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Serious incidents resulting from the use of live polarity testing

This safety alert is for all electrical workers required by law to undertake a polarity test prior to doing a connection.

What happened?

Two serious incidents occurred within a month of each other when the electrical workers involved relied on a live polarity testing method.

The first incident occurred when a live polarity test was used to test the connection of a newly installed mains cable and mains entry box. Because the connection was transposed between the phase and the neutral at the mains entry box it resulted in the installation being livened in a fault condition.

The workers used a live polarity test which requires the power to be on to enable the test to be carried out. Because of the transposition, turning on the power to carry out the polarity test in this situation created the fault condition before the workers could identify that the polarity of the electrical installation was incorrect, and respond.

The transposition of the mains livened any electrically earthed connections, such as the hot water vent pipe.

Because the hot water vent pipe in this installation was equipotentially earthed, this caused a current to flow between the vent pipe and the iron roof. This resulted in intense localised heating and/or

arcing which in turn caused the building paper to ignite. This resulted in significant fire damage to the roof space of the residential dwelling.

The second incident occurred adjacent to a school property and resulted in a neighboring iron fence becoming energised because of electrical work being carried out on the mains at the school. This was a serious near-miss incident and created a risk of electrocution for anyone coming into contact with the fence.

Again, in this incident the electrical workers had used a live polarity test which required the power to be on to enable the test to be carried out.

Turning the power on to conduct the polarity test, created a fault situation in which the transposition of the mains livened the electrically earthed connections. In this case the iron cladding of a storage shed on the school grounds was livened.

There were several iron poles leaning up against the shed which were in also contact with the neighboring iron fence. This resulted in a flow of electrical current between the storage shed and the neighboring fence causing arcing to the fence.

Energy Safety advice

The following apply when doing a connection on an electrical installation as required by the Electrical (Safety) Regulations 2010:

- Regulation 73A (1) of the Electricity (Safety) Regulations 2010 requires **before connecting** to a power supply a low or extra-low voltage installation or part installation on which prescribed electrical work has been done, the person doing the connection must - (e) in the case of a low voltage installation or part installation, do all of the following: (i) **ensure** that the polarity and phase rotation of the supply are correct.
- Regulation 73A (5) of the Electricity (Safety) Regulations 2010 - to avoid doubt, in this regulation **connection** refers to the prescribed electrical work that is the final step that will allow electricity to flow in the installation or part installation on which other prescribed electrical work has been done.
- These incidents would have been prevented by using the correct method of polarity testing. The polarity test that **must** be carried out is a deenergised polarity test. This polarity test method should be done after the connection has been carried out and before the installation is livened.

More information

Guidance on how to carry a deenergised polarity test method can be found in the standard AS/NZS 3017.

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Images showing fire damage in the roof space and the hot water vent pipe that was livened.



Images showing arcing on the iron fence and poles that were making contact between the fence and the storage shed.