

HUBBELL® TIPS & NEWS

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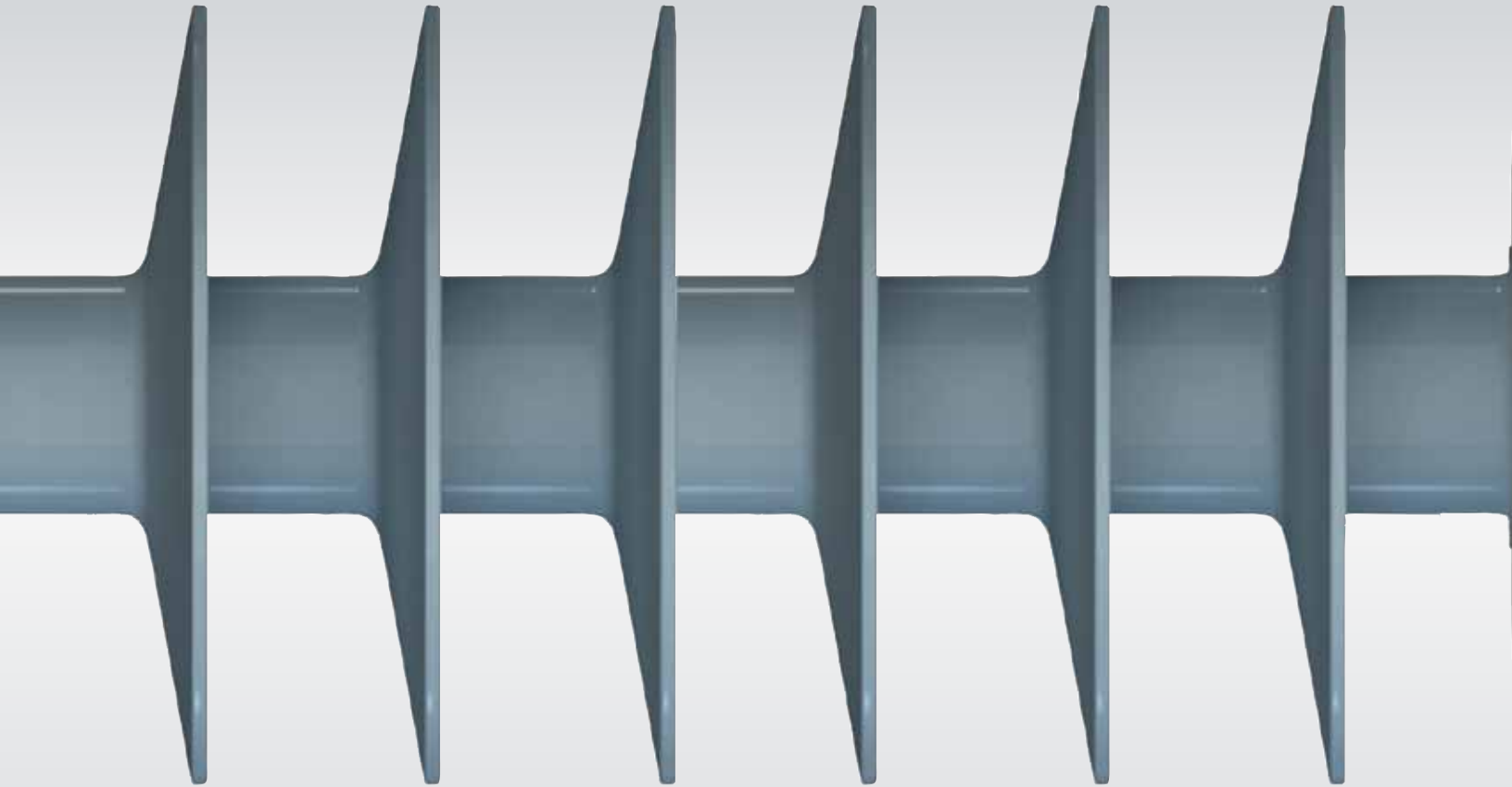
*Today's
environment
is unpredictable.*

*Your insulator
can't be.*



Quadri*Sil™ Insulators

A Better Design. A Better



Technologically Advanced Insulator from Hubbell Power Systems

The successful introduction of any new product should start with an innovative, ground-breaking design that begins with a clean sheet of paper and evaluates the function of that product from the ground up. Great technological advances don't usually happen by accident — they are the result of exhaustive research, on-going analysis, manufacturing feasibility, cost-effectiveness — and great ideas.

