

HUBBELL[®] TIPS & NEWS

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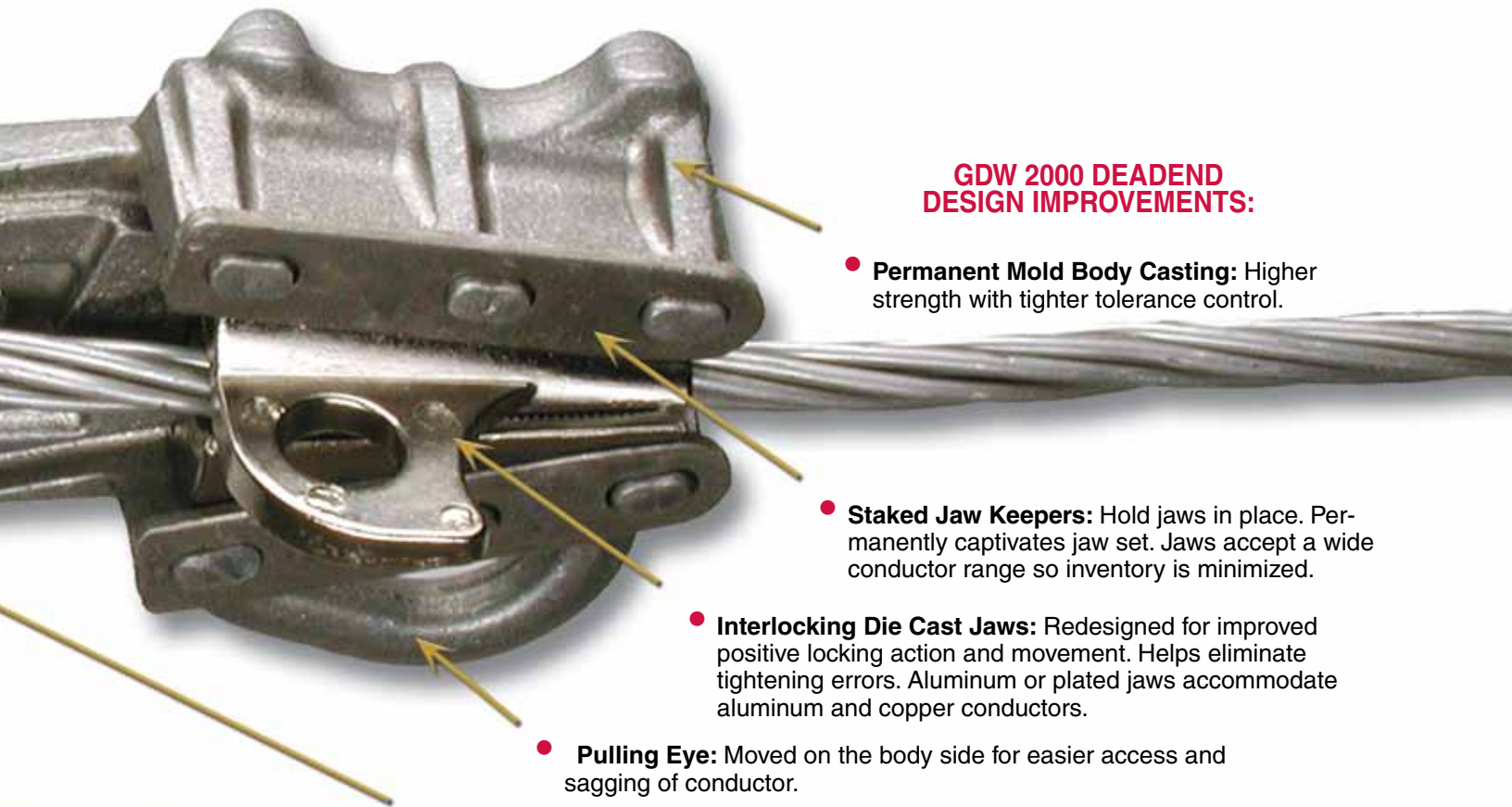


GDW 2000 SERIES

Five Distinct Improvements



- 1993 Fargo introduces the first generation side-opening wedge deadend.
- 1995 Fargo introduces the second generation wedge deadend with spring-loaded jaws.
- 2001 Fargo introduces third generation wedge deadend with five distinct design improvements.



