



**Arc Flash Hazards in Electric Metering-  
What can be done about it?**

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# It Can't Happen to Me. Not!

It was an Arc Flash incident that precipitated TSTM's VT Pack low-voltage metering product.

In the Oil Fields of Northwest South Dakota – TSTM President Greg May nearly met his Maker!

## Quote

***“Anyone who would directly install a self-contained solid-state meter in an energized 480-volt meter socket with high available fault currents is out of their f@%\$ing mind!”***

Quote from the exasperated chief meter design engineer of a major domestic meter manufacturer in response to a question as to how one of their new meters could have loose parts floating about on the interior.

# Disclaimers

- This presentation in no way represents to be a comprehensive discussion of all aspects of Arc Flash.
- This presentation will put forth ideas and topics for discussion only in the narrow area of Arc Flash hazards related to revenue electricity metering at electric utilities in the U.S.
- Federal, State and Local laws and specific Utility rules and guidelines will always supersede any and all ideas/recommendations in this presentation.

# The Quandary...

Many interpret current Arc Flash Rules to require that \*480 volt live parts - whether in switchgear, transformers, cabinets, meter sockets, etc., be treated essentially the same. Common sense, on the other hand, tells us that 480 volt switchgear having the capacity to deliver potentially lethal fault currents in the hundreds of thousands of amps is a fundamentally different animal than a meter socket having #14 or #12 conductors for the potential circuits. This presentation will develop what I believe to be common sense solutions to this vexing problem for electric utilities.

\*(yes, 480/277 volt 4-wire wye **IS** 480 volt)

## Ways to eliminate/reduce the hazards

- De-energize Service
- Use approved arc flash clothing/equipment
- Use of fuses/breakers
  - Advantages -
  - Disadvantages -

## Ways to eliminate/reduce the hazards, Cont.

- Self Contained 480 volt
  - Add CTs and VTs
  - Use Adapter with CTs and VT Pack™
  - Use Adapter with CTs and VTs
- Transformer Rated 480 volt
  - Add VTs
  - Add VT Pack

Ways to eliminate/reduce the hazards, Cont.

## Hazards of Arc Flash in Metering

For many in the industry the hazards of metering a 480 V self-contained metering application are obvious.

However, the hazards of metering a 480 volt transformer-rated metering application (CTs, but no VTs) are not universally understood or as obvious.



# Hazards of Arc Flash in Metering

Available fault currents in a self-contained metering application can run to the many tens of thousands of amps!

A transformer rated metering application, on the other hand, may have only a \*few thousand amps of fault current available in the meter socket.

\*Fault currents available in the socket may be limited by the small relative size of metering potential conductors.

# Hazards of Arc Flash in Metering

A few thousand amps may not seem like much – especially if it is to be carried by relatively small copper wire! Unfortunately, #14 copper wire can carry approximately 3000 amps for up to 6 cycles – long enough to cause serious electrical burns to unprotected personnel who happen to be exposed to a full three-phase flashover!

# How to remove hazardous voltages

- Self-Contained 480 volt services – The conventional solution to remove 480 volts from the meter socket is to install CTs and VTs to mitigate the hazards. The problem for utilities boils down to money and space requirements. Many times a CT/VT cabinet must be mounted, a new transformer-rated meter socket and meter purchased and all the necessary mounting of ITs and associated wiring must be performed by utility personnel or qualified contractors at great expense.

# How to remove hazardous voltages

- Transformer-rated 480 volt services – The conventional solution is to install VTs to mitigate the hazards. The problem for utilities again boils down to money and space requirements. Many times a cabinet must be mounted if there is not room available to mount VTs. Then the mounting of VTs and associated wiring must be performed by utility personnel or qualified contractors at great expense.

# Easier ways to eliminate the hazards

- Self-Contained 480 volt services – Instead of the conventional installation and wiring of ITs in an IT cabinet, an alternate solution is to use a socket adapter with metering accurate CTs mounted in the adapter interior with a wiring harness for metering potential exiting the rear of the adapter with a connector to be plugged into a \*VT Pack™ conveniently mounted on the socket exterior or other convenient location.

\*Conventional VTs could also be applied.

## Easier ways to eliminate the hazards, Cont.

Self-Contained 480 volt services, Cont. - The base of the adapter is configured with the same stab arrangement as the meter it replaces. The face of the adapter contains the needed jaws to accept the required replacement transformer-rated meter. Shorting of current transformers would be accomplished by either an external sealable shorting plug or field proven solid-state shorting devices.

# Easier ways to eliminate the hazards

- Transformer-Rated 480 volt services – Adding VTs to non - VT 480 volt services can be a challenge. The conventional method is mount VTs at the top of a pole, in an IT cabinet, padmount transformer or other appropriate location. Difficulty arises when space is limited and additional cabinetry must be installed. After mounting of needed conventional VTs in the cabinetry, the numerous wiring connections must be made.

# Easier ways to eliminate the hazards

- Transformer-Rated 480 volt services, Cont. – An alternate method is to mount a VT Pack™ in an existing IT cabinet on one ¼ inch screw, at the top of a pole or even on the socket exterior through knockout or punched hole using an external mounting kit. The VT Pack wiring harness can then interface the existing voltage circuits using butt splices in a matter of minutes.



# Additional TSTM Options

- TSTM sockets with provisions to mount the VT Pack™.



# Additional Options From Brooks Utility Group

## FlashSentry™



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## Contact info

- Visit TSTM Web site <http://ts-tm.com> for more information.
- Call 605.334.2924

