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Farmstead Safety Evaluation Guide

Safe working conditions for personnel and safe, healthful living conditions for animals are critical requirements in the design of all farmsteads.

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All farmsteads periodically should be evaluated for potential hazards and conditions that could lead to injury, death, or premature building failure or loss. Some hazards develop with time and are easily overlooked. Others are the result of poor planning or just being "too busy." To assess the safety of your farmstead and buildings, answer the following questions. Any question that cannot be answered with a firm "yes" indicates a need for corrective action.

General Building Safety

1. The loss of my building is covered by a good and valid insurance policy.
   _____yes? _____no?*

   *Many insurance policies contain exceptions or conditions which make the policy invalid. Some of these include electrical wiring that does not meet the minimum requirements of the *National Electrical Code* (state law), inadequate roof design loads, inadequately protected foam insulation, and animal loss due to suffocation resulting from ventilation system failure. Read your policy carefully or have your insurance agent outline any exceptions and special requirements in your policy -- before you need it!

2. Major buildings are located at least 100 ft. from any shelterbelt and at least 75 ft. from other buildings.
   _____yes? _____no?*

   *Locations within 100 ft. of a shelterbelt have increased snow accumulations and reduced airflow during warm weather. The airflow is critical with non-mechanically ventilated livestock buildings. Adequate building separation is necessary for surface drainage, site maintenance, and minimizing fire losses.

3. Major buildings are designed to carry a roof snow load of at least 25 lbs per sq. ft. (psf) [30 psf in the northeastern third of Nebraska] and to withstand the forces of at least an 80 mph wind (approximately 15"-1"6 psf).
_____yes? _____no?*

*Livestock buildings should be designed to carry at least the listed loads. Lighter design loads save little in initial cost but may result in premature building failure. Before accepting lighter design loads, consider what next week would be like if your building collapsed during a storm tonight.

4. Wood building framing members are free of insects and dry rot or other deterioration. Steel structural members are free of corrosion.
_____yes? _____no?*

*"Dry" rot and corrosion indicate moisture problems due to leaks, inadequate ventilation, etc. These conditions weaken structural members and lead to premature building failure.

5. Building purlins, ceiling and wall panels are free of water stains.
_____yes? _____no?*

*Purlin staining usually indicates inadequate ventilation. Water stains on ceiling or sidewall panels indicate inadequate insulation, migration and condensation of moisture, or leaks.

6. The farmstead and traffic routes in buildings are free of tripping and other hazards. Floors and walkways have a slip-resistant finish.
_____yes? _____no?*

*Eliminate debris, ropes, cords, baling wire, boards, limbs and similar hazards from the animal and personnel environment. Small hard-to-see hazards are particularly dangerous. Remove all nails from discarded lumber. Keep stairs clean and free of debris. Smooth floor and lot surfaces become slippery when wet and increase risk of injury.

7. Access ports to cisterns, ground cellars, and manure storages; openings for dropping feed or bedding from storage mows; etc., are grated or otherwise covered and protected during periods of non-use. Unused and abandoned wells have been filled in accordance with state regulations.
_____yes? _____no?*

*Death due to drowning, inhalation of toxic gases, or falls can occur if personnel or animals enter in-ground storages or fall through openings in floors or into wells.

8. Access ladders to silos, grain bins, feed bins, storage mows, above-ground manure storages, etc., are equipped with safety cages and are above the reach of children.
_____yes? _____no?*

*Falls are a common cause of injury and death among children. Prevent child access to ladders, elevated platforms, etc.

9. Catwalks, platforms, etc., more than 18 inches above ground or floor level are equipped with safety rails or cages.
_____yes? _____no?*

*Falls and injuries occur when people slip or lose their balance. Provide a 42-inch high rail along any working platform that cannot be easily accessed by a single step. A rail is recommended on any platform more than 18 inches above the adjacent floor or soil surface.

10. An effective, on-going rodent control program is in place.
_____yes? _____no?*

*Failure to control rodents increases the spread of disease and damage to insulation, vapor barriers, or electrical wiring. Control begins by denying harborage and access to feed and water.

Livestock Housing Facilities

11. All gates, partitions and animal constraints are designed to minimize the risk of animal strangulation. Unused gates and panels are secured and stored in a way to prevent them falling over and causing injury.
_____yes? _____no?*

*Reduce the risk of animal injury or strangulation by limiting the clear space in and around gates, partitions, etc., to the following: pig nurseries -- 2 in.; pig growing/finishing and mature animal units -- 4 in.; calves -- 4 in.; cows, horses, mature beef animals -- less than 6 in. or 12 in. or more. Secure unused gates and panels with chains to prevent them from falling over and crushing or injuring personnel or animals.

