TB-0242 Distribution Transformer Default Tap Setting

Purpose
The purpose of this technical bulletin is to inform staff of a change to the default tap setting applied to distribution transformers out of the Transformer Workshop. The background to this change in relation to Australian Standard 61000.3.100 steady state voltage limits is also discussed.

Background
The steady state voltage limits for public electricity systems in Australia is defined by Australian Standard 61000.3.100, which was introduced in 2011. The key features of this standard are:

- A voltage compliance range of 230V +10% - 6% (253V to 216V) at the customer connection point. This replaced the historic voltage range of 240V +6% (254V to 225V).
- Percentile limits; that is, for 1% of time the voltage may be above 253V and for 1% of time the voltage may be below 216V (based on a minimum 1-week measurement period with 10-minute averaging).
- Guidance to target an average (or 50th percentile) voltage in the range of 225V to 244V to allow for accommodating distributed generation.

There has been significant growth in residential solar PV generation in recent years. In many cases, existing voltage levels are incompatible with stable inverter operation; that is, the voltage is too high.

To date the major focus on delivering improved voltage compliance or “230V nominal migration” has been through reductions of zone substation target voltages, where appropriate, as well as reactively adjusting transformer taps associated with customer complaints.

Some 40 zone substations have had target voltage adjustments based on network modelling, justifiable customer complaints (inverter trips) and smart metering voltage data. These adjustments have significantly improved voltage compliance for many customers and reduced PV inverter mal-operations with very minimal resultant low voltage complaints.

Distributions transformers have historically been set to the nominal tap position at the Transformer Workshop. Network wide analysis has been undertaken which showed that for the vast majority of our distribution substations the 11275V (tap code 20, for 11kV) and 22550V (tap code 22, for 22kV) taps result in improved compliance to AS 61000.3.100 limits. These tap settings are one away from the nominal tap and allow headroom for accommodating distributed generation.

Actions
All distribution transformers from the Transformer Workshop will now be set to the 11275V tap for 11kV networks or the 22550V tap for 22kV networks by default rather than the nominal tap.

Implementation
While this default tap setting will be appropriate for most locations, certain locations will require alternate tap settings, for example where substation target voltages are significantly different from nominal voltage or where there are line voltage regulators.

System Control has been provided with the data to lookup the required tap position based on the location to ensure that new transformers are commissioned on an appropriate tap; or, existing transformers under outage for maintenance are adjusted as appropriate.
The change in the default tap setting of transformers from the Transformer Workshop will reduce the likelihood of a physical adjustment being required on site on commissioning.

**Impacted Standards**

The contents of this technical bulletin will be included in the next update of the following standard(s):

- MDI 0050 – Network Power Quality Limits and Levels