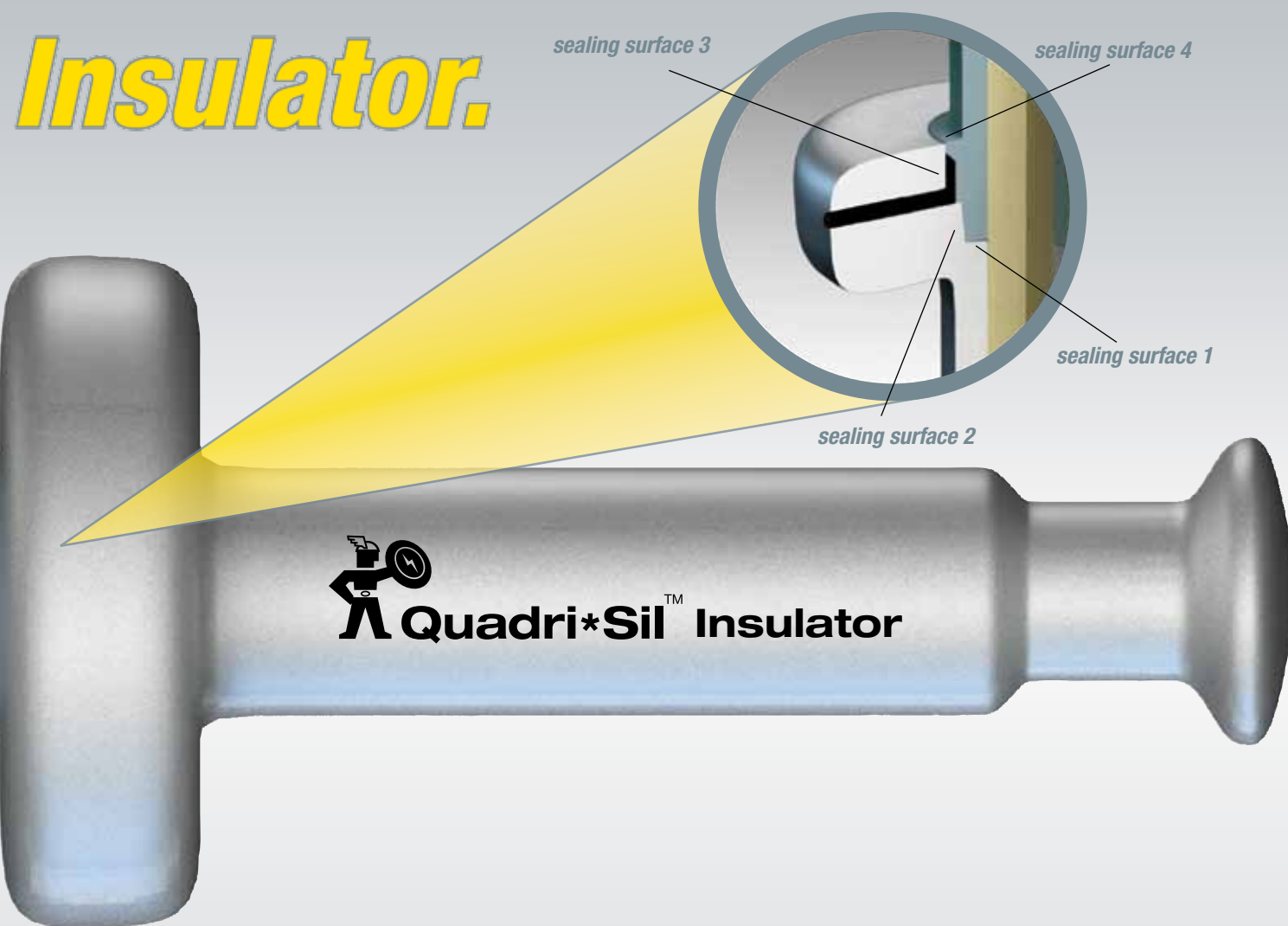
When the engineers at Ohio Brass took a critical look at transmission insulators, they saw a better way to design and manufacture them. Ideas began to build on each other until an insulator with greatly improved resistance to moisture penetration was designed.

Introducing the Quadri*Sil™ Insulator

The new Quadri*Sil™ insulator is designed around a revolutionary new end fitting which contains several redundant sealing points to protect the triple point (the location where the polymer housing, the fiberglass rod and the end fitting meet). The redundant seals greatly decrease the possibility of moisture entering the insulator, a leading cause of brittle fracture.

A revised and improved electrical shielding design in the end fitting of the new Quadri*Sil silicone-rubber, direct-bonded transmission insulator also reduces the possibility of corona cutting. This phenomenon occurs when corona, a source of ultra-violet energy capable of destroying the polymer material in an insulator, breaches the housing. This allows moisture to come in contact with the fiber-

Insulator.



glass rod, which can also result in brittle fracture.

Our Exclusive Four-Point Seal

At the heart of the new Quadri*Sil insulator design is an exclusive Four-Point Seal which provides backup support to guard against any potential break that might allow moisture to reach the fiberglass rod. The cutaway diagram above illustrates the redundant design that provides unmatched protection and reliability in insulator function.

This Four-Point Seal protects the triple point so well that in moisture penetration tests (ANSI C29.13, clause 7.5.3.1), the Quadri*Sil insulator performed flawlessly with the outer half of the counterbore machined away, leaving only two of the original four seals intact. No dye penetration was noted, even with two seals eliminated for the testing procedures. The Quadri*Sil insulator maintained functional

integrity with only **half** the seals of the original design.