12. Building and lot pen partitions are high enough to prevent animals from jumping or crawling over them.
_____yes? _____no?*

*Recommended partition heights for swine buildings are: nursery and growers -- 30 in.; growing/finishing units -- 36 in.; breeding/gestation facilities -- 48 in. Partitions for horses, dairy heifers, cows and mature beef animals should be at least 4 ft. high. Goat housing requires special care because of the animals' climbing ability. Avoid horizontal rails in swine and goat housing.

13. The farmstead and all livestock lots are free of ledges.
_____yes? _____no?*

*Ledges develop at any location where soil and concrete join. Minimize tripping hazards by eliminating ledges. In open lots, control ledges to ensure easy animal access to waterers and feeders or bunks, to control mud, and to minimize the risk of animal injury. Any ledge 6 in. or more in height is unacceptable.

14. All livestock waterers have antiback-siphoning outlets or are equipped with anti-backflow check valves.
_____yes? _____no?*

*Antiback-siphoning devices are required to prevent backflow from livestock waterers into the farmstead water system. A mechanical anti-siphon device or an air gap equal to twice the outlet pipe diameter is required. When was the last time you checked your livestock waterers to see if you'd like to drink the water?

15. The odors in my livestock buildings are low enough that I would not hesitate to go directly from my animal housing facility to the local coffee shop.
_____yes? _____no?*

*High odor levels indicate deficiencies in the system. Problems may be due to inadequate ventilation or improper manure management practices. Ammonia and hydrogen sulfide ("rotten egg" gas) depress animal performance and can cause death.

Heating and Ventilation

16. My below-floor or in-building manure storage is equipped with a ventilation system or other means to assure continuous removal or dilution of gases in the animal zone.
_____yes? _____no?*

*Continuous airflow through the animal space is needed to remove or dilute toxic and irritating gases. In mechanically ventilated swine buildings, install inlets above the dunging area. Operate one fan continuously. In non-mechanically ventilated buildings equip the storage with PVC pipe "chimneys" extending from just beneath the floor surface to at least 5 ft. above the roof. Provide one 12 in. diameter chimney per 400-500 sq. ft. of manure surface area in the storage. Space chimneys at 30-50 ft. intervals along the length of the building. Use equivalent ratios and spacings for other pipe sizes. Do not allow manure to accumulate within 6 in. of the chimney inlet.

17. I can work in my building for several hours or a full day without getting a headache.
_____yes? _____no?*

*One possible cause of headaches is elevated carbon monoxide levels. Carbon monoxide problems are common during cold weather in poorly or under-ventilated buildings with non-vented heaters. Carbon monoxide also causes abortions and many "unexplained" deaths of young animals.

18. Continuous airflow is provided in every building where I use unvented heaters that burn liquid or gaseous fuels.
_____yes? _____no?*

*Unvented heaters discharge about five quarts of water vapor for each gallon of propane burned. A minimum of 6 percent of the propane burned is discharged as unburned hydrocarbons. Ventilation is needed to remove moisture and air contaminants. Inadequate ventilation allows carbon monoxide concentrations to reach unacceptable levels. A continuous airflow of at least 4 cfm per 1000 Btu's/hr of heater capacity is required. Unvented heaters are not allowed in buildings where humans are working unless continuous ventilation air is assured. Inadequate ventilation depresses animal performance and increases health problems.

19. All heating devices are serviced by a qualified repairman at least once per year.
_____yes? _____no?*

*Annual servicing is needed to assure air vents are open, remove dust, maintain heat transfer efficiency, and correct problems with controls or wear of the fuel orifice. Dirty equipment and improper adjustment decrease fuel use efficiency and increase the risk of toxic gas formation.

20. The relative humidity in my buildings is generally less than 65 percent.
_____yes? _____no?*

*Excess relative humidity increases respiratory problems, decreases the die-off rate of pathogens (i.e., disease-causing organisms), decreases animal comfort, and increases deterioration of equipment and structural members. A relative humidity of 50-65 percent is best.

21. My livestock buildings are free of "fog" on cold mornings.
_____yes? _____no?*

*Fog in livestock buildings indicates inadequate ventilation and high relative humidity. Such conditions depress animal performance and health.

22. Dust levels in my building are minimal at all times.
_____yes? _____no?*

*Excessive dust indicates inadequate ventilation and increases respiratory problems. Dust enhances pathogen

movement within the animal environment. Methods to help control dust include increasing ventilation airflow rates, using drop chutes from feed augers into feeders, putting covers on feeders, adding fat to diets, or using a coarser grind. Remove dust between groups of animals to prevent re-inoculation of the clean environment and help control the spread of disease.