GDW 2000 DEADEND DESIGN IMPROVEMENTS:

- **Permanent Mold Body Casting:** Higher strength with tighter tolerance control.
- **Staked Jaw Keepers:** Hold jaws in place. Permanently captivates jaw set. Jaws accept a wide conductor range so inventory is minimized.
- **Interlocking Die Cast Jaws:** Redesigned for improved positive locking action and movement. Helps eliminate tightening errors. Aluminum or plated jaws accommodate aluminum and copper conductors.
- **Pulling Eye:** Moved on the body side for easier access and sagging of conductor.
- **Parallel Legs:** This improvement allows for easy conductor passage and installation of larger conductors. Conductor is quickly cradled within the deadend.

ES Wedge Deadend nts. Same Cost Savings.


Eight Years in the Running

When Fargo introduced the industry's first side-opening wedge deadend in 1993, utilities quickly adapted the new wedge-type deadend as a way to significantly cut costs associated with the installation of bolted deadends.

Seven years later we've incorporated field-proven design alterations to bring you the next generation automatic side-opening wedge deadend for the new millennium.

Cut Installation Costs 80 - 85%

In an earlier study by an electric utility, the utility compared installing Fargo GDW deadends to bolted deadends. The results showed the utility cut deadend installation time from 20 to three minutes. Installation costs fell from \$19.00 per bolted deadend to \$2.85. In another comparison, installation costs fell from \$14.25 per bolted deadend to \$2.85. If you are still using bolted deadends, look at our new 2000 series GDW deadends. The cost savings are real. The design improvements welcome.

Continued . . . 



Quick, Easy Installation

During installation, simply lock the jaws of the deadend open and insert the conductor between the jaws. Tap the back of the jaws to lock conductor in place. You're done. It's that fast. No feeding of conductor through the deadend. Applied spring tension of the deadend holds conductor securely. No special tools. No tightening errors. An installation you can depend on.

When nature strikes and restoring power is everything, you can't beat the speed of Fargo GDW deadends in helping crews repair damage quickly and get power restored. ■



Compare the New Generation GDW 2000 Series to Other Methods

	Feed Through Bolted Deadend	Side Opening Bolted Deadend	Automatic Deadend	GDW Series
Range Taking	YES	YES	NO	YES
Side Opening	NO	YES	NO	YES
Adjustable	YES	YES	NO	YES
Easy Installation	NO	YES	YES	YES
High Holding Strength	NO	NO	YES	YES
No Tools Required	NO	NO	YES	YES
Bimetallic	NO	NO	NO	YES

Contact factory for Typical Test Data.

For more information, contact your Hubbell Power Systems representative, fax 573-682-8714 or e-mail hpscontact@hps.hubbell.com.

If you are a Lineman or have line experience, see our website survey and enter to win a ball cap! www.hubbellpowersystems.com.



THE MULTI CAP FEATURE



Bronze bolted cable connectors are supplied with Anderson's multi cap. This design allows the connector the flexibility of covering a wide range of copper cable conductors. The caps have two cable grooves and are reversible to handle different size conductors. You do not sacrifice either electrical or mechanical efficiency with the multi cap design.

Inventory stock levels can be reduced and field errors of misapplication are kept to a minimum with the multi cap design feature.

Bronze terminals, tees, couplers and stud connectors have the multi cap design feature.

The following chart shows the type connectors supplied as standard with multi caps and the cable ranges covered by each cap. ■

CATALOG NUMBER PREFIX (CONNECTOR TYPE)	CATALOG NUMBER RANGE	COPPER CONDUCTOR RANGE		
		SMALL GROOVE	LARGE GROOVE	DIA. INCHES (MM)
*SWL, SWH SWHD, STC8 TCC, T2CC T2HC2HC, TTC TT2C, DSC	022	#6 Sol. - #2 Str.	#2 Sol. - 2/0 Str.	.162 - .419 (4.11 - 10.64)
	025	#4 Sol. - 1/0 Str.	2/0 Str. - 250 MCM	.204 - .575 (5.18 - 14.60)
	050	1/0 Sol. - 4/0 Str.	250 - 500 MCM	.325 - .813 (8.26 - 20.65)
	080	2/0 Sol. - 500 MCM	500 - 800 MCM	.365 - 1.031 (9.27 - 26.19)
	100	4/0 Str. - 750 MCM	750 - 1000 MCM	.522 - 1.152 (13.26 - 29.76)
	200	500 - 1500 MCM	1500 - 2000 MCM	.811 - 1.632 (20.60 - 41.45)