Setting the New Standard

Severe weather conditions, extreme climatic changes and environmental contaminants are all part of our world. The insulators you use have to be the best and most reliable you can find. It just makes sense to specify insulators that have been designed with a superior sealing system to stand up to the worst Mother Nature can throw at them.

With nearly 100 years of transmission insulator experience, it comes as no surprise that the next generation of innovative and reliable insulators is from Ohio Brass and Hubbell Power Systems.

Quadri*Sil transmission insulators establish a new benchmark in the insulator industry. You'll be seeing more about Quadri*Sil in the near future. ■





Hubbell Products Help Harness the Wind

**Bluegrass Ridge Wind Farm
King City, MO**

On time delivery is critical to completion of wind farm project

Tim Shugart, Project/Site Manager, Alliant Energy WindConnect, a company that designs and builds wind farms and related infrastructure, describes a wind farm as a very large generator – 9 square miles in the case of the Bluegrass Ridge Wind Farm in NW Missouri whose construction he is overseeing. Despite the unusual spread of the project, success depends as usual on good design, and a quality product delivered on time and expertly installed. Hubbell Power System products played a key role in bringing the generated power of Bluegrass Ridge Wind Farm to the customer.

Location of Bluegrass Ridge

Bluegrass Ridge Wind Farm is located in King City, MO, in Gentry County about 60 miles north of Kansas City, MO. It is the first wind farm built in Missouri. The ridge, from which the installation takes its name, lends itself to capturing winds more steady than those in other areas of the state, Shugart reports.

The developer is Wind Capital Group, St. Louis, MO. Project financing is provided by John Deere Wind Energy, a unit of Deere & Company. Associated Electric Cooperative Inc. is the wholesale power supplier for 51 rural electric cooperatives in Missouri, southeast Iowa and northeast Oklahoma and will buy all the electricity produced by the wind turbines. Northwest Electric Power Cooperative, one of Associated's six generation and transmission cooperatives and the main customer, is constructing or updating its transmission system to support and transmit power from Bluegrass Ridge and other wind farms planned by Wind Energy Group. The wind facility was constructed in 2006 and early 2007 and became operational in April, 2007.

Electrical Features

The electrical capacity of each wind turbine is 2.1 MW. Overall capacity from the 27 turbines at Bluegrass is 56.7 MW. The wind turbine manufacturer is Suzlon, Pune, India.

An underground electrical collector system captures and feeds output to the Gentry

continued . . . ➡



Aerial view of turbines, the main crane for the erection of the turbines, and the Gentry Substation.

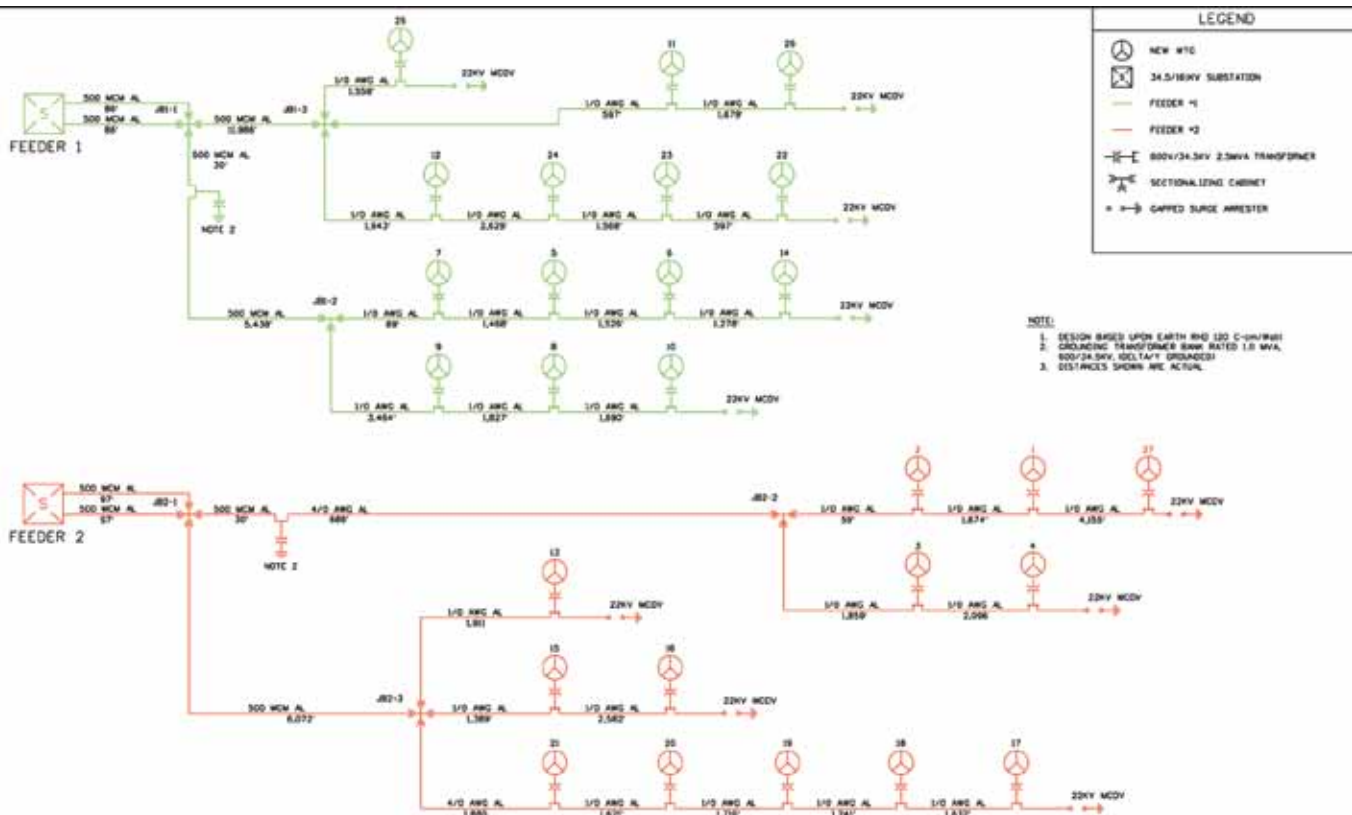
Substation located within a NW Electric Cooperative 161 kV transmission switching station. (See one-line diagram of the plan.) Each turbine generates at 600 V. Power is fed to a pad-mounted transformer at the base of each tower where it is transformed to 34.5 kV for transmission to the substation. Shugart explains, “There are two circuits using 1/0, 4/0, and 500 MCM 34.5 kV underground cable direct buried a minimum of 4 ft. The circuits feed into the Gentry Substation where there are two breakers and a transformer where the voltage steps up to 161 kV for transmission.”