23. Copper pipes and wires in my buildings are still copper in color and galvanized pipes are still galvanized in color.
_____yes? _____no?*

*Blackened copper or a white powder on galvanized pipes results from elevated levels of hydrogen sulfide. Discoloration indicates a need to evaluate the ventilation system, manure management practices and general sanitation.

Fire Safety

24. All foam insulation materials in my buildings are covered with a protective overlay.
_____yes? _____no?*

*All foam insulation materials burn when exposed to fire. When they burn, toxic gases are produced. Cover all insulation materials with plywood, metal or other overlay material to control the spread of fire. Vinyl, foil, and thin aluminum facings used on some insulation products do not offer adequate protection. Some insurance companies will not insure buildings with improperly installed foam insulation.

25. All propane tanks are located at least 25 ft. away from the buildings.
_____yes? _____no?*

*Tanks set too close to buildings increase the risk of propane fumes seeping into the building in the event of a leak and increase the risk of a propane tank explosion in the event of a fire. An explosion will spread the fire and might cause personal injuries. Greater separation distances are required for tanks with a capacity in excess of 2,000 gallons.

26. All flammable materials, e.g., gasoline, kerosene and paper towels, are properly stored in labeled containers away from possible ignition sources.
_____yes? _____no?*

*Improper storage of flammable materials increases the risk of fire and loss. Sparks from an electrical fault or motor starting can ignite some materials. Combustible materials on the floor around motors and vacuum pumps increase slip hazards and can increase the spread of a fire.

27. Building attic spaces have been separated into compartments not over 100 ft. long using fire-resistive materials.
_____yes? _____no?*

*Fire-resistive barriers are needed in the attic space of all buildings to help control the spread of fire. Install barriers at intervals not exceeding 100 ft. A metal or gypsum (dry wall) covering over a truss provides a satisfactory barrier. The covering must extend up to the roof surface, i.e., between purlins. A masonry fire wall that extends at least 2 ft. above the roof is even more effective.

28. All connecting passageways between buildings have fire-rated self-closing doors.
_____yes? _____no?*

*Self-closing doors with at least a one-hour fire rating are needed to control the spread of fire within passageways connecting buildings. A masonry fire wall provides added protection.

29. A UL approved lightning protection system is in place on all buildings, silos, etc. A "Master Label" has been obtained for each installed system.
_____yes? _____no?*

*A properly installed lightning protection system is a good investment on all buildings. Systems must be maintained to assure maximum protection and safety.

Electrical System

30. All farmstead electrical systems are free of corrosion.
_____yes? _____no?*

*Corroded boxes, conduit or conductors, and damaged insulation increase the risk of electrical system failure and fire or electrocution of animals or personnel. Metallic boxes, conduit, etc., are not allowed in livestock buildings and feed-processing areas.

31. All electrical panels are readily accessible and clearly labeled.
_____yes? _____no?*

*Avoid storing anything within 3 ft. of the front of any electrical panel. Easy access is needed for maintenance and in emergencies. Every disconnect and circuit breaker must be clearly labeled.

32. All wiring has been done using either type UF cable or non-metallic conduit with type THHN/THWN conductors.
_____yes? _____no?*

*NEC Article 547 requires cables or conductors designed for wet locations in agricultural buildings. Type NM (non-metallic) or NM-B electrical cable (one trade name = Romex®) is not satisfactory and should not be used. Appropriate fittings are required in all cases. Corrugated electrical non-metallic tubing (ENT) is not allowed in agricultural buildings.

33. All electrical wiring is surface mounted.
_____yes? _____no?*

*Surface mounting reduces the risk of damage by rodents, enhances maintenance and preserves the integrity of vapor barriers and interior wall or ceiling linings. Some companies will not insure buildings with concealed wiring. Where conductors or conduits must pass between rooms, openings around the cable or conduit -- and the space around the conductors within the conduit -- must be sealed with electricians' putty.

34. All electrical boxes and fixtures are made of corrosion-resistant materials and are of a dust-tight and water-tight design.
_____yes? _____no?*

*Metallic electrical system components deteriorate quickly in livestock buildings. Article 547 of the *National Electrical Code* (NEC) requires corrosion-resistant materials. Boxes must be dustproof and waterproof. Cast aluminum boxes do not perform well in agricultural buildings. Use sealed switches and plastic (not Bakelite®) fixtures. Non-waterproof residential style plastic boxes are not allowed in agricultural buildings.

