

ECANZ FAQ
(Regulations, Standards, & Codes of Practice)



Q12012
Bonding sinks
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QUESTION

Regarding bonding / earthing of sinks; are insert sinks treated differently from sinks that have a drip tray or exposed metal work above the bench surface when it comes to earthing them?

There seems to be a lot of agreement amongst trades people that a sink with a drip tray or flashing above the bench surface must be earthed whilst a sink that is just an insert (ie no exposed metal work above the bench surface) doesn't need to be.

ANSWER

When considering earthing and bonding we need to clearly understand what these related, but different, functions are. AS/NZS 3000 covers it very well, but the short form is that earthing is designed to carry fault current, while bonding is only designed to carry low currents sufficient to equalise voltage. The full term is "equipotential bonding" and if we remember that it will help keep the two in perspective.

As for what needs to be earthed, that's pretty much always been any exposed conductive parts of the electrical installation which are liable to become alive. Since a sink/bench of any flavour is not part of the electrical installation the earthing rules cannot apply.

On the other hand, metalwork associated with mains, such as support brackets, conduits, and meter boxes, are part of the electrical installation. If conductive, they might well become alive so they need to be earthed, not bonded. In practice, the crucial difference is in the required size of conductor.

What has needed to be bonded has changed over the years. The sink bench vs sink insert issue was in the 1976 Electrical Wiring Regulations. These had a list of must be earthed (R 148); a list of what need not be earthed (R 149); and a list of what must not be earthed (R 150). R 151 went on to talk about additional requirements for earthing and bonding - using these terms pretty much interchangeably, which has caused a lot of confusion ever since. Listed as requiring earthing & bonding were: "exposed metal pipes, sinks, tanks, baths, wash tubs, taps, waste pipes, gas pipes, and other similar things". The Notes went on to explain that earthing and bonding was required whenever segregation could not be ensured; but that it was not required if a person touching the item in question could not simultaneously touch earthed metal. In cases of doubt, the rule was to bond and earth. Further notes advised that non-metallic waste pipes or water pipes were considered to provide segregation where there was no other contact. Metallic sink bench tops were specifically required to be earthed in all cases, regardless of the type of waste pipe.

There was NO mention of sink flanges, nor of draining trays. Draining trays were typically regarded as being a bench top, however to treat a mere flange as being the same is a silly misunderstanding - but may well have been enforced in some areas by ignorant inspectors. With the abolition of supply authorities in 1993, and the creation of independent inspectors; we were supposed to be rid of strange local interpretations. Unfortunately they are still with us, the saving grace being we are free to find an alternative inspector who is more reasonable.

The reason for requiring benchtops to be earthed was in case an appliance placed on the bench suffered a fault, thus livening the bench relative to other earthed items which might be within reach. A moment's thought will bring the realisation that that is fault current, and thus requires earthing, not bonding. Carrying fault current in order to trip a protective device is the job of the protective earthing conductor (PEC) for Class I appliances, and everything else is double insulated.

Skipping over the requirements of 1993 and 1997 Regulations, what are the current rules?

Under AS/NZS 3000, the bonding rules are quite straightforward. They are set out in section 5.6, and the list of items required to be bonded is small:

- 5.6.2.2 conductive water piping must be bonded IF it is both accessible and continuously conductive from inside building to a point of contact with the ground.
- 5.6.2.3 Other conductive piping, IF in contact with exposed conductive parts
- 5.6.2.4 Conductive pipes containing flammables, IF in contact with conductive cable sheaths or wiring enclosures
- 5.6.2.5 Conductive reinforcing of concrete wall or floors, IF associated with a room containing a bath or shower. Note the bath or shower does NOT need to be conductive to trigger this rule, just the reinforcing.
- 5.6.2.6 Swimming pools and spa pools: fixed conductive parts of the pool structure (including reinforcing, and conductive fittings (eg ladders), and any other conductive material within arm's reach (eg a fence or a lamp standard); IF there is any exposed conductive part of electrical equipment in any Zone, or IF there is any exposed conductive parts of electrical equipment in contact with pool water and not separated by double insulation. It is likely that the pool rule will be amended shortly to require that provision for this bonding be made even if the conditions requiring bonding do not exist at time of installation - a fence might be built later, triggering a need to bond the reinforcing of the pool shell.

That's it. Telecoms earthing systems "may" be bonded, but don't have to be. Once that list is ticked off, it's back to the general clause 5.6.2.1; which points out that additional requirements may be imposed by other Standards (eg for photovoltaic arrays, patient treatment areas, etc), and imposes the overall requirement that bonding shall be provided to avoid any potential differences that may occur between electrical equipment and other items which may be in contact with the mass of earth.

That's why bench tops - usually - don't need to be bonded. There's almost no chance of a metallic benchtop being in contact with the mass of earth, unless it's because of metallic piping - which has already been bonded. And if it's not in contact with the earth, neither the neutral fault next door nor the lightning strike down the road, nor anything else, can raise its potential.

As for mains-related metalwork, so for conductive building materials such as metal framing. The requirements (5.4.1.2 and 5.4.6) are not in the bonding section, but under earthing; because it done in order to carry fault current. If the cables concerned are large, the earth conductor for the metal will need to be correspondingly large in order to meet the trip time requirements.

Thinking of the hours spent as an apprentice, running bonding wires to every waste pipe, sink bench, shower tray, and urinal; all because the writers of the Regs hadn't understood these two different concepts; may well make one wonder what else we've "always done" that really didn't serve any useful purpose.

Some of those old earth - bonds were done by connecting into the nearest socket circuit.. which is no longer acceptable. The minimum size for a bonding conductor is 4 mm² (5.6.3.2). Connecting to a PEC is forbidden, but in any case most PECs aren't big enough, and the maximum permitted resistance of the PEC for a circuit might be higher than the 0.5 Ω mandated for bonding conductors

5.6.3.1 requires bonding conductors to be installed in accordance with the rules for PECs (except size). Ideally they should be run to the earth busbar of the main switchboard, but a distribution switchboard will do. They must be connected to the main earthing conductor (MEC), or to another point on an earthing system that is connected to the main earthing conductor. Clause 5.6.2.2 requires that bonds for water pipes must be either to the MEC or to the earth bar. It further stipulates that a water pipe bond must NOT be connected directly to the earth electrode, but may be formed of an extension of the MEC beyond the electrode.

This is where we find that using a PEC for double-duty as a bond is forbidden - unless that PEC is directly connected to the MEC. If the PEC is connected to an earth bar - as most are - then it's not connected to the MEC, so can't be "another point on an earthing system that is connected to the main earthing conductor".

As always, the best advice is to stop doing things because you've always done them that way, and take the time to read what the rules actually say.

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