Men working in Gentry Substation assembling one of the 161-kV transmission switches used to isolate one side of the transmission line from the other and to allow the wind farm to feed the transmission line.

Hubbell Power Role

Hubbell Power Systems supplied all the cable and wire connectors within Gentry Substation in





Last wind turbine being assembled.

addition to 34.5-kV and 161-kV lightning arresters. Specifically these products were Ohio Brass 314042 station arresters, 600042 Protecta*Lite arresters, and Anderson welded connectors, steel hardware, high voltage fittings, and grounding connectors. Shugart says regarding the choice of Hubbell as supplier, “We did have some delivery times that had to be met. Hubbell was able to get product here on time as needed and at a good price. Also Alliant Energy and Northwest Electric have had experience working with Hubbell and found them to be very reliable. In sum, our choice was based on past experience, quality, delivery time and price.”

Wind farm projects are proliferating across the world in the rush to install renewable energy, but project success still depends on product quality and on-time delivery as well as price. As usual, Hubbell Power Systems met the goal. ■



Overall view of Gentry Substation. From left to right: Substation control house, 34.5-kV switch and buss structure, two 34.5-kV breakers, main transformer (34.5/161 kV), 161-kV breaker, 161-kV switch, 161-kV bus, 161-kV transmission line dead-end structure with switches. The tall pole is for lightning protection.

