

uPole

AMERON UTILITY POLE





Ameron International & the uPole

Ameron International Corporation is a 101 year old major worldwide supplier of highly engineered infrastructure products including fiberglass, concrete, and steel pipe, concrete and steel light poles, steel wind tower structures, concrete aggregate and steel rebar. Ameron, has plants around the globe. One of its successful Fiberglass Reinforced Polymer (FRP) pipe products is made with a polymer mortar core for added strength and stiffness using a low cost continuous process.

NOW

this patent-pending process has been engineered further to create Ameron's new uPole distribution pole series in order to provide customers with a long-life cost-effective alternative to distribution poles made from wood, steel and prestressed concrete.



AMERON applications using FRP pipe of similar size to the new uPole



AMERON uPole distribution pole shaft under bending test at plant



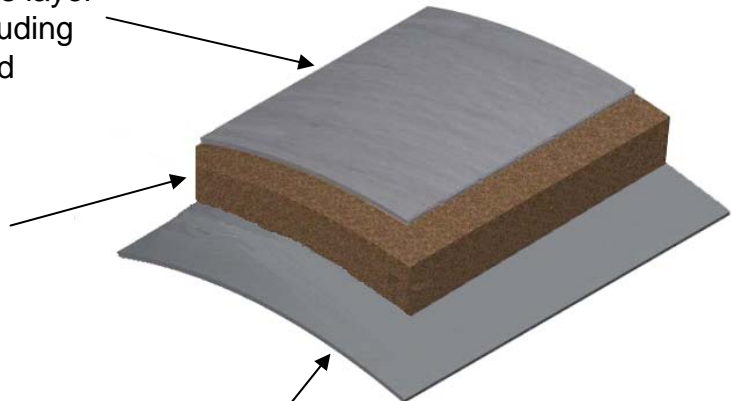
HARDENED FRP POLE WALL

- Using a patent-pending continuous process, Ameron is able to do unique things in the construction of the structural pole wall and outer layer of its uPole series pole shafts.
- Ameron's approach is to build hoop and axial strength and stiffness in the pole wall using strong and durable epoxy resins, and by employing a proprietary sand filled polymer mortar core to thicken the wall, thereby providing strength and stiffness at relatively low cost compared to other FRP poles.
- The final step is to apply the thick outer layer coating resin with strong UV absorbers and with fine sand embedded in the surface to provide an outer barrier that is nearly impervious to the elements.
- The final result is a hardened FRP pole wall that feels solid like concrete, but has the performance and toughness of fiberglass.

Outer axially reinforced
structural epoxy/fiberglass layer
with integral coating including
embedded fine sand

Epoxy/sand filled
polymer mortar core

Inner axially reinforced
structural epoxy/fiberglass
layer





Average Strength Surpasses New Wood

BENDING STRENGTH

Cantilever bending testing at EDM International in Ft. Collins, CO and Ameron EDC (Engineering Development Center) in South Gate, CA confirmed the Ameron uPole ADP45-1 meets ANSI 05.1 and NESC C2-2007 requirements.



Pole Number	Strength (lb)	Test Location
060615-1	3,221	EDC
060615-2	3,291	EDC
060615-3	3,223	EDC
060906-6	3,392	EDM
060906-7	3,087	EDM

Testing conditions simulated burial embedment of 6.5 feet and load applied 2 feet from the pole top.



uPole top deflection similar to wood pole



Exceptional Fire Resistance

TEST RESULTS

- uPole fire/flame testing was done at EDC using an 1,800° F propane fired flame directed at the pole surface for a full 2 minutes from a distance of approximately 3¼ inches.
- Ameron's integral hardened pole coating did not support combustion and exhibited only minor charring compared to other pole sections made of wood and FRP poles made by others. The treated wood pole section exhibited the most damage.
- Ameron's superior coating performance comes from the inert polymer sand mortar core and the embedded fine sand in the outer coating that act in concert to dissipate heat.



Ameron's hardened FRP uPole surface is highly resistant to direct flame which may address wildfire or city fire challenges.

The treated wood pole exhibited the most damage.