* Example catalog number: SWL-025

For more information, contact your Hubbell Power Systems representative, fax 573-682-8714 or e-mail hpscontact@hps.hubbell.com

**Free Demonstration
on our web site:
www.hubbellpowersystems.com**

HeliCAP™
Engineering Software

**NEW!
EXCLUSIVE!
Copyrighted!
On a CD!**

**The only interactive software
in the industry that helps you
solve your project require-
ments with helical anchors.
Immediately!**

**For a FREE on-line demo and how to get a CD,
visit: www.hubbellpowersystems.com**

The only computer program of its kind, Chance® HeliCAP™ Engineering Software is an easy-to-use interactive program that provides helical anchor solutions for your guying and tower-base projects. Its graphics simulate “virtual anchoring” on screen in a PC Windows environment. It performs powerful, sophisticated calculations, based on your project parameters, to derive the proper Chance anchor.

Available on CD, it includes Help screens and Reference materials as close as your keyboard. It gives you prompts to maintain control over essential criteria to effect the same process Chance anchor-application engineers employ daily to analyze problems and specify solutions.



**The standard anchoring
practice to build on —**

You make these inputs:

1. Soil type, layer depths, strength parameters;
2. Anchor length, helix configuration, angle of installation, distance to datum;
3. Load — magnitude and direction.

It gives you this output:

Bearing capacities in tension and compression of an anchor in the given soil conditions.

See how it can benefit your current project and how to get your copy. Just visit our web site at www.hubbellpowersystems.com today! ■

New PVIA Polymer Intermediate Arresters

Ideal for enclosures & tight spots.



The Ohio brass (OB) PVIA arrester is an alternative to the PVI OB polymer intermediate arresters you may already be using. The PVIA advantage is its slim profile. This product is only 4.0 - 4.5" in diameter.

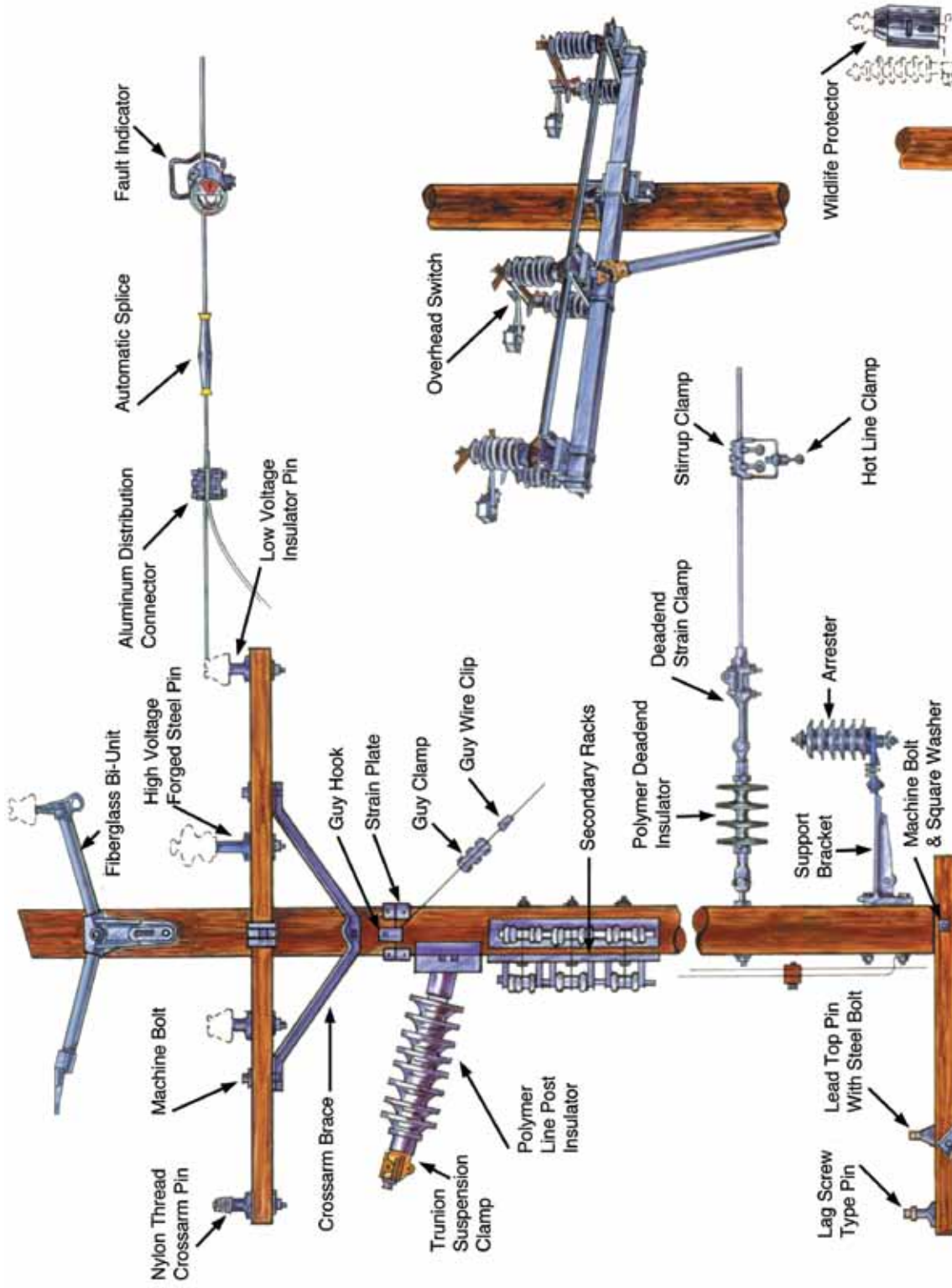
Use the PVIA in enclosures where space is at a premium. It's light weight (the PVIA saves almost 50% of the weight of standard polymer intermediate arresters) making it easier to handle and position within the enclosure. Compared to a porcelain-housed arrester, you cut the weight by 75%. These features of weight and size reduce shipping cost, enclosure size and therefore reduces your overall cost.

