Grounding Clusters – Liability or Benefit
By W P Blackley, PE

In recent months at least two major utilities have questioned the use (effectiveness) of portable grounding clusters.

Industry consensus is that the use of grounding clusters probably originated from a paper presented at the IEEE/PES Summer Meeting in 1988 written by J.T. Bonner, B. Erga, W.W. Gibbs, and V. M. Gregorius.

Protection of electrical workers is typically accomplished by one of three methodologies; insulation, isolation or equal potential zones.

Rubber gloves, sleeves, hose, and blankets make up the bulk of insulating protective items currently used. These devices are periodically inspected, tested and all exhibit conductivity at some voltage level.

Isolation using insulated sticks and work position provide a second method of worker protection. Again at some voltage these items are also conductive.

Equal potential zones are a proven work practice for EHV work (bare hand) where a properly sized conductor assures that each and every item a worker can touch is (and remains) at the same potential as the worker.

Equal Potential grounding practices as used in distribution and in transmission are now being questioned and the tests are based on the conductivity of the pole.

Obviously wood (an imperfect wooden pole) by nature is a conductor or industry would not use insulators to isolate current carrying conductors. Equally obvious is that it is sufficiently conductive to create hazardous conditions for line workers touching conductors that are energized or may become energized.

Using Heuristic Analysis we can assert that if the pole was at or near 100% conductive (metal pole) and the current carrying conductor was bonded to the pole with a properly sized conductor that for all practical conditions the conductor and pole would be at the same potential. And an equal potential zone would be established. And a worker in contact with the pole and conductor during the time it was energized would be protected.

Using the same Heuristic approach we can equally assert that if a pole is 100% non conductive (a perfect wooden pole) the worker would be equally protected if contacting the current carrying conductor and pole.

Consequently the issue of an equal potential zone of a wooden structure is dependant on the conductivity of a wood pole. In service wood poles may be as old as 40+ years and as new as today. They come in a variety of wood treatments to preserve and extend their useful life. Some of these treatments are undoubtedly more conductive than others. It seems unreasonable to say with any degree of confidence that wood poles can be assigned either a finite conductivity or a finite insulating value rating because of different types. Equally adding to the difficulty is weathering (wear), current conditions (rain, sleet, or snow) and ecological locations. Poles in the desert southwest or on the Olympia peninsular (average rainfall of 150 plus inches) will have little in common. (Note the 1988 paper originated in Bellevue, Washington)

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The task of testing pole conductivity of any one pole or pole type and drawing conclusions from such test leaves significant questions about what is a pole.

It is also reported that repairing the pole grounds and re-stapling pole grounds accomplishes as much or more than a pole grounding cluster.

If we accept this finding it leads to the next question; why not use both concepts (ground cluster and repair pole ground) and increase the probability of improved protection?

It also reported that the grounding cluster adds protection on wet poles. If we accept this finding as correct then it seems appropriate to repair all pole grounds and install a grounding cluster before workers are permitted to remove their gloves.

In summary it appears that we have not definitively proved anything except that on poles with high conductivity (wet) we improve the probability that we are protecting the worker and on very dry poles we accomplish very little improvement if any. None of the data currently reviewed has shown that a pole cluster reduces the safety margin.

Granted grounding cluster may not provide the 100% safety margin many workers believed they provided, but neither do rubber insulating products. This can be readily demonstrated by the haphazard manner rubber is used and stored.

No evidence showing the grounding cluster increases the hazard has been found or reviewed.

In conclusion common sense indicates that two connections; one a new connection (grounding cluster) and a repaired and/or updated connection (pole ground) provide the greatest probability of energizing the pole and the workers feet at the same potential as the hands.

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