

Our Ref: CM-9581

15 November 2019

Ms Kate Symons
Chairperson
Essential Services Commission
Level 37, 2 Lonsdale Street
MELBOURNE VIC 3000

Dear Ms Symons

ELECTRICITY DISTRIBUTION CODE REVIEW ISSUES PAPER

I am writing in response to the request for Energy Safe Victoria (ESV) comment on the Essential Services Commission's (ESC) Electricity Distribution Code (EDC) Review Issues Paper. Your staff advised ESV of submissions received from multiple stakeholders that may impact regulated safety programs prescribed under the Electricity Safety Act 1998 and general safety concerns. I provide the following comments for your consideration.

Impulse Voltage Limit

The Impulse Voltage Limit specified in Table 1 and Table 1A of section 4.2.2 and 4.2.2A respectively of version 9A of the EDC for 22 kV networks is 150 kV peak. Stakeholders have submitted to the ESC that commercially available 22 kV equipment is manufactured to international standards with a maximum impulse rating of 125 kV peak and propose reducing the impulse voltage limit accordingly. Other stakeholders have proposed differing limits for overhead (150 kV) and underground (125 kV) networks accordingly.

I do not anticipate that changing the impulse limit would materially impact regulated safety programs administered by ESV or create an immediate safety concern and therefore I have no objection to a potential change. I note that the gap between the impulse voltage limit and equipment rating can be overcome through the installation of appropriate surge diverters, but this has been a source of confusion within the industry. I am of the view that reducing the limit to 125 kV and aligning the EDC with international standards for all powerline types would likely resolve this confusion.

Harmonics

Table 3 in section 4.4 of the EDC specifies a Total Harmonic Distortion Voltage (THDV) limit of 3% for distribution voltages between 1 kV and 66 kV. The ESC's Issues Paper asks whether this limit should be harmonised with the National Electricity Rules and adopt a higher limit of 5%.

Harmonics impact the ability to collapse the voltage on a faulted phase below the 250 V limit of the *required capacity*, as mandated in the Electricity Safety (Bushfire Mitigation) Regulations 2013 for 45 prescribed networks throughout Victoria. This is because the Rapid Earth Fault Current Limiter (REFCL) technology used by distribution businesses (DBs) to achieve this performance target only compensates for the fundamental (50 Hz) voltage and cannot compensate for harmonics. THDV of 3% equates to 381 V and THDV of 5% equates to 635 V. The practical limit considered by the industry to achieve the required capacity is 1.8% THDV (229 V).

The current limit specified in the EDC already exceeds the practical limit to achieve the *required capacity*. In practice harmonic levels are lower and I do not anticipate a relaxation of the limit to result in a sudden increase in harmonics on real networks. Furthermore, DBs can manage harmonics on their networks through harmonic filtering and treatment of major sources of harmonics at their source. I therefore have no objection to aligning harmonic limits with the National Electricity Rules. However, the ESC should consider whether the benefit of the proposed change will outweigh the potential cost of additional harmonic mitigation initiatives.

REFCL Condition

Table 1A of section 4.2.2A of version 9A of the EDC removes the phase to earth overvoltage limit specified in Table 1 of section 4.2.2 for a distribution system experiencing a *REFCL condition*. Stakeholders have noted that commercially available 22 kV equipment is manufactured to international standards with a maximum phase to earth overvoltage rating of 22 kV \pm 10% for 8 hours, and recommend including a time limit for a *REFCL condition*.

A *REFCL condition* can occur when compensating for a fault on the network or may be intentionally induced as part of testing by the DB. Current industry practice involves compensating for a fault for a short period (less than 1 minute), while the longest duration testing occurs for 30 minutes. Longer fault compensation times are not supported by ESV, as this would allow unsafe situations to persist for prolonged periods. DBs may choose to extend testing durations, but the benefit of longer duration testing is currently unclear to ESV and testing beyond 8 hours is considered unlikely.

I do not anticipate that introducing a time limit on the *REFCL condition* that aligns with international standards would materially impact regulated safety programs administered by ESV or create an immediate safety concern and therefore I have no objection to a potential change. The ESC should consider that the lack of a time limit for a *REFCL condition* may encourage inefficient investment in higher voltage class equipment that can withstand overvoltages in perpetuity by both private and public entities.

Flexible Voltage Standards

The ESC's Issues Paper invites stakeholder views on how to consider both the voltage standards and relevant customer protections, suggesting the potential adoption of a statistical distribution to voltage variation from Australian Standard (AS 61000.3.100). It is my view that adopting the principles of AS 61000.3.100 will strengthen the incentives to improve safety outcomes.

Under the current framework DBs are maintaining some voltages close to the 253 V upper limit. This is leading electricians to configure inverters outside of standard requirements, such that generation is maintained above the 253 V level. This creates an unsafe situation where equipment is operating above design limits. This situation is difficult for inspectors to identify and for compliance to be enforced.

Adopting a statistical distribution of voltage variation is likely to incentivise DBs to reduce the target average voltage level, increasing the likelihood that inverters are appropriately configured and reduce the risk of the installation operating outside of equipment ratings.

Should you have any queries regarding this matter, please contact Ian Burgwin, General Manager Electricity Safety and Technical Regulation on ian.burgwin@energysafe.vic.gov.au or 9203 9781.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Paul Fearon', written over a faint, illegible printed name.

Paul Fearon
DIRECTOR OF ENERGY SAFETY

23 January 2020

Our ref: C/20/965

Paul Fearon
Director, Energy Safe Victoria
Level 5, 4 Riverside Quay
Southbank VIC 3006

Dear Mr. Fearon,

Electricity distribution code review

Thank you for your letter dated 15 November 2019 regarding our review of the Electricity Distribution Code. The regular engagement and meetings that have occurred between respective staff was appreciated as various technical standards of the Electricity Distribution Code were considered.

In line with our standard policy, we will be publishing the Energy Safe Victoria letter of 15 November 2019. We will also continue our engagement with Energy Safe Victoria as we progress the Electricity Distribution Code review.

If you have any other questions or concerns, please contact Aaron Yuen, Senior Regulatory Manager on 9032 1342 or aaron.yuen@esc.vic.gov.au.

Yours sincerely



Kate Symons
Chairperson