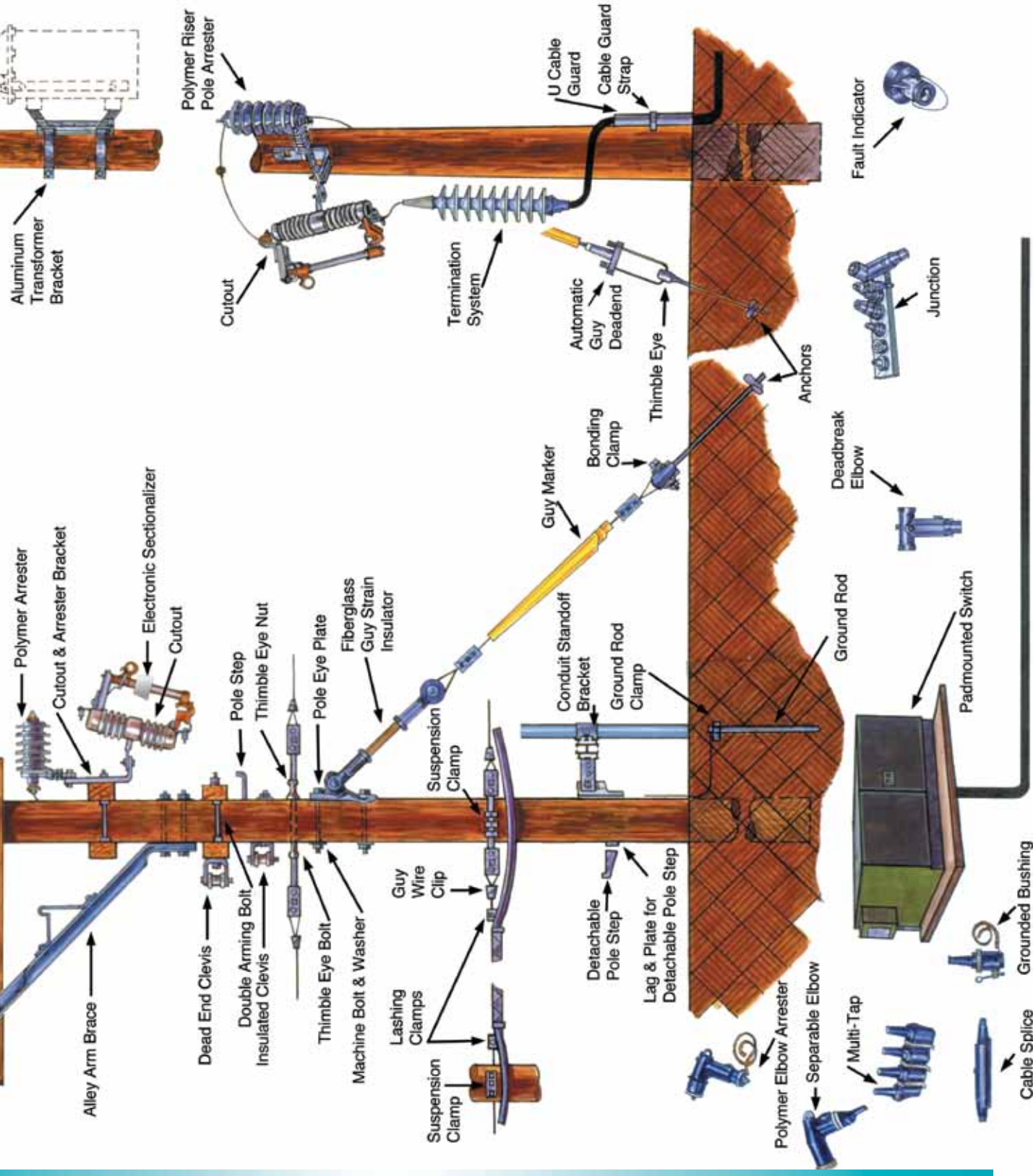
PVIA arresters fully comply with the ANSI requirements for intermediate arresters. Available in MCOV ratings from 2.55 to 57kV, which translates to 3 to 72kV rated voltages.