Long-Term Weathering

UV and Corrosion Protection

The hardened FRP construction of the Ameron uPole includes an integral resin/sand polymer mortar outer coating layer filled with strong UV absorbers that has been lab tested to withstand the effects of harmful UV ray exposure.

Over 14,000 hours in a QUV chamber under aggressive UV-B bulbs has not resulted in any coating crazing, cracking, peeling or other significant degradation.

There is no corrosion with Ameron's uPole.

Designed with tough conditions in mind, Ameron uPoles resist the effects of harmful UV exposure



uPole Coating After 14,000 hrs QUV-B Exposure



Environmentally Green



*Plant a uPole...Keep
trees in the ground.*

**Ameron's uPole is
an environmentally
attractive alternative
to wood.**

- **The Ameron uPole is non-toxic and can be reused or disposed of in a standard landfill.**
- **The Ameron uPole contains no pesticides, preservatives or other harmful chemicals that can leach into the ground.**
- **Once properly installed for the line design requirements, unlike wood or steel poles, no further maintenance of the Ameron uPole should be required.**



Ameron Quality

ISO 9001-2000

**Non-Conductive
and Non-
Flammable**



QUALITY TESTED

- **The Ameron uPole is manufactured in Ameron's Burkburnett, Texas plant which is certified to ISO-9001-2000. This plant has been in operation making FRP pipe for 40 years.**
- **Material and processes are rigorously tested to strict standards.**
- **Testing conditions proved a pole with through-bolt fasteners was able to withstand bolt torque loads well in excess of the 50 ft-lbs requirement in most specifications.**
- **Bolt down-load bearing tests prove over 5,000 lbs capacity.**
- **In addition to the excellent performance against UV radiation, the Ameron uPole is impervious to thermal shock, humidity, freeze and wet-dry test cycles.**



Attributes

- **Excellent alternative to wood distribution poles with a number of significant advantages**
- **Strength and durability of Ameron uPoles provide dependable and cost-effective defense against weather related threats to an electric utility's ability to deliver power to its customers**
- **Resistant to all known mechanisms of degradation thus eliminating maintenance costs related to....**
 - **Rust and corrosion**
 - **Rot**
 - **Woodpeckers**
 - **Termites**
 - **Water absorption**
 - **Long-term creep**
- **High BIL (Basic Impulse Level) compared to wood per NEETRAC testing**
 - **600 kV dry**
 - **455 kV wet**
 - **75 impulses no damage**
- **Fire Resistant**

Withstands flashovers due to lightning surges much better than wood





Hole Drilling & Steps

- **Factory drilled holes available on request**
- **uPoles can be field drilled without special tools other than standard carbide coated steel bits or masonry bits**
- **Approximately 30 or more holes per bit**
- **Removable or permanent step attachments available on request from outside suppliers or customer supplied**



Factory hole drilling



Field hole drilling



Standard Chance step on mounting plate washer



uPole Tops & Butt Plates

- **uPole top caps and butt plates are made from tough polymer mortar**
- **Conical shaped top cap designed to resist bird and raptor nesting**
- **The butt plate is dimensioned to resist all down loads with the embedment resistance area similar to a wood pole of the same Class**
- **uPole tops caps and butt plates are permanently bonded to the inside of the pole using structural epoxy adhesive**

