



## REFCL Program Fact Sheet

Powerline Bushfire Safety –  
High Voltage Customers

**AusNet**  
services

### High Voltage Customer Solutions

High Voltage (HV) Customers who are connected to a REFCL protected network need to implement a strategy to mitigate the consequences of elevated voltages on their assets.

#### Why are parts of the network REFCL protected?

The Rapid Earth Fault Current Limiter (REFCL) reduces the risk of powerlines starting bushfires by rapidly limiting the current that is released in a phase to earth fault.

The REFCL is a protective device installed in the neutral point of the 22kV transformer.

#### How does REFCL work?

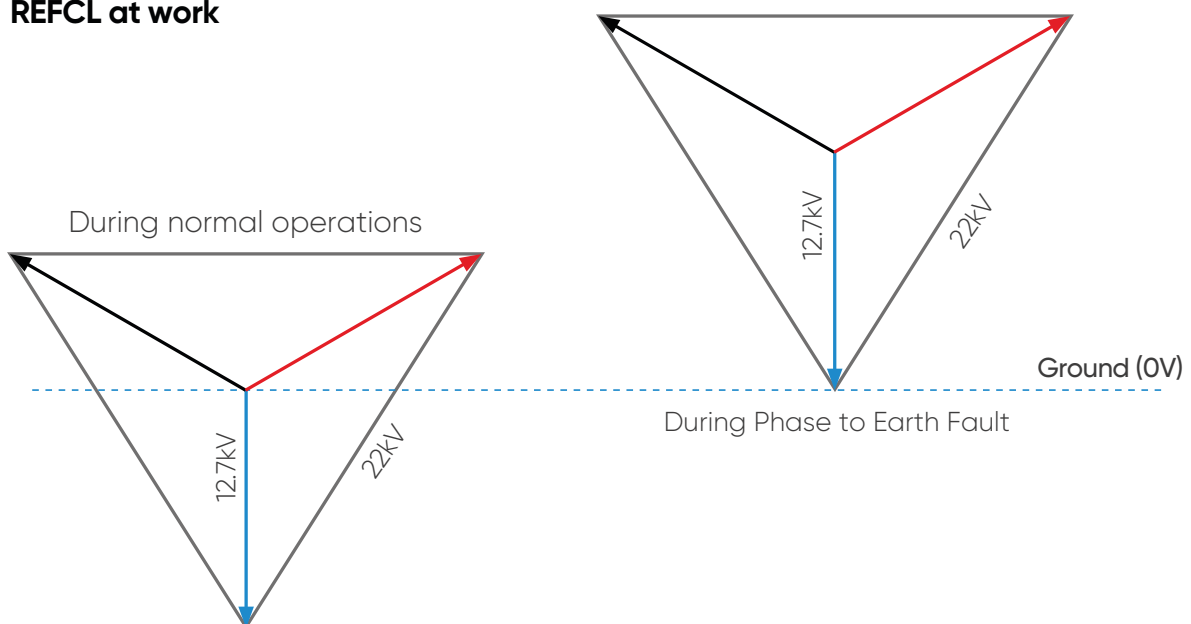
REFCL technology employs resonant earthing with an additional residual current compensation feature. This involves injecting current into an arc suppression coil (ASC) at 180° out of phase with the residual fault current.

When a phase to earth fault occurs, the tuned ASC creates a resonant circuit between the downstream network and the neutral connection of the zone substation transformer.

This results in voltage displacement across the neutral, effecting the phase to ground voltages of the 22kV polyphase network:

- The faulted phase to ground voltage becomes virtually zero
- The fault free phase to ground voltages increase from 12.7kV to 22kV (and potentially 24.2kV, being 22kV plus 10%). REFCL at work

#### REFCL at work



### How does REFCL affect our HV Customers?

Changes to phase to earth voltages affects customers who are supplied at high voltage (22kV). HV Customers are required to implement a solution to protect their HV electrical primary assets against elevated voltages<sup>1</sup>.

AusNet Services (AST) suggest these technically acceptable solutions:

- Conversion to a low voltage (LV) supply
- Hardening of the customer's HV electrical primary assets
- Installation of an isolation transformer

### What is the impact of REFCL?

When operating, the REFCL elevates phase to ground voltages on the two fault free phases. These fault free phases are required to withstand 24.2kV for up to 8 continuous minutes.

The REFCL also automatically adapts to network conditions. This may result in individual phase voltages being increased by 20% (16.7kV phase to ground) at a time for up to 45 seconds. This will occur multiple times during a day in an attempt to tune itself to the present network conditions.

The voltage changes only relate to phase-to-earth voltages. Phase-to-phase voltages are unaffected.

## Possible solutions for HV customers

### Convert to a Low Voltage (LV) Supply

The HV Customer converts their HV primary assets to LV. This can involve changes to the electrical switchboard.

AST will provide a new connection offer and a new connection agreement for your LV supply.

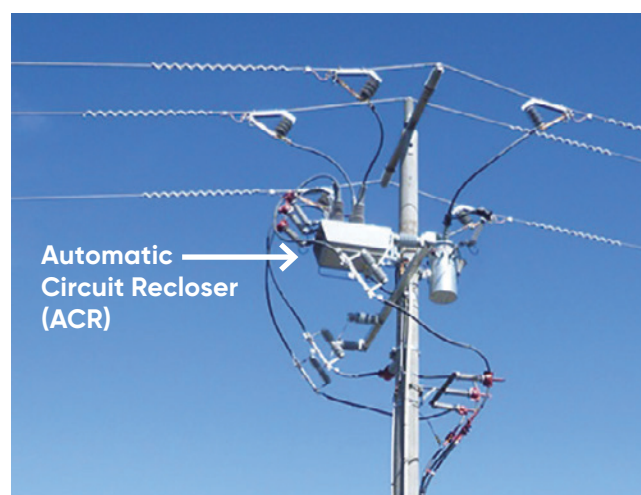
In considering this option, the HV customer must consider the impact on their network tariff. This information is obtained from the HV Customer's Retailer.

*Note: this solution may be an option if the site maximum demand is below 700 – 750kW*

### Harden HV Electrical Primary Assets

This solution involves the identification, evaluation and replacement of those HV electrical primary assets which are not capable of withstanding an elevated voltage of 24.2kV for at least 8 continuous minutes.

There is a requirement for an Automatic Circuit Recloser (ACR) to be installed on the distribution network at the boundary of the HV Customer's premises, for protection and control purposes.



### Install an Isolation Transformer

An isolation transformer is installed at the HV Customer's point of connection to electrically isolate their installation from our distribution network.

The components of an isolation substation include the installation of:

- one Automatic Circuit Recloser (ACR) on the network side of the isolating transformer, for AST protection and control purposes
- an isolation transformer (size of isolation transformer will depend on the customer capacity requirements).

### For more information:

REF 30-10 HV Customer Policy for REFCL Protected Networks (Load & Generator)

Distribution Connection Policy: <https://ausnetservices.com.au/en/New-Connections/Electricity-Connections>

1. Refer to the Electricity Distribution Code, as amended by the Essential Services Commission in August 2018, for HV Customer-related REFCL regulatory obligations.

<https://www.esc.vic.gov.au/electricity-and-gas/codes-guidelines-and-policies/electricity-distribution-code>