

# **IEEE Guide to Understanding, Diagnosing and Mitigating Stray and Contact Voltage**

Midwest Rural Energy Council  
2016 Breakout Session  
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Chuck DeNardo  
We Energies

# Introduction

The Stray & Contact Voltage Working Group

Mandatory Editorial Coordination

The Initial Ballot & Comment Resolution

The Recirculation Ballot & Comment Resolution

REVCOM Submission & Approval

Peer Review

The Guide

# IEEE Working Group on Voltages at Publicly and Privately Accessible Locations

This working group was formed at the joint request of the PES Distribution Subcommittee members and the EEI T&D Committee.

The purpose of the working group is to write a guide for assessing voltages at publicly and privately accessible locations. The proposed guide may include some or all of the following topics:

- Definitions
- Causes
- Testing protocols
- Measurement Equipment
- Mitigation options
- Applicable codes and standards
- Levels of concern

<http://grouper.ieee.org/groups/td/dist/stray/>

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# The Working Group

[Working Group Attendance Roster & Mailing List](#)

# Mandatory Editorial Coordination

[MEC Review](#)

## The Ballot

- The chair forms a ballot pool and monitors it to ensure balance.
- No interest category (e.g. utility engineers) can comprise over one-third of the balloting group.
- Anyone can join the ballot pool. You do not have to be invited.
- IEEE SA members ballot for free while others pay a hefty fee (~\$300).
- Anyone can submit comments without joining the ballot pool, but you can only vote if you have joined the ballot pool (use "Submit Rogue Comment" in myProject).
- Approval requires a 75% return of ballots with a 75% yes response.
- All comments, positive and negative, must be addressed until a 75% approval has been reached.
- Negative votes must include specific reasons for the negative vote or they will not be counted.
- The ballot must be recirculated when comment resolution results in a technical change or when there are unresolved negative comments.
- Balloting is performed electronically through IEEE SA's myBallot system: (<https://development.standards.ieee.org/my-site> ).

# The Initial Ballot & Comment Resolution

[The Ballot Pool](#)

[Draft D2](#)

[Ballot Response Summary](#)

[Ballot Response Analysis](#)

[Initial Ballot Comment Resolution Spreadsheet](#)

# The Recirculation Ballot & Comment Resolution

[Draft D3 \(Redline\)](#)

[Recirculation Ballot Response Summary](#)

[Recirculation Ballot Comment Resolution Spreadsheet](#)



# REVCOM Submission & Approval

Draft D3

Recirculation Ballot Comment Resolution Spreadsheet

[REVCOM Approval](#)

## P1695 Peer Review Process

- Completely transparent process (i.e. all aspects of document creation and peer review open to anyone with an interest)
- Approximately 250 individuals (e.g. utility engineers, consultants, university professors, regulators and others) involved from the start, providing valuable input and reviewing all drafts
- 79 balloters from a wide variety of occupations with a month to review and comment on Draft D2
- 397 comments openly received and addressed
- 79 balloters with 10 days to review and comment on Draft D3
- 19 comments openly received and addressed
- REVCOM review and approval.

# Peer Review??

Science of the Total Environment 447 (2013) 500–514



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Science of the Total Environment

journal homepage: [www.elsevier.com/locate/scitotenv](http://www.elsevier.com/locate/scitotenv)



## Relationship of electric power quality to milk production of dairy herds – Field study with literature review<sup>☆</sup>

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### HIGHLIGHTS

- ▶ Dairy cows were sensitive to earth currents from neutral-to-ground circuit outlets.
- ▶ Clamp-on ammeters on grounded-Y down grounds give quick current readings.
- ▶ Harmonic distorted voltage affects cows' behavior, health, and milk production.
- ▶ Peak-to-peak current must be measured for full impact of current on production.
- ▶ IEEE standards should include harmonic current effects on human and animal health.

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### ABSTRACT

Public Utility Commissions (PUC) in several states adopted 0.5 volt rms (root mean squared) or 1.0 milliamperes as the actionable limit for utilities to respond to complaints of uncontrolled voltage. This study clearly shows that the actionable level should be reduced to 10 mV p-p (peak-to-peak), which is 140 times less than the current standard. Dairy farmer complaints that animal behavior and milk production were affected by electrical shocks below adopted standards were investigated on 12 farms in Wisconsin, Michigan, and Min-

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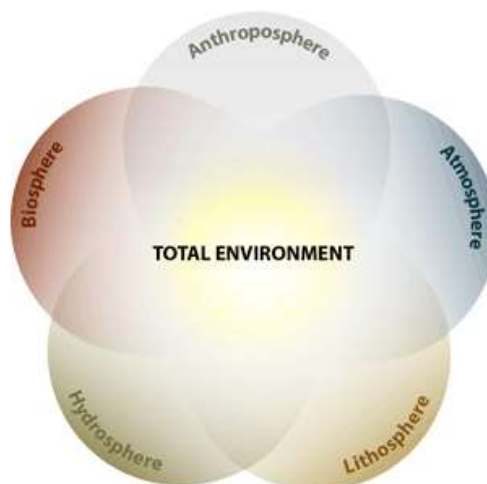
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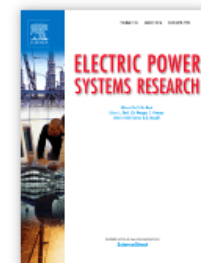
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- Generation techniques ranging from advances in conventional electromechanical methods, through nuclear power generation, to renewable energy generation.
- Transmission, spanning the broad area from UHV (ac and dc) to network operation and protection, line routing and design.
- Substation work: equipment design, protection and control

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# The Guide

[A Guide to Understanding, Diagnosing and Mitigating Stray & Contact Voltage](#)

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