (BA1) instructed in the use of the installation does not become an instructed person (electrically) or cease to be an ordinary person.

The documented risk assessment shall be provided with the appropriate electrical installation certificate.

The requirements of Regulation 411.3.3 do not apply to FELV systems according to Regulation 411.7 or reduced low voltage systems according to Regulation 411.8.

NOTE 2: See also Regulations 314.1(iv) and 531.3.2 concerning the avoidance of unwanted tripping.

NOTE 3: RCD protection of all socket-outlets is recommended.

NOTE 4: See Appendix 2, item 11 in respect of risk assessment.

NOTE 5: A lighting distribution unit complying with BS 5733, shaver supply unit complying with BS EN 61558-2-5, luminaire track system, installation coupler, LSC or DCL is not regarded as a socket-outlet for the purposes of this regulation.

It should be noted that this requirement does not apply to socket-outlets rated at more than 32 A. Neither is there a distinction between single and three-phase supplies.

Let's consider the individual indents. The first (i) requires protection for users who are ordinary, unskilled people (BA1), young (BA2) or disabled (BA3), which is a reasonable requirement. The second point (ii) is where many socket-outlets might fall – a common example being a 32 A BE EN 60309 connector providing power to a server rack in an IT room.

The paragraph below indent (iii) does allow a risk assessment option for socket-outlets not used by those falling into categories BA1, BA2 or BA3. This may be appropriate in installations such as the IT room example where such a location is typically under skilled supervision by technicians and the risk of damage low.

Indent (iii) is also fairly self-explanatory, though as indicated before, it is really important to understand what the 'mobile equipment' is. An industrial heater or a steam cleaner could be a good example of an appropriate application of a 30 mA RCD on a three-phase 32 A socket. A mobile unit (such as a site office) which has its own distribution inside with final circuits already protected by a 30 mA RCD, is an example of where the designer should consider the application, including the routing and protection of the supply cable. In this case, there is no selectivity between the RCDs in the cabin and a fault or excessive leakage currents could cause power to be lost to the cabin itself, which doesn't avoid any potential dangers or minimize inconvenience in the event of a fault.

This is explored in Note 2 which is of particular importance here. It refers to regulation 314.1 indent (iv) which is:

Division of Installation

Every installation shall be divided into circuits, as necessary, to:….

***(iv)** reduce the possibility of unwanted tripping of RCDs due to excessive protective conductor (PE) currents not due to a fault*

Also of relevance are indents (i) and (iii) of the same –

***(i)** avoid danger and minimize inconvenience in the event of a fault*

***(iii)** take account of hazards that may arise from the failure of a single circuit such as a lighting circuit*

Note 2 of 411.3.3 references regulation 531.3.2 which reinforces this requirement as follows:

531.3.2 *Unwanted tripping*

Residual current protective devices shall be selected and erected such as to limit the risk of unwanted tripping. The following shall be considered:

subdivision of circuits with individual associated RCDs. RCDs shall be selected and the circuits subdivided in such a way that any earth leakage current likely to occur during normal operation of the connected load will not cause unwanted tripping of the device. See also Section 314.

As regular readers know, it is always good to refer back the fundamental principles in Part 1, from which all other requirements stem. One - often overlooked - requirement is so important in any electrical design:

132 DESIGN

132.1 General

The electrical installation shall be designed by one or more skilled persons to provide for:

the protection of persons, livestock and property in accordance with Section 131

the proper functioning of the electrical installation for the intended use.

'Proper functioning' of course means that the installation will perform as required without protection operating unnecessarily. For example, one wouldn't install a six amp circuit breaker on a domestic cooker supply as it will operate whenever the cooker is turned on. So why fit a 30 mA RCD to a socket-outlet where the leakage currents of connected loads are likely to cause operation of the RCD? A proper consideration of the design, application and a documented risk assessment might well be in order for many designs.

In summary, not all socket-outlets should be protected by a 30 mA RCD. And doing so in some cases can be distinctly unhelpful to users – it may also mean your installation actually *doesn't* comply with the fundamental principles of BS 7671!