

Tips to Reduce Fire Risks in Poultry Houses



Even when the wintertime brings a slight reduction in electrical demand, it does not mean that electrical-system maintenance and inspection should be postponed or neglected. Electrical system failures due to bad weather or poorly maintained electrical systems can be costly, no matter the time of year. Here are a few construction tips for new and existing farms that can help mitigate fire risks and reduce the likelihood of future headaches from electrical system failures.

Is your grounding system in working order?

Some growers know the damage that lightning strikes cause all too well, while others may have never experienced their destructive potential. Lightning strikes can cause fire and destroy housing equipment such as controllers and motors. Proper earth grounding of house structures, electrical systems, and equipment is necessary to minimize the damage caused by lightning.

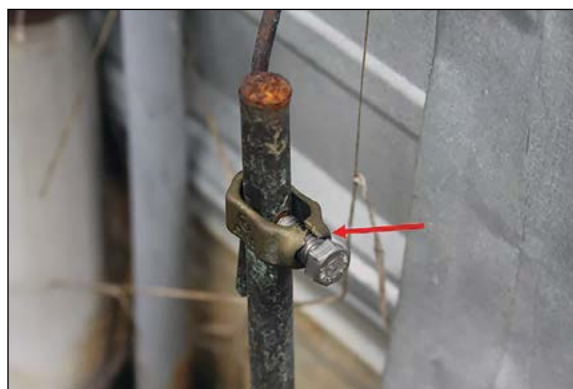
According to the National Electric Code, a properly grounded system should have an earth ground resistance of 25 ohms (Ω) or less. Earth ground resistance needs to be as low as possible to ensure that the electrical current from a lightning strike flows to the ground and not through generators, generator transfer switches, controllers, feed bin motors, etc.

A survey of nine Mississippi poultry farms (29 houses total) in early 2019 showed that 12 of the 29 houses had resistances at the control room breaker box higher than the recommended 25 Ω . The most consistent grounding locations were the control room breaker boxes, generator service entrances, and generator frames. Attention to electrical grounding systems have significantly improved over the last 20 years, but there are still substantial differences between farms, mostly as a result of house age, electrical system modifications/updates, and electrician preference and attention to detail.

One farm in the survey had Ufer grounds installed at the control room breaker boxes. A Ufer ground is achieved by bonding electrical service equipment to the steel rebar in the control room concrete pad or the concrete footer. Ufer grounds can help lower overall electrical resistance and strengthen the overall grounding integrity of the



A Ufer ground is achieved by bonding the steel rebar on the left side of the picture to the ground rod on the right side. The rebar in this picture is reinforcing the control room concrete pad. To create a Ufer ground in compliance with National Electric Code (NEC) standards, a minimum of 20 feet of 4 AWG or larger bare copper conductor or steel reinforcing bar or rod not less than 1/2 inch in diameter should be encased by at least 2 inches of concrete and located near the bottom of the concrete foundation.



Broken clamps like the one shown here can increase resistance due to a poor connection. The red arrow is pointing to the portion of the clamp that has split most likely as a result of overtightening. Problems such as this should be fixed immediately. Inspecting ground wires, clamps, and rods yearly is a good idea.

electrical system. In general, installing Ufer grounds in new construction is a good idea, but you have to plan it at the time the concrete is poured. Installing a ground rod inside of the control room (through the concrete slab) is also a good idea to protect the rod and the connection from corrosion and damage, but like a Ufer ground this also has to be planned in advance. Ground rods must be at least 5/8 inch in diameter and must be driven at least 8 feet vertically into the ground. Acorn-type, solid ground

clamps and 6-gauge wire are typically used to connect equipment to the ground rod.

Ground rods and wires can break due to equipment damage and negligence. Checking the connections of grounding systems regularly is a good idea to ensure that houses are protected from lightning strikes. In existing houses, resistances can be lowered by bonding two ground rods together. MSU Extension can test ground resistances on poultry farms. If you are interested in learning more about your electrical grounding system, contact the author at john.linhoss@msstate.edu or (662) 325-1978.

Have your electrical wiring and circuit breakers been inspected?

Poultry house environments are tough on electrical systems, including wiring. Over time, electrical connections can degrade, corrode, or become loose. Under optimal conditions, electrical current (amperes) flows through wires with little resistance, but if a connection is loose or a wire is undersized or corroded, the flow can be impeded and heat can build up in the wire. Doubling the amount of current through a wire produces a fourfold increase in heat generation. Therefore, it's important to ensure that wires are properly sized to decrease the potential of overheating. Excess heat in wires can lead to fires, but it can also cause the insulation surrounding the copper wires to become brittle. Exposed electrical wire corrodes quickly in elevated ammonia environments and can increase the risk of shock and short circuiting.

Commercial or industrial grade electrical wire (no Romex) should be run to all equipment inside of the house

and through rigid conduit. It may be tempting for the electrician to run electrical wire through the attic space, but this should never be done. In addition, commercial or industrial-grade outlets should be used inside of the house. They are fully sealed and designed for moist and dusty environments.

Wiring systems should be periodically inspected by a qualified and competent electrician. A temperature gun, infrared camera, volt meter, and flashlight are tools that can be used to inspect breakers, connections, and wires that may be operating outside of their maximum recommended temperature range. Paying close to attention to electrical systems in older houses is especially recommended and can prevent major losses.