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

How to 'get-a-grip' on fuse links

- Easiest to open packaging
- Fastest access to fuse link

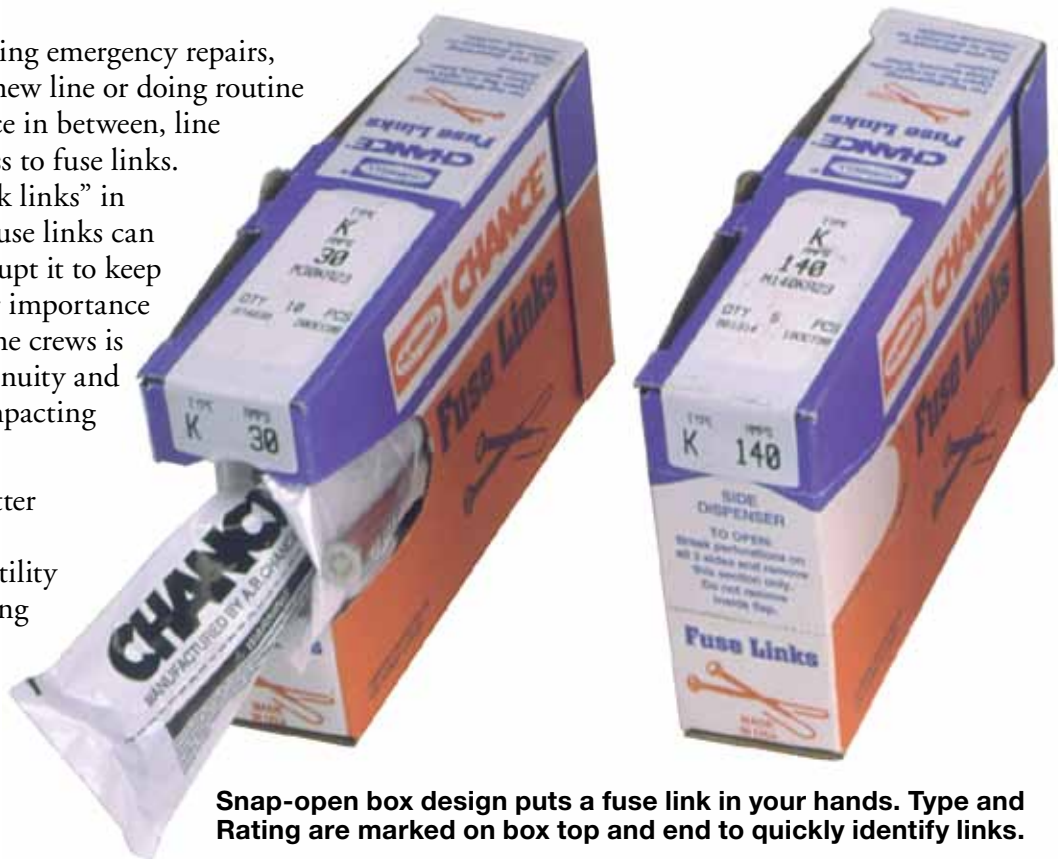
Whether making emergency repairs, building a new line or doing routine maintenance in between, line crews need ready access to fuse links. Intentionally the “weak links” in distribution systems, fuse links can restore power or interrupt it to keep system integrity. Their importance to being on hand to line crews is critical to service continuity and restoration, directly impacting system reliability.

No one knows this better than the lineman who answers upstream to utility management for keeping the lights on. While all fuse links may not be created equal, they must meet performance criteria.

Easy to sort them all out

To the crew member whose hands put each specified fuse link in its proper place, what matters most is that it's easy to do. That starts with locating the exact one out of the many stored onboard a line truck burgeoning with other replacement parts and the tools to install them.

By design, our dispenser packaging makes fuse links easy to find and access on a line truck. It also keeps each individual fuse link clean and dry while easy to view inside a transparent plastic bag. The master box and each fuse link bag are printed with the link type



Snap-open box design puts a fuse link in your hands. Type and Rating are marked on box top and end to quickly identify links.

and amperage rating. To easily get to the single fuse link, the bag simply rips open on a perforated line. The bag even tells line personnel how to properly install a fuse link into a cutout.

Not an expendable task

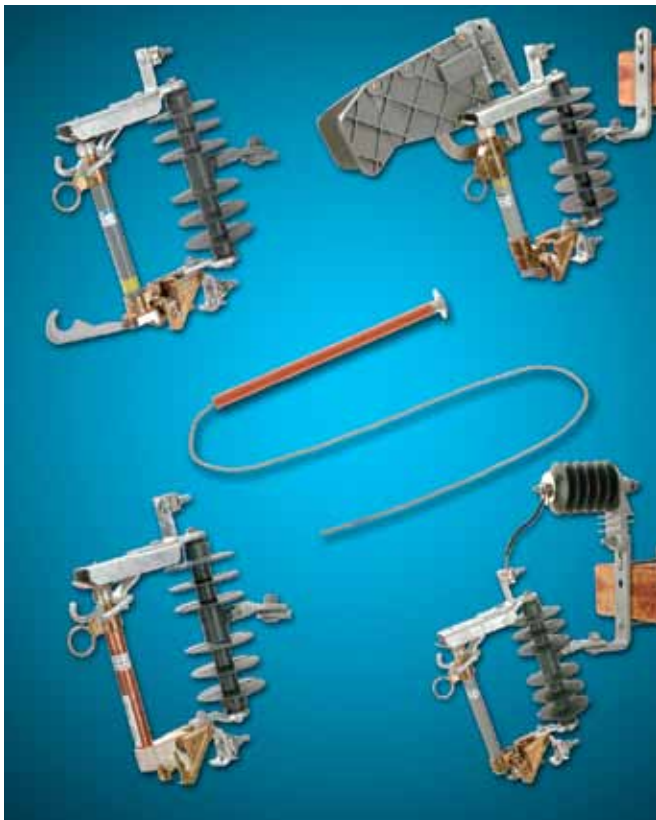
Fuse links may be called “expendable” parts in a scheme of system-protective apparatus. But, replacing them properly is not an expendable task. A distribution system's survival relies directly upon the “sacrificial” fuse link. Package design here means getting the job done in a timely manner . . . the very essence of efficient performance. ■

- **Snap!**
Open dispenser box
- **Zip!**
Open one-unit bag



Accuracy (even more than speed) is key to finding the right fuse link whether in an emergency or during routine installations. Clearly marked packaging helps crew efficiency in terms of doing it quickly and right the first time.