Top Cap Installed



Butt Plate Installed





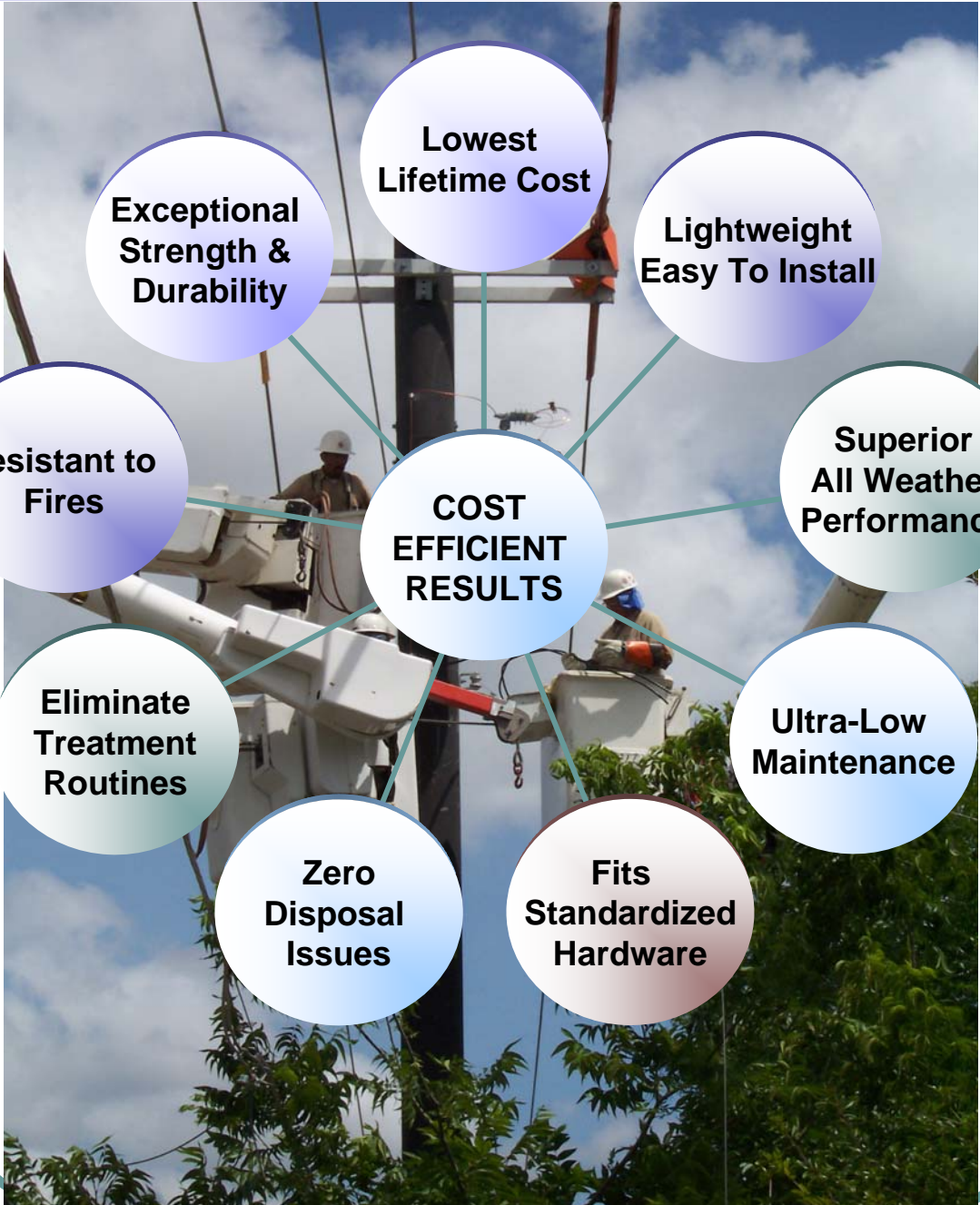
Installation

- **Embedment same as for wood poles using standard equipment**
- **Ameron uPoles are approximately 40% lighter than wood poles**
- **Standard framing and luminaries**
- **Standard tools can be used**
- **High bolt down-load bearing capability – tests prove over 5,000 lbs capacity**
- **Supports standard wood, steel and FRP crossarms**
- **Supports standard transformers and other hardware**
- **Bonding/grounding wire attached using standard clips and self-tapping screws, or can be run inside the pole and out at ground line**





The Ameron uPole Advantage



**Exceptional
Strength &
Durability**

**Lowest
Lifetime Cost**

**Lightweight
Easy To Install**

**Resistant to
Fires**

**COST
EFFICIENT
RESULTS**

**Superior
All Weather
Performance**

**Eliminate
Treatment
Routines**

**Ultra-Low
Maintenance**

**Zero
Disposal
Issues**

**Fits
Standardized
Hardware**



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