

POLK-BURNETT ELECTRIC COOPERATIVE

Policy No.: **M-26**

Subject: **Neutral to Earth Voltages (Stray Voltage) at Livestock Facilities**

Objective: To set forth policy and procedure to address member stray voltage concerns.

Policy: The cooperative provides electric energy and service to its members utilizing a multi-grounded, current-carrying neutral. This neutral is solidly connected to all grounds throughout the system both primary and secondary. The use of a multi-grounded current-carrying neutral greatly enhances the safe operation of the distribution system for all concerned. This type of neutral connection has been, is, and will be the standard for all points of service.

A normal and fundamental condition on the electric system neutral is the presence of a low level of current and will therefore have voltage on the electrical system neutrals. The term "stray voltage" as used in this policy is defined as a 60 Hz steady state AC RMS (root means squared) voltage through a 500 ohm shunt resistor parallel in a circuit measured between two points that can be simultaneously contacted by an animal. This voltage is variable depending on many factors, but may be of specific concern to livestock operations. This policy adopts Ohms Law as the standard for measuring stray voltage.

Members should construct their facilities in ways that will satisfy their special requirements. If the member suspects that the normal low voltages are affecting his or her operations, the member shall have the responsibility to inform the cooperative. The cooperative, at its discretion, can determine if the farm is wired according to the codes and laws of Wisconsin and then determine if testing will be performed at the facilities.

The cooperative shall provide technical assistance, including testing at member facilities who request assistance in measuring and mitigating stray voltage on a limited basis. All initial investigations will take place in accordance with the Public Service Commission of Wisconsin (PSC) required and approved testing practices and procedures.

The cooperative has adopted the PSC's steady state level of concern of 2 milliamperes (1 volt) through a 500 Ohm resistor as an acceptable level of current to be measured in the animal confinement areas. Further, the cooperative accepts the PSC's findings which provides that mitigation should be initiated when it is determined that over 1 milliampere (0.5 volts) through a 500 Ohm resistor in the animal confinement area is attributed to the primary electric system, in which case the cooperative will take appropriate action to reduce the steady state contribution to 1 milliampere (0.5 volts), or less if possible. This action may include, but is not limited to, the installation of a neutral isolator between the utility's grounded primary neutral system and the member's neutral system at the cooperative's transformer location.

If, after investigation and/or mitigation by the cooperative and/or the member's own electrician, the member deems the level of neutral voltage to be unsatisfactory for his or her applications, the member may elect to install available remedial devices on his or her secondary service to bring the standard of service within his or her requirements, or may request non-standard service from the cooperative.

Non-Standard Service - Neutral Isolation

General Conditions of Service:

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1. The cooperative shall select, own, provide, install and maintain the neutral isolator device.
2. No neutral isolator shall be installed or remain installed at a location other than an active livestock operation.
3. Prior to installation, the farm site must be inspected for compliance with the “*National Electric Code (NEC) Article 250 Farmstead Verification for Isolation of Neutral Systems*” form. In the event the member’s electrical system does not meet the conditions of Article 250 of the National Electrical Code, a neutral isolator will not be installed until all non-compliance observations are corrected.
4. The cooperative requires that the member allow stray voltage testing in the animal confinement area before and after the farm is isolated. Testing must also be allowed any time after the cooperative makes changes to the system that may impact neutral-to-earth voltage levels or animal contact voltages.
5. The cooperative will notify all other utilities in the area of the request to isolate a farm. Only after verification that all other utilities neutral systems are properly separated (isolated) from the cooperatives, will the cooperative isolate the farm.
6. The cooperative reserves its right to remove a neutral isolator if it has evidence the farmstead’s secondary electrical distribution system is no longer in compliance with Article 250 of the National Electric Code or is otherwise incompatible with the use of a neutral isolator.
7. It shall be the responsibility of the member to notify the cooperative of changes in measurable neutral to earth voltages or detected neutral isolation equipment failure.

Polk-Burnett Mitigation:

At the cooperative’s discretion, the use of a neutral isolator to reduce a primary contribution below the level of concern will follow the general conditions of service requirements (above), and satisfy the listed terms and conditions:

1. After completing the necessary testing as recommended by the PSC, it is determined the primary system’s contribution to the steady state current is 1 milliampere (0.5 volts) or greater through a 500 Ohm resistor in the animal contact area. The cooperative, at no cost to the member, may install a neutral isolator as a permanent means of mitigation, or as a temporary mitigating device until an alternate means of mitigation is implemented.
2. The cooperative shall arrange for the electrical inspection of the member’s grounding and bonding system with cooperative personnel, an electrical contractor that has training through the farm rewiring program, or an electrical inspector and be responsible for all associated inspection costs.
3. Following the installation of a neutral isolator as a means of mitigating contribution from the primary system, it is determined that an alternate form of mitigation is available to reduce the primary system’s steady state contribution level to 1 milliampere (0.5 volts) or less, through a 500 Ohm resistor, the use of the neutral isolator device may be discontinued and removed.

Neutral Isolation by Request:

At the member’s request and at the cooperative’s discretion, the use of a neutral isolator suitable to the cooperative to provide for the isolation of neutrals between the primary and secondary systems will follow the general conditions of service requirements (above), and satisfy the listed terms and conditions:

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1. The cooperative will within 30 days from receipt of a request and compliance with all terms and conditions of this policy by the member, complete its own testing and install a neutral isolator.
2. The member shall submit to the cooperative a signed “*Farmstead Verification for Isolation*” form verifying the farm is in compliance with the requirements of the National Electric Code, Article 250.
3. The cooperative shall require the property owner(s) and/or the member (s) to sign a “*Member Requested Non-Standard Service Neutral Separation Agreement*” form.
4. At the discretion of the cooperative, any costs required for modifications to the system to maintain a reasonable and adequate quality of power for other adjacent animal confinement operations may be borne by the member requesting isolation of the farm.
5. For temporary installations, i.e., no more than 120 days, the member may be required to pay prior to installation the labor costs per Policy M-21 to install the neutral isolation device. If the member chooses to have the temporary installation converted to a permanent installation, a monthly fee of \$50 to cover annual testing and maintenance of the device may be applied to the requesting member’s electric service account as a facility surcharge. The monthly charge may be retroactive to the date of installation.
6. A member may choose to keep a neutral isolator at a non-operating livestock facility that no longer requires neutral isolation. In this case, it will be considered neutral isolation by request and a \$50 monthly maintenance fee may apply.
7. The member may be required to pay for the costs of any excess facilities or work requested or required beyond the basic neutral isolator installation. These costs must be paid prior to installation.
8. The neutral isolation device will remain in service until the member requests its removal in writing, or until the cooperative in its judgment elects to remove it, or upon failure of the member to pay the monthly fee, or if the member interferes in any way with the neutral isolator or any other cooperative facilities located on the member’s property.

Responsibility: The general manager and/or operations manager.

Edward O. Gullickson, President
March 25, 2019