Choose from our line up of Chance Fuse Links and Type C Cutouts for your distribution systems.



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

SAFETYSHIELD™

TO THOSE WHO CLIMB™

Hot Stick Barrier - Now for Ratchet Wire Cutters!

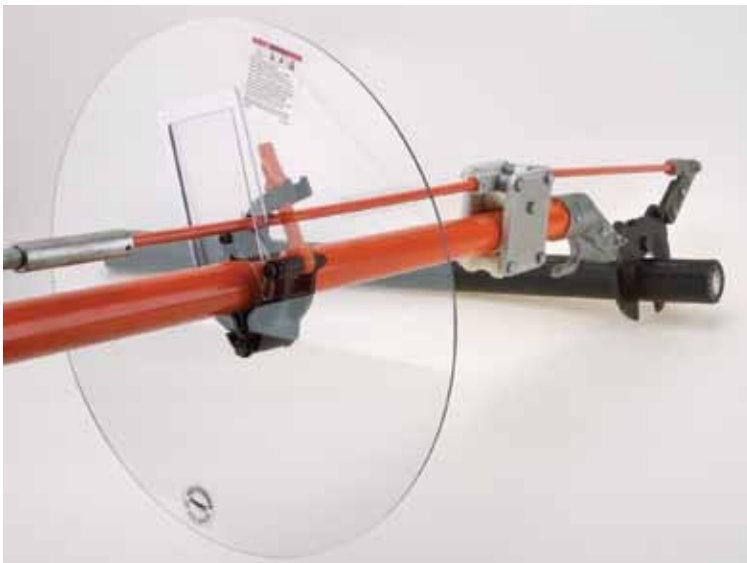
In less than a minute, the SAFETYSHIELD™ Hot Stick Barrier can be mounted on a 1½"-diameter Chance® Ratchet Wire Cutter† handle. That adds a 16"-diameter protective screen between a lineman and a potential electrical hazard.

This is the same design as our Safetyshield Barrier for hot sticks used by major electric utilities, co-operatives, contractors and industrial customers in the U.S. and abroad. It should be mounted on the cutter handle nearest the point where an electrical arc flashback may occur. It is made of two flame-retardant transparent polycarbonate protective shields affixed with a nylon fastener to a nylon 33% glass-filled clamp.

Safetyshield Cat. No. PSC4170630 includes orange storage case, instructions. 16"-diameter (406.4 mm) 1 lb. 6 oz. / 0.62 kg. fits our popular Ratchet Wire Cutters on Catalog page 2152: †Cat. No. C4031381, C4031382, C4031383 & C4031384. ■



Tested per ASTM Standard F2522-05: Test Method for Determining the Protective Performance of a Shield Attached on Live Line Tools or on Racking Rods for Electrical Arc.



Orange protective storage case and Instructions are included with each SAFETYSHIELD™ Hot Stick Barrier.

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





National Performance Standard for Underground Enclosures

ANSI/SCTE 77-2007

ANSI/SCTE 77-2007 Specification for Underground Enclosure Integrity sets a national performance standard for underground enclosures. This ANSI standard supersedes ANSI/SCTE 77-2002 which was the first national performance standard that is not material specific to help ensure long service life, minimize maintenance and reduce liability issues related to underground enclosures. Previous to ANSI/SCTE 77-2002 the underground enclosure industry did not have a national performance standard to follow for the testing of products. Secondly, because enclosures are made using various materials, designs and technologies, it was easy for manufacturers to misunderstand and make misleading or false claims about the performance and appropriate applications for their enclosures.

While the first ANSI standard was being formulated, the National Fire Protection Association (NFPA) was also pro actively working to increase the safety and reliability of handholes. NFPA recognized that while the equipment and wires that go into underground handhole enclosures had to meet the Code, the enclosures themselves had not been addressed. The NFPA then took steps to bring handhole enclosures into the Code. The result of this action is in the 2005 NEC section 314.30.

When specifiers and end users use the ANSI standard (ANSI/SCTE 77-2002 now revised to ANSI/SCTE 77 2007) as their guide to selecting enclosures, they have a dependable guide in selecting enclosures that “withstand all loads likely to be imposed.” Enclosures that will remain safe and reliable for the intended applications. Quazite underground enclosures meet or exceed ANSI/SCTE 77-2007. Although all underground systems will specify this standard, it is especially relevant for the electrical industry because the 2005 National Electric Code, Section 314.30 requires that, “Handhole enclosures shall be designed and installed to withstand all loads likely to be imposed.”

The new ANSI/SCTE 77 2007 standard remains the same as the 2002 standard for all provisions but more clearly defines and extends the loads and testing procedures with the following added enhancements:



Phil Stephens

This is an installment of a series of Hubbell Tips and News magazine articles addressing Quazite precast polymer concrete underground enclosures. The information is based upon an article previously published in the April 2005 edition of NEC Digest and authored by Phil Stephens, National Product Manager, Quazite, Hubbell Lenoir City, Inc.