Other PVIA Benefits:

- Voltage ratings are of single unit design
- No field assembly of stacked units
- Polymer housing makes it safer than porcelain
- Single unit design gives improved contamination performance over multi-unit designs
- Allows closer phase-to-phase spacing
- Increased creepage

Your Source for Distribution Products





This recently updated 17" x 24" poster is ideal for showing utility personnel how products are used on the distribution system. Go to hubbellpowersystems.com on the web and request your free Hubbell Distribution Products poster using the literature request form. Type in "poster" in the comments box and submit. ■

Safer Cost Effective Wildlife Protectors

*By:
Carl Cumming
Director of Information Technology
Fiber Cable Inc.
Palm Beach Gardens, FL*



In the late 1980s I was working for an electric utility company that had a state-mandated 5kV rubber-gloving limit on their electric distribution lines. Because of this limit, the company was interested in a wildlife protector that could be applied quickly with hotsticks as a retrofit to their existing electric distribution transformers.

At the time I was a Distribution Methods Specialist in my company's Work Methods Department with 22 years experience as a lineman and crew leader with one of their district line

... continued 

departments. My job in the Work Methods Department included testing and evaluating tools and line hardware devices such as wildlife protectors for use with the transformers.

At that time there were few wildlife protector units on the market that could be applied with hotsticks. These were rubber glove units that had been retrofitted for hotstick use; they were difficult to use and it frequently required two linemen to close and latch them around the transformer bushing. After testing these, I realized that only a completely redesigned wildlife protector would work the way we wanted.

I believed that a snap-on design that had one side open to allow the transformer tap wire and bushing to slip through would be ideal. This design was similar to the older style snap on line guards that were used by line workers to cover primary conductors.

In order to develop a demonstration model for Fargo, I heated a short length of PVC pipe in the oven to soften it so that I could shape it. Using the prototype I demonstrated to the Fargo personnel that the protector could be applied with shotgun hotsticks to equipment bushings of any voltage both quickly, safely, and easily. After several modifications, including one to accommodate the blow molder's manufacturing requirements, Fargo introduced the GS-565 one-piece wildlife protector in 1989.

This wildlife protector is superior to others on the market because it can be easily and safely installed on a variety of high-voltage equipment. These include switches, lightning arrestors, reclosers, regulators and pothead bushings as well as the distribution transformers. The only limiting factor is the protector's bushing



diameter range.

The Fargo GS-565 is designed with a pre-cut slot with angled edges that allow it to be slipped over tap wires and bushings rather than the "cut and fit" application of other protectors. Another design advantage is the GS-565 has grab handles with holes on three sides of the protector. This means that the lineman can position the protector securely from a variety of angle positions with a shotgun hot stick.