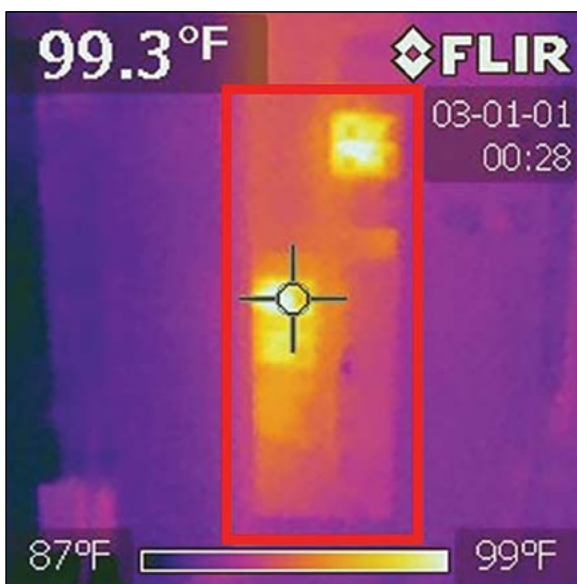
What about your heaters?

Radiant heaters are not generally considered to be part of the electrical system, but maintaining them is critical to ensure bird comfort and reduce fire risks. Unfortunately, they often receive little attention until there is a problem. A visual inspection of all heaters during brooding to make sure that all hoses are secure and fittings are tight can ensure your heaters perform efficiently and can reduce fire risks. Gas hoses or electrical wire should not be in contact with the canopy of the heater. Cleaning heaters several times a year with a backpack blower can remove built-up dust and debris and increase overall performance. The performance of a dirty round radiant brooder was shown to have a 30 percent reduction in performance when compared to a new heater. Preventative maintenance of radiant heaters can bolster poultry house safety and prevent future headaches.

When purchasing new heaters, look for UL- or CSA-rated heaters. Heaters with this designation usually have a sticker with "UL" or "CSA" on it, which indicates that they meet strict standards for safety, emissions, and other aspects of design and construction.

Are you periodically testing your generator?

Generators are a critical component of your electrical system. If they don't fire up when power is lost, then it's really just an expensive piece of metal. The National Poultry Technology Center at Auburn University recommends that generators be tested once every flock with all the equipment needed for the flock operating. Testing a generator under full load ensures that it will be able to properly handle the electrical needs of the farm in a crisis. A generator can also be tested while houses are empty, but make sure that all fans and lights are on before transferring power. Performing a "kill test" on your farm helps identify and fix problems with your generator or

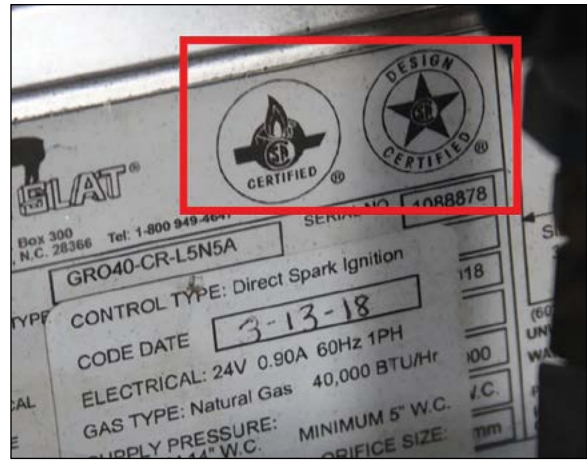


This thermal image shows a breaker box (inside red box) that is in good working order. The circuit breakers shown here are all operating under 104 degrees, which is the maximum operating temperature for most circuit breakers. If a breaker is operating well above 104 degrees, it's time to replace it and start troubleshooting potential problems.

your electrical system before the unexpected storm or lightning strike.

Many growers have their backup generators programmed to “exercise” once per week for an hour or so at a time, often on Monday mornings. If you do this, make sure the automatic transfer switch is “exercising” the generator under load. This way, you will know each week that the battery is good and can start the generator under full load, and that in case of emergency, the generator can operate all the necessary equipment, such as feeders, lights, fans, cool cells, brooders, and well pump(s). A trickle charger may help keep the battery at its best and a block heater may help the generator start easier in cold weather. Be sure to check the fuel tank on a regular basis, keep the tank at least $\frac{3}{4}$ full, and top it off if threatening weather is in the forecast.

It is also currently recommended that the generator shed be built in a centralized location on the farm and not attached to any particular house. The reasoning behind this is that if a house is lost due to fire or windstorm and the generator shed is attached to it, power is lost to the entire farm. Completely enclosing a generator in its own building is a good idea to protect it from the elements and critters. However, if the generator is in an enclosed building, it must be properly ventilated.



This round radiant heater has been certified by CSA (symbols shown in red box). The certification ensures quality construction and performance and should be found on all heaters that are installed in poultry houses.

Take-Home Message

An ounce of prevention is worth a pound of cure. This saying definitely applies to poultry-house design and construction. Reducing risks of catastrophic losses from inadequate electrical systems is a benefit to growers, integrators, and insurance companies. Also, don't forget to have a competent and qualified electrician perform an electrical inspection on your farm annually.

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