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COUNTRY :	New Zealand	PREF. SUBJECT :	2
REGISTRATION NUMBER : 7366		QUESTION N° :	1

National Grid substation seismic design in New Zealand

Transpower as the New Zealand National Grid owner / operator:

- Utilises IEEE693 (more stringent than IEC60980-344 nuclear facilities, IEC62271 HV Switchgear)
- Uses standard designs that are tested and proven
- Has period supply contracts with suppliers
- Uses design, static, dynamic and FEA analysis and then full-scale system shake table testing for verification to build a track record and confidence in analysis performance and outcomes

For example, with new CT's we place these on our stand type, and match with a CB, add control and primary connections and cabling and then shake and test all as one system. With the CT and CB jumpers and droppers connected we then and open and close the CB during shake table testing to simulate a live seismic travelling wave event at up to 1g acceleration in both vertical directions.

To date transmission assets have performed well, with no impact from earthquakes post-Christchurch seismic event.

The Christchurch performance was 100% capacity and 100% security at all sites except for one. The latter site had 100% capacity and N security with damage repaired within 48 hrs, which was:

- Line pull (dropper too tight) on 220 kV CVT
- Line pull (jumper too tight) on 66 kV transformer bushing

We believe that the power systems industry still needs to work on HV and EHV power cables seismic resilience installation plus testing both physically (shake table) and electrically (HV tests), ideally simultaneously, so we know the proposed cable and termination and buried arrangement will work to do what it must, which is not necessarily physically to remain intact but electrically carry current safely during and after the seismic event.

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