The design of the Fargo GS-565 makes it a safer product to install because linemen can install it at hotstick distances from almost any angle. The fact that one lineman, working at a safe distance from

energized hardware and conductors, can install the protector in a few minutes reduces labor costs significantly. This alone makes up for any additional purchasing costs involved.

The GS-565 is resistant to ultraviolet deterioration, tracking and weather. Protrusions under the top skirt and rolled edges ensure that the protector remains in position. Because of the protector's one-piece non-hinged flexible slip-over design, there is no need to disconnect the equipment tap wire during installation.

I would suggest that during cold weather linemen allow this device to warm up a few minutes in the cab. This makes it easier to slip the device over various kinds of bushings. The protector can be stretched open and will remain open until it is installed. Because of the product's material "memory", the protector will slowly return to its original position closing tightly around the bushing. ■

GUY TO 100,000 LB. *with* **ADJUST-A-GRIP** DEADEND FOR GUY STRANDS

Here's the most powerful of the deadending devices. It hooks up fast. Allows you to adjust later for tower plumbing and guy retensioning after construction.

Put it on and tighten the U-bolt using a torque wrench, so you'll know when you reach the desired tension. 18-inches of adjustability.

No need for ladders, thimbles, clevises, turnbuckles, eyes or pins. Works with galvanized steel or aluminum covered steel strands. Eliminates corrosion failure concerns. And, coordinates with your anchors for a match-mated system.

Ask for ADJUST-A-GRIP® deadends for guy strands. ■

For more information, contact your Hubbell Power Systems representative, fax 573-682-8714 or e-mail hpscontact@hps.hubbell.com.



NEW

EQUI-MAT™ Personal Protective Ground Grid

• Protective grounding for workers on ground level

Chance has a long history of successful products used for personal protective grounding. Now, Hubbell Power Systems is continuing that tradition. This introduction of another new product will further improve safe working conditions for line workers.

To establish a common ground for all readers, consider first a short review of the principles of worker protection using personal protective grounding, then the application of these principles to the worker at ground level and, finally, a device that provides protection to the worker on the ground.

Protection for the ground worker has long been missing in many cases. Now we have a product that addresses these workers.



Protective grounding, a short retrospective

A great deal of attention has been paid to the safety of the worker aloft, either on the pole or structure, or in the basket of a bucket truck. Over the years several different protection schemes have been used, and some have been found to be less than satisfactory. The latest method, single point or worksite grounding has had a lot of study and testing. Chance has been promoting this method since the 1970s. It now has been accepted by most utilities and also has been written into the OSHA guidelines.

The key to this method is the extremely low resistance path that is placed in parallel with the worker's body. One grounding jumper is the primary source of protection. Its purpose is to shunt the high level of fault current around the worker. It works because it keeps both the current through and the voltage across the body at a low level. That is, the hands and feet are at nearly the same voltage, i.e., an equipotential zone. Other jumpers in this method are used to protect the electrical system. Their purpose is to insure that the system sees a low resistance return path for the current back to its source. This forces the flow of a fault current so that it will be interrupted by the breakers or fuses that protect the system. For this reason, connections are





made to a driven earth ground and/or the neutral, if one is present.

Protection overhead versus on-the-ground

Understanding the foregoing factors and the effects of electricity on the human body makes grounding protection somewhat straightforward for workers on overhead lines. To do so, we must know something about available fault current, worker resistance and the speed of operation of protective devices.

But what about workers at ground level? How do we protect them? And from what are we protecting them? Step potential and touch potential are the primary hazards.

Step potential is created when a fault current flows into the earth. The earth has resistance. Current flowing through a resistance creates a voltage drop. The worker's feet can span a voltage drop.

Touch potential is created when an energized element is connected to something near a remote worker by something conductive. It spans the distance between the energized part and the worker. For example, a digger-derrick boom gets into an energized line and a worker standing on the ground touches the truck. The truck now is at the line voltage. The worker's feet are near voltage zero and his hand touches the truck. He is the path to ground. This type of accident often is fatal.

Workers can be protected in both of these cases by using the same principle we discussed for the worker aloft: Maintain a low voltage drop across the body by keeping the hands and feet at nearly the same voltage. That is, by establishing an equipotential zone.

