

Bulletin 22-3-6
Electrical equipment in confinement barns
Rules 22-002, 22-100, 22-200-22-204, 22-300 and 22-400

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Background/Question

The move toward larger farming operations in which livestock and poultry are housed in larger, more extensive confinement buildings has changed the environment within these buildings. Construction practices incorporating a sealed envelope design of the buildings and under floor waste collection has created a dangerous corrosive atmosphere within these buildings, causing large fire losses due to failure of electrical devices and terminations. Thermo graphic imaging has identified the problem primarily in large swine confinement buildings; however, the issue has also been identified in large poultry and other livestock confinement buildings.

Direction

In order to minimize the effects of the corrosive atmosphere in the animal or poultry confinement area of the building, the following shall be adhered to:

1. The animal containment areas of the barns shall be classified as Category 1 and Category 2 locations in accordance with Rule 22-002.
 - a. A Category 1 location is one in which moisture in the form of vapour or liquid is present in quantities which are liable to interfere with the normal operation of electrical equipment.
 - b. A Category 2 location is one where corrosive liquids or vapours are likely to be present in quantities that are likely to interfere with the normal operation of electrical equipment.
2. Wiring methods in the animal or poultry containment areas shall be suitable for both Category 1 and Category 2 locations as outlined in Rules 22-200 to 22-204.
 - a. Rule 22-204 3) (wiring suitable for damp locations) shall not be permitted in the livestock or poultry areas due to present cleaning practices incorporating regular wash-down of these areas with high pressure washing systems.
3. Conductors and cable assemblies shall be copper in accordance with Rule 22-204 4).
4. Only such electrical equipment that is essential to the operation in the confinement area shall be installed in the area to comply with Rule 22-100.
5. Non-essential electrical equipment and equipment incorporating overcurrent devices shall be installed only in locations suitably separated from the confinement area and which are supplied with clean, dry, temperature controlled air (e.g. in electrical/mechanical rooms, offices). As an alternative, the equipment may be installed in the animal confinement portions of the barn provided it is in a pressurized enclosure which is supplied with clean, dry, temperature controlled air, and provided there is an alarm to signal loss of air flow (pressure).
6. Essential equipment and lighting in the livestock area shall be hardwired where practical with the use of wire connectors incorporating an anti-corrosion agent.
7. In cases where it is absolutely essential to use portable lighting or equipment fed from service receptacles in the area, the portable equipment flexible cord, cord cap, as well as the receptacle shall be approved for the corrosive atmosphere. In addition, the portable equipment shall be suitable for the environment in which it is used.
8. As an alternative to using the equipment cord cap to connect portable equipment to a receptacle, it shall be permitted to remove the cord cap and hardwire the equipment flexible cord to the branch circuit with the use of a box connector approved for the location incorporating a suitable gland for the type and size of the equipment flexible cord.

9. Equipment and enclosures required to be in the confinement area shall have enclosure designations in compliance with Rule 2-400 and Table 65 for corrosive areas (minimum 4X).
10. All raceways, fittings, junction boxes, cable assemblies and associated connectors, devices, and device boxes and covers, shall be approved for the corrosive atmosphere in the area.
11. Where conduit is used, it shall be:
 - a. Arranged so as to drain at frequent intervals to suitable locations; and
 - b. Equipped with approved fittings which permit the moisture to drain out of the system;
 - c. Installed so as to give 12 mm clearance from the supporting surface when either conduit or supporting surface is metallic; and
 - d. Sealed to prevent the migration of corrosive vapour where due to the location of equipment such migration is considered possible.
12. Where a conduit or aluminum-sheathed cable leaves a warm room and enters a cooler atmosphere, it shall be sealed off so as to prevent breathing and subsequent condensation, and shall be done in such a manner that condensate will not be trapped at the seal.
13. Proper sealing of the conduit system will prevent the migration of corrosive vapours through the conduit from the livestock area into the electrical panels, etc. that are located outside the livestock area. Where conduits go from warm to cold areas they also must be sealed to prevent condensation in the electrical conduit system.

Recommendation

Rule 2-300 requires all electrical equipment be kept in safe and proper working condition. ESA recommends the following for these types of installations:

1. Electrical equipment in this environment should be checked regularly for deterioration and tightness of connections.
2. Enclosure covers should be secured properly to ensure gaskets provided with the enclosures minimize the influx of corrosive atmosphere and moisture within the enclosure. Damaged and deteriorated gaskets should be replaced.

Photo B1 - Thermo graphic images that demonstrate overheating of terminations at a receptacle and a panel board that are located in a large confinement barn

