

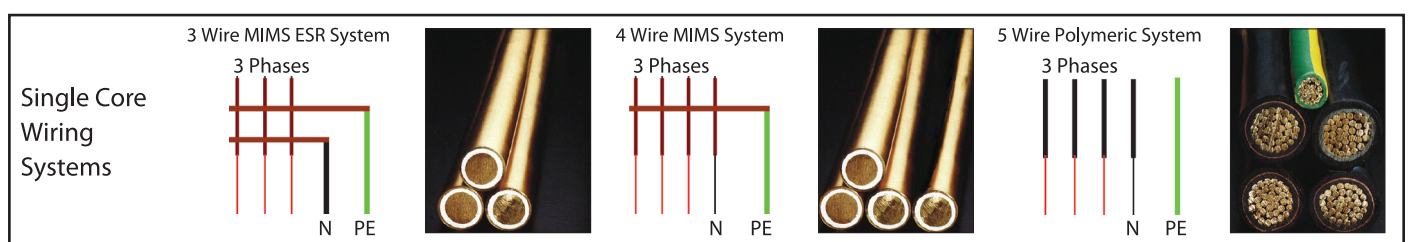
## **PART 1 OF A SERIES: COMPLIANCE WITH AS/NZS3000:2007 UTILISING MIMS WIRING SYSTEM MODELLLED WITH POWERCAD-5™ ELECTRICAL DESIGN SOFTWARE.**

Following growing interest in MIMS wiring system as a solution to comply with AS/NZS3000:2007 and in particular clause 1.5.5.3, Protection by automatic disconnection of supply, clause 5.7 Earth Fault-Loop Impedance and clause 5.3.3.1.1 (a) PE thermal stress withstand, the Earth Sheath Return (ESR) wiring system is now included in PowerCad-5™ electrical design software.

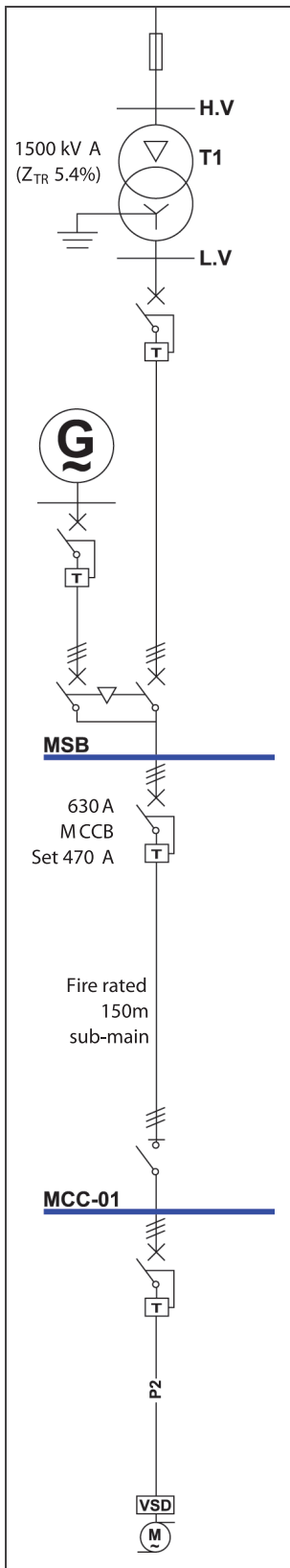
Concentric wiring, utilising Mineral Insulated Metal Sheath (MIMS) cables, has been practiced in the United Kingdom since 1938. The Earth Sheath Return (ESR) wiring systems have been operating successfully in Australia for over 30 years, with the first installation in Brisbane in 1975 and later introduced to New Zealand in AS/NZS 3000 – 1990.

The Earth Sheath Return (ESR) wiring system uses the combined cross sectional area of the Mineral Insulated Metal Sheath (MIMS) cable's copper sheath as a combined protective earthing and neutral (PEN) conductor. Two conductors, one for the protective earth (PE) and one for the neutral (N), are used at terminations with proprietary accessories to facilitate the sheath bonding. ESR wiring systems are covered under AS/NZS 3000:2007 Clause 3.16.

MIMS cable is available in Australia as Pyrotenax 3E cable from Tyco Thermal Controls.



In a MIMS 3 wire ESR multiphase wiring system, the combined cross sectional area of the copper sheath of three single core Pyrotenax 3E MIMS cables is > 100% of the active conductor for sizes up to 400 mm<sup>2</sup>.