This technique has been used by utilities for many years, as grids or grillages buried under substations and beneath overhead-switch operating handles. They work, but are permanently installed and can't be moved from worksite to worksite.

Extended protection zone 'To Go'

Previously, there wasn't a reasonable solution for this portable protection. However, a product now is available that duplicates the substation grid, is portable and can be used to improve safe work conditions in a variety of work situations. The product is the EQUI-MAT™ Personal Protective Ground Grid from Chance.

EQUI-MAT™ Ground Grid consists of a grillwork of flexible copper braid, both criss-crossing and around the perimeter of a durable mat. It's placed on the ground at a work site and connected to the de-energized system component that could become accidentally re-energized. A separate connection must be made as a low resistance fault current return path. These two are in parallel because the mat is not meant to carry fault current, rather to keep voltage across the worker at a low value. The sizing of these connections is less critical than the parallel jumper used for the worker at pole top, whose protection depends upon the resistance of the parallel path. While connections at ground level are less critical, they must be sized so they will not fuse during the flow of a fault current.

Easy-to-use, three sizes may be coupled

The mat comes in 5x5, 5x10 and 10x10-foot sizes. Terminals on two diagonal corners provide the means to connect to the de-energized part using the grounding jump-

Human limits to the effects of electricity

Remember that some current will flow through every possible path and that even small levels of body current are dangerous. That is why the total resistance in parallel with the worker must be kept at an extremely low resistance value. By determining the maximum fault current that may flow at every worksite a crew services, one set of protective grounds can be developed to provide the protection needed at all sites. This eliminates the need to carry multiple sizes of grounds on a single line truck.

With the approximate fault current at the worksite and the worker's body resistance known, we can calculate the maximum parallel resistance needed to protect the worker. It's basically a simple parallel circuit.

The least current an average man can feel is 1.1 milliamperes. The threshold for a painful shock is 9 milliamperes. The let-go threshold is 16 milliamperes and heart fibrillation begins at 25 milliamperes. Heart fibrillation is the main hazard. Once it starts, only high-voltage medical-rescue paddles can shock the heart back to its proper rhythm.

Heart fibrillation is a function of the length of time the current flows. That means a higher level of current can be tolerated for a shorter time, without going into fibrillation. Conversely, a lower current flowing for a longer time may cause fibrillation. This is why it is so important to have the protective devices operate as fast as possible.

ers normally carried on the line truck. Nothing special is required. These terminals also provide the means for connecting together multiple mats to enlarge the protected work area. This means they can be placed around a truck or stringing equipment to provide a place for workers to stand. They can be placed around pad-mounted transformers or switches during maintenance. They can be placed at dig-in sites for such underground-cable work as adding a tap or splicing.

Application range verified and defined

The EQUI-MAT™ Personal Protective Ground Grid has been tested up to 35kV using a 1,000-ohm resistor as the simulated worker. Fault currents varied from 100 to 1,000 amperes. In all cases, voltage across the “worker” was negligible.

However, it will **not** provide protection during the final part of a splicing operation if the worker is in contact with the center conductor of underground cable and a remote worker removes the cable’s grounded elbow from the grounded parking stand and replaces it on the energized bushing. This energizes the center conductor, which by design is insulated from the ground. In this case, the worker is now a path to ground, with or without the mat.

In summary, the principles to protect workers up on structures now can be successfully applied at ground level. The portability of the EQUI-MAT™ Ground Grid and its ready use with equipment normally found on line trucks offers significant improvements in protection now available for workers at ground level. ■



Pre-Packaged Kits

Each Pre-Packaged Kit includes Ground Grid (size below with Long Ball Stud & illustrated instructions) plus Ground Set T600-2841 and Storage Bag C417-0147

Kit Catalog No.	EQUI-MAT™ Personal Protective Ground Grid Size	Weight per Kit
C600-2989	58" x 58"	11 lb. / 24.2 kg.
C600-2990	58" x 120"	17 lb. / 37.4 kg.
C600-2991	120" x 120"	29 lb. / 63.8 kg.

Basic EQUI-MAT™ Personal Protective Ground Grid

Each includes Long Ball Stud & illustrated instructions

Catalog No.	Size	Weight
<i>Single 1/4" Perimeter Braid</i>		
C600-2850	58" x 58"	5 lb. / 11 kg.
C600-2851	58" x 120"	10 lb. / 22 kg.
C600-2852	120" x 120"	20 lb. / 44 kg.



