



Overhead and underground power lines

HSB, a Munich Re company, is a technology-driven company built on a foundation of specialty insurance, engineering, and technology, all working together to drive innovation in a modern world.

Equipment description

Power lines are used to carry electrical power from the source to the electric equipment load. Typically, lines are mounted at approximately 15 to 18 feet above the ground or buried 3 feet below the ground. Electrical services lateral to outbuildings and other remote locations are often installed below grade in conduit.

When the appropriate type of underground cable is properly installed and protected, it can have a reasonably long service life. Underground cables are less affected by weather or accidents than overhead lines, but they are also less visible. Underground electrical service lines on farms, especially servicing outbuildings and remote power stations, are often not mapped. As a result, the service lines are frequently cut or otherwise damaged during excavation.

Above-ground power lines are easier to install than underground lines. However, above-ground wiring is more often affected by harsh weather or vehicle accidents, and can get in the way of large vehicles or equipment.

Maintenance tips

- Overhead, customer-owned power lines and poles may sag or shift respectively over time. When this occurs, restore the tension and the proper height clearance.
- Poles at the ends of line runs or at side tap locations can drift out of plumb. These poles may need steel guy cables anchored to the ground to counteract the wire tension imbalances.
- It is important to keep areas surrounding power lines clear of foliage or other objects. Trees can damage or knock down overhead power lines. They may also provide a ground path if line insulation is weak (or no longer present). If you notice a tree that could potentially damage a power line, consult a licensed tree service professional to inspect, trim, or remove the tree.

Failure reasons/loss prevention tips

1. Wooden overhead power poles rot near the pole base and fall over

- Prevent loss of farm power by regularly inspecting poles for rot or insect damage and replacing them before a structural failure occurs.
- Avoid future pole rotting potential by using pressure-treated poles designed for direct burial.
- Locate power poles away from farm vehicle traffic routes to prevent gouging of the pole material by vehicle bumpers or tractor implements.

2. Overhead single conductors are damaged by high-vehicle impacts

- Prevent overhead damage from tall vehicles by routing overhead conductors to avoid passing over roadways or tractor paths.
- Prevent wires from being pulled down by making sure the installed height of the conductors provides adequate clearance for all farm-owned vehicles and attachments.
- Consider using underground wiring when wires must cross roadways, to eliminate impact possibilities.
- Use signage to mark or identify low overhead conductors for visitor drivers.

3. Overhead conductors are damaged by storm-related activity

- Prevent tree damage to conductors by inspecting, trimming, or removing nearby tree limbs that could hit conductors if broken during a storm.
- Prevent conductor shorting or grounding by removing any "climbing" vines like Virginia Creeper, Wild Grape, Ivy, etc. that wrap around and climb the pole to contact the conductors.
- Prevent unexpected power loss by periodically inspecting, tightening, or replacing defective conductor-attaching devices such as insulators, cable clamps, and splices. Wind and ice accumulation can easily pull down weak attachments or loosely spliced cables.

4. Underground conduits or direct-buried cables are damaged during digging or sitework activities

- Avoid nuisance power losses by meeting with digging contractors to define all underground feeder routings and buried utility excavation markings before work begins.
- Reduce the chance for an outage by always using plastic "buried cable warning" marking tape installed over the buried conductors. Backhoe operators will lift the warning tape before damaging the cable beneath.
- Prevent accidental underground damage to critical circuits by installing permanent warning markers on posts driven into the ground at regular intervals along the buried conductor route.



5. Underground electrical systems are shorted or grounded by infiltration of ground-water

- Prevent unexpected cable failures by periodically inspecting cables and splices in underground manholes and junction boxes. Rework any failing splices with modern splicing kits before the failure occurs.
- Prevent excessive amounts of ground-water from infiltrating manhole vaults by maintaining existing, or installing new sump pumps with automatic level switch activation and pump failure alarms. Test the floats periodically.
- Proactively replace any underground cable runs with a history of failure due to age-related deterioration. One new cable replacement project will be less costly than repeated repairs with business interruption losses.

Safety tips

- Above-ground power line clearances are important. Make sure all equipment can safely pass under power lines without breaching established clearance distances.
- Never try to move or alter exposed utility power lines on your own. Only qualified utility workers should handle exposed power lines. Customer-owned power lines should be handled by licensed electricians.
- Always call the diggers hotline in your area to have the locations of existing utility-owned underground wiring marked out prior to starting any excavation work on your property.
- Mapping of installed farm-owned underground power lines and referring to it when excavating can help prevent cutting or damaging the lines.
- Always keep an eye out for low hanging or damaged wires. If you see a downed power line, stay away from the area. Call your electric utility company immediately. Contact a qualified electrician if the line is customer owned.

Energy savings/conservation tips

- As electricity passes through power lines, energy is lost due to the impedance of the wire. The percentage of energy lost is dependent on a number of factors, including size of the conductor, length of the line, operating current, and the voltage. To reduce the amount of lost energy, size the conductors for no more than a 5% voltage drop from the source to the connected load.
- Perform periodic thermography checks on overhead wiring. High-resistance connections consume energy and will cause voltage fluctuations on the electrical system. Schedule the repair or replacement of all high-resistance joints or cables found during the thermographic inspections.

HSB

One State Street
P.O. Box 5024
Hartford, CT 06102-5024
Tel: (800) 472-1866

HSB.com

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