PowerCad-5™ electrical engineering design software provides the platform for engineers to rapidly model LV distribution networks. Once modelled “what if” scenarios as to cable wiring systems, protective device options switchboard configurations can be tested with the software dynamically designing and checking each scenario for compliance with AS/NZS3000:2007.

As an example to compare the effect of the three single core wiring systems for compliance with AS/NZS3000:2007...

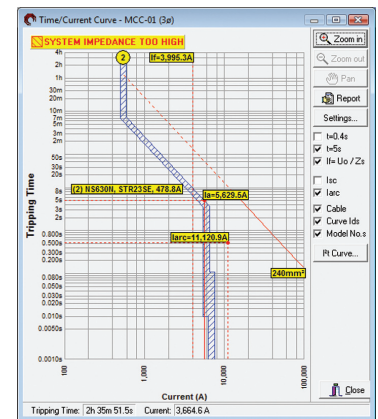
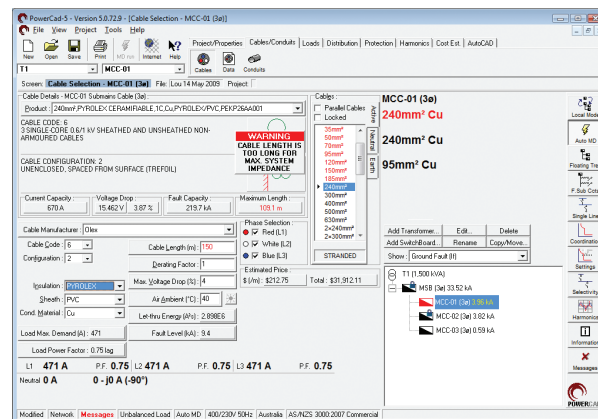
- clause 1.5.5.3 Protection by automatic disconnection of supply
- clause 5.7 Earth Fault-Loop Impedance

... a 150m fire rated sub-main cable feed to a Motor Control Centre with a 470A load was set up as a distribution model in PowerCad-5™ with a 1500kVA (ZTR 5.4%) supply and a standby Generator connected to the Main Switchboard.

## 5 WIRE FIRE RATED POLYMERIC SYSTEM

Polymeric Cable active CSA 240 mm<sup>2</sup>, Protective Earth CSA 95 mm<sup>2</sup> per AS/NZS3000:2007 table 5.1.

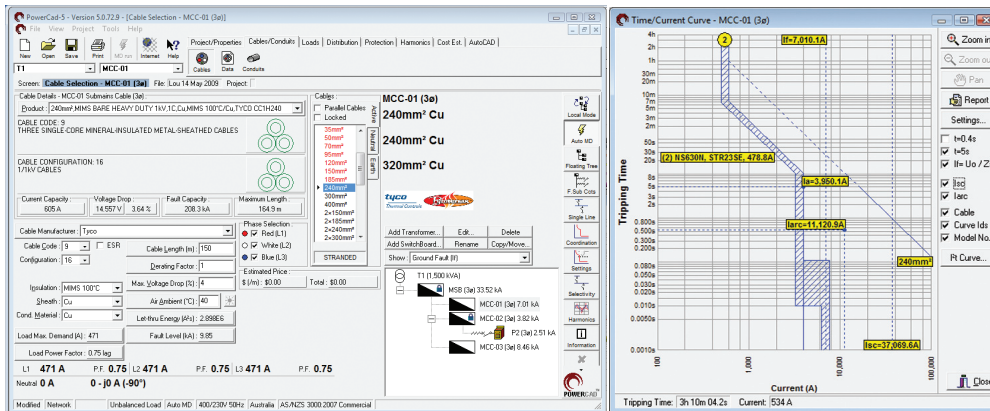
Failed clause 1.5.5.3 /5.7 compliance with minimum size PE from table 5.1. The setting on the protective device could have been adjusted, but adjusting the magnetic would cause non compliance with clause 2.5.7.2.3.



## 4 WIRE MIMS SYSTEM

Pyrotenax MIMS Cable active CSA 240 mm<sup>2</sup>, Protective Earth CSA 320 mm<sup>2</sup> (sheath as PE conductor). Design complied with clause 1.5.5.3 /5.7.

Also protective device setting allowed compliance with clause 2.5.7.2.3.



## 3 WIRE MIMS ESR SYSTEM

Pyrotenax MIMS Cable active CSA 240 mm<sup>2</sup>, Protective Earth CSA 240 mm<sup>2</sup> (sheath as PE and Neutral conductor). Design complied with clause 1.5.5.3 /5.7.

Also protective device setting allowed compliance with clause 2.5.7.2.3.

