



# *Safety Advice 05-2007(c) (NZ)*

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## **Supplementary Safety Advice to original Safety Advice 05-2007 concerning LV fatal incident June 2007**

In June 2007 a fatality occurred when a Line Mechanic was connecting a three phase low voltage cable from a newly installed ground-mounted sub station to an overhead line. The de-energised cable, connected at its ground level termination within the substation cabinet, was being handled aloft for connection using LV live work techniques to the live overhead conductors. The connecting work aloft was being conducted from an insulated EWP bucket. One phase of the cable had been successfully connected to an overhead conductor and as the next phase was being positioned for the connection, cable distortion at the ground mounted substation cabinet caused that cable phase termination to contact an adjacent live termination. The pressure of the distortion on the termination insulating sheath against the adjacent live termination caused the sheath to split and contact between the terminations to occur, livening the cable phase being handled aloft for connection. It is understood that the fatality occurred when the Line Mechanic, unaware that the cable phase in hand had been livened at the cabinet terminations, also grabbed the live overhead conductor with his other hand. The Line Mechanic was not wearing insulating gloves while carrying out this task aloft in the insulated EWP.

Failure to implement required personal protective barriers was the immediate cause of this fatality; however, the asset owner also reviewed their requirements for associated hazard and risk management processes as an added precaution. The improvements are shared with the electricity supply industry to further reduce opportunities for recurrence of this sort of incident elsewhere. The additional precautions do not in any way diminish the prime responsibility on supervisors and employees for strict adherence to safe work procedures when carrying out live LV work, particularly the application of personal protective equipment in keeping with industry requirements.

### ***Generic clauses inserted in manuals***

The asset owner amended the introductory section of its Overhead Line Construction Standard that guides contractor work procedures by adding wording that explicitly reiterates existing industry requirements. The following is an example of these requirements: -

#### **“Health and safety hazard identification and management wording inserted in asset owner technical standards**

- Contractors and Service Providers....shall obey the requirements of *(asset owner) standard Health And Safety Requirements For Contractors – (reference to internal H&S standard)*.
- A systematic method of identifying all hazards shall be applied to all projects and worksites, generally as required by *Safety Manual – Electricity Industry (SM-EI) Parts 1, 2 & 3*.
- Appropriate hazard mitigation methods shall then be implemented before work commences. This process is particularly important when running overhead conductors in order to avoid contact with adjacent circuits.
- This process is also particularly important when designing structures and selecting materials and equipment for use on *(asset owner)* electricity network.
- Particular attention shall be given to the ability to apply effective worksite earthing equipment and any equipotential bonding requirements, to comply with all SM-EI earthing requirements.



- Personnel shall use personal protective equipment (PPE) as per the requirements of: - *(reference to SM-EI and specific internal standard for selecting, use and maintenance of personal protective equipment).*

And additionally:

#### **“Risk Identification and Management**

- A systematic method of identifying all risks shall be applied to all design, construction and maintenance projects undertaken on the *(asset owner)* network, generally as required by *Risk Management Standard AS/NZS 4360:2004* Appropriate risk mitigation or reduction methods shall then be implemented before work commences on any network asset.”

#### **Design improvements**

Three areas for improvements to existing design and construction standards were implemented. The additional requirements included: -

- Two layers of correct size heat shrink or self amalgamating tape and two layers of PVC tape appropriate to the phase colour to cover each termination;
- Heat shrink used for insulating 400V cables needs to be of a particular grade such as Raychem WCSM or Raychem RNF-100 or equivalent
- 400V cable sizes above 240mm<sup>2</sup> can lead to distortion of terminations. Cable termination box arrangements for such cables, including those boxes with grouped fuse arrangements need to be of sufficient depth and space to enable cable bend that avoids distortion pressure on the terminating lugs. Alternatively, a separate terminating box of adequate dimensions to avoid cable distortion can be utilised.

It is recommended that asset owners assess the relevance of the above improvements for their own technical and safety standards, and ground-mounted sub station cabinet design criteria. Future work routines should include checks of existing installations as well. This should reduce the opportunity for latent design causes that could compound immediate causes such as failure to wear appropriate protective equipment. Notwithstanding any such improvement, it is essential that asset owners and contractors insist on the use of appropriate personal protective equipment as an essential non-negotiable in the conduct of live LV work.

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