-Tier 22: (22,500 pound Design Load, 33,750 pound test load) testing and performance criteria. The 2002 standard previously only included Tier 5 (5,000 pound Design Load, 7,500 pound Test Load), Tier 8 (8,000 pound Design Load, 12,000 pound Test Load), Tier 15 (15,000 pound Design Load, 22,500 pound Test Load) for non-deliberate traffic applications. For deliberate traffic applications both standards direct the specifier to use AASHTO H20 certified pre-cast concrete, cast iron or AASHTO recognized materials.

-Coefficient of Friction Test:

Measures the slip resistance of the walking surface that is or may be exposed to pedestrian traffic. The static coefficient of friction of this surface shall be a minimum of 0.50 as determined using ASTM C1028-06 Section 8, or any equivalent test method.

-Reliable test procedures for testing underground enclosures with sidewalls greater in length than 48.”

All other existing provisions of the 2002 standard are included in ANSI/SCTE 77 2007.

ANSI/SCTE 77-2007 is an appropriate performance specification rather

than a construction specification meaning than any properly designed and constructed enclosure could potentially meet the ANSI standard regardless of the construction materials. To meet the ANSI standard, enclosures must pass a battery of physical, environmental and internal equipment protection tests to ensure long, reliable service life with minimal maintenance. These tests include: structural testing to simulate typical non-deliberate vehicular loading; accelerated service; chemical resistance; simulated sunlight exposure; impact resistance; water absorption and flammability resistance. While all the tests are important to ensure long-term performance, the heart of the standard is in the three position structural tests (See page 14). The three-position test is the best indicator of an enclosure’s overall strength. The first position tests how an enclosure’s lateral sidewall withstands soil surcharges as a vehicle approaches the enclosure. The second position tests how an enclosure withstands vehicular loading applied directly onto a vertical sidewall, and the third position tests vehicular load-

ing applied to the center of the enclosure’s cover.

In the past, some underground enclosure manufacturers would use only the results from the center of the cover test to tout the strength of their enclosures. This practice was misleading because no mention was made of lateral or vertical sidewall strength. If the enclosures were weak in those areas, end users were none the wiser and enclosures that were not strong enough for certain applications were installed anyway. This issue was one of the main drivers for the development of the ANSI standard, which now spells out that enclosures must be tested at all three positions in order to meet the standard.

The load chart (table below) helps eliminate the practice by some enclosure manufacturers of using test loads (the minimum ultimate failure load) rather than design loads (the expected load plus a safety factor of 1.5) to promote the strength of their enclosures. This misleading practice can lead to dangerous failures because test loads do not

Application	Loading Requirements			
Light Duty Pedestrian traffic only	Vertical	Test Load	13.3 kN	3000 pounds
TIER 5 Sidewalk applications with a safety factor for occasional non-deliberate vehicular traffic	Vertical	Design Load	22.2 kN	5000 pounds
	Lateral	Test Load	33.3 kN	7500 pounds
TIER 8 Sidewalk applications with a safety factor for non-deliberate vehicular traffic.	Vertical	Design Load	28.7 kPa	600 pounds/sq. ft.
	Lateral	Test Load	43.1 kPa	900 pounds/sq. ft.
TIER 15 Driveway, parking lot, and off-roadway applications subject to occasional non-deliberate heavy vehicular traffic	Vertical	Design Load	35.6 kN	8000 pounds
	Lateral	Test Load	53.4 kN	12000 pounds
AASHTO H-20 Deliberate vehicular traffic applications	Vertical	Design Load	28.7 kPa	600 pounds/sq. ft.
	Lateral	Test Load	43.1 kPa	900 pounds/sq. ft.
Certified precast concrete, cast iron or AASHTO recognized materials				

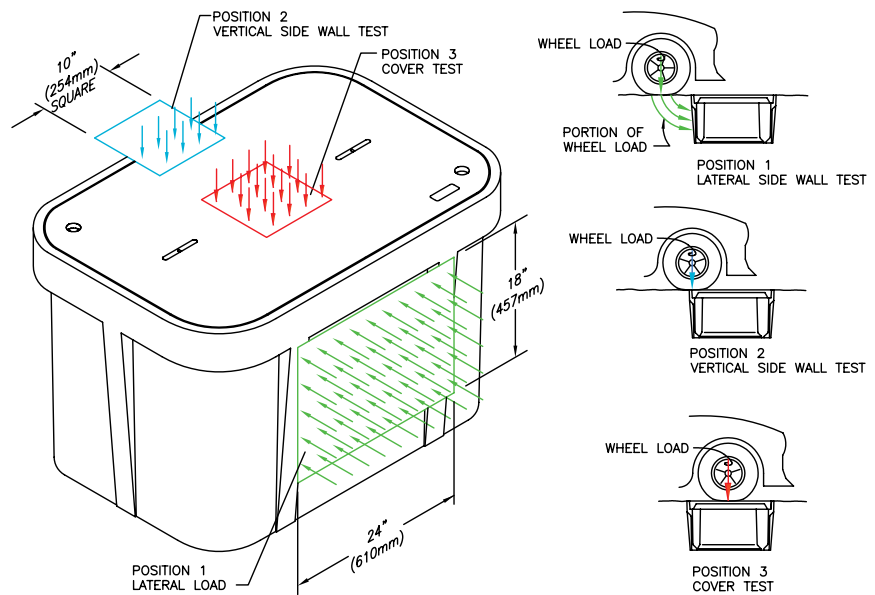
provide a factor of safety. End users, therefore, might unknowingly put enclosures in applications that push loading ratings dangerously close to, or even past, the limits of the enclosures. Now, however, ANSI compliant enclosures must meet design loads that have a 1.5 safety factor built in.