(At left) To join mats, the conductive grids simply connect at corner tabs with the bolt, washer and nut included with each mat. Tabs are fitted with shrink tube for stress relief. (Right) Ball stud can join mats and/or connect to grounding cable clamps.



Long ball stud accepts various grounding clamps as shown below: Duckbill, Ball/Socket, and C Type.



For more information, contact your Hubbell Power Systems representative, fax 573-682-8714 or e-mail hpscontact@hps.hubbell.com.

CROSSARM COVER ADJUSTS TO NEEDS

- Telescopes to 'fit all'
- Insert for pin insulators removes for post insulators

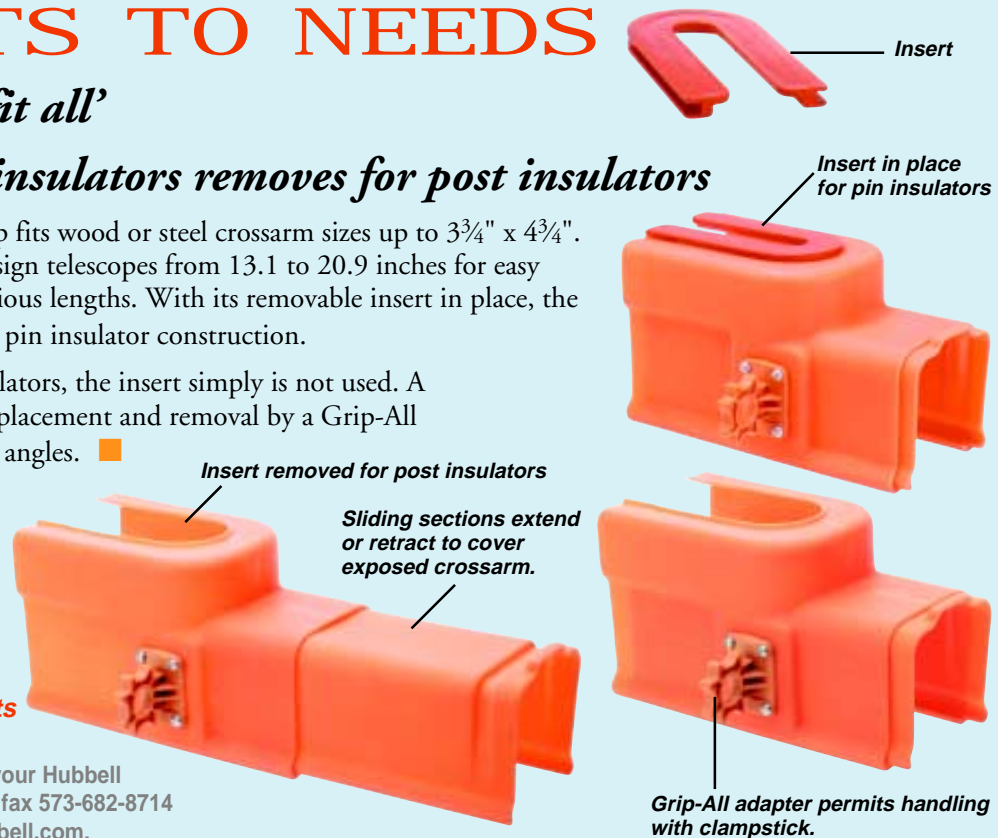
A new rigid cover up fits wood or steel crossarm sizes up to 3¾" x 4¾". The two-piece design telescopes from 13.1 to 20.9 inches for easy adjustment to various lengths. With its removable insert in place, the cover fits close on pin insulator construction.

For a similar fit on post insulators, the insert simply is not used. A hotstick adapter allows easy placement and removal by a Grip-All clampstick from most access angles. ■

Crossarm Cover Up
Catalog No. C406-0504

- Tested to ASTM F712
- Manufactured to ASTM F968 specifications
- Meets Class 3 requirements

For more information, contact your Hubbell Power Systems representative, fax 573-682-8714 or e-mail hpscontact@hps.hubbell.com.



NOTE: Because we have a policy of continuous product improvement, we reserve the right to change design and specifications without notice.

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Your suggestions and editorial or photographic contributions are invited and may be submitted to **Hubbell TIPS & NEWS**.

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