The ANSI standard defines loading requirements for enclosures based upon anticipated loads and separates these requirements into Tier levels defined by the applications. As shown in the Table, the end user now has straightforward instruction that if there is a sidewalk application, an enclosure that meets, at a minimum, the loading requirements for Tier 5 or Tier 8 depending on the potential that the enclosure has of being run over by a vehicle. To make it easier for end users or contractors to determine the correct Tier level of enclosures, some of the leading manufacturers, including Quazite, have taken the initiative to emboss Tier designations directly onto the covers of their enclosures. This visual aid helps eliminate confusion and the possibility of misapplication when enclosures are pulled from pre-existing stock.

Judgement should be applied when determining the appropriate Tier level needed for a particular underground enclosure application. For example, if an enclosure is installed in the sidewalk away from the curb, a specifier would usually determine that a Tier 8 enclosure would be the most suitable choice. If that enclosure were located in the sidewalk next to a curb, though, where there is an increased likelihood of coming into contact with vehicles, it would be a better choice to specify a Tier 15 enclosure.

If an enclosure is being installed in a grassy area, the installer might first assume that a light-duty enclosure would be strong enough for the application. However, if that enclosure comes in contact with a lawn tractor, it would be wise to install a Tier 8 enclosure instead.

At Quazite, we deliver superior underground en-



Product Test Positions (from ANSI/SCTE 77-2002 Specifications for Underground Enclosures Integrity) simulate all loadings likely to be imposed upon the enclosure.

closure performance with a life cycle that is longer than traditional materials for cost effective and trouble free service over the long term. We welcome ANSI/SCTE 77-2007 as a national performance code that includes rigorous testing to help ensure safe, reliable underground enclosures based upon application.

Underground Enclosure Performance Specification

Enclosures, boxes and covers are required to conform to all test provisions of the most current ANSI/SCTE 77 **“Specification For Underground Enclosure Integrity”** for Tier_____ (specify Tier 5, 8, 15 and/or 22) applications. When multiple “Tiers” are specified the boxes must physically accommodate and structurally support compatible covers while possessing the highest Tier rating. In no assembly can the cover design load exceed the design load of the box. All components in an assembly (box & cover) are manufactured using matched surface tooling. Independent third party verification or test reports stamped by a registered Professional Engineer certifying that all test provisions of this specification have been met are required with each submittal. ■

New! Slack Blocks **TO THOSE WHO CLIMB™**

- **All components rated for 750 lb. working load**

Not personal protective equipment, these blocks and hooks are not for human support.

- **Galvanized steel body and hooks**
- **30 ft. x 3/8"-diameter braided Poly rope**



Complete Block and Tackle Set
Weight: 4 1/4 lb. (1.93 kg.)

Catalog No. PSC4032934
Rated working load: 750 lb. (340 kg.)

Parts and Accessories:



Swivel Hook
Catalog No. PSC4032936
Weight: 1 lb. (0.45 kg.)
Rated working load: 750 lb. (340 kg.)

Flat Hook
Catalog No. PSC4032935
Weight: 1 lb. (0.45 kg.)
Rated working load: 750 lb. (340 kg.)



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While They Last

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PCORE Electric Joins Hubbell Power Systems Family

PCORE® is the leading domestic manufacturer of high voltage condenser bushings for power transformers. Based in LeRoy, NY, PCORE products provide safe passage of electricity into and out of transformers. Product applications range from 15,000 to 500,000 volts. With an ability to manufacturer more than 2500 designs, PCORE is a certified supplier to every utility in the U. S. and Canada.

As a subsidiary of Hubbell Power Systems, the PCORE management team, with more than 65 years of combined experience, will continue to direct the company.

PCORE joins the Anderson, Chance, Fargo, Ohio Brass and Quazite brands as Hubbell Power Systems continues to expand its transmission, distribution, substation and OEM manufacturing capabilities. ■



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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Hubbell TIPS & NEWS magazine is published to inform personnel of electric utilities and associated companies of new ideas and techniques in transmission and distribution practices. The magazine, under different titles and formats, has been published since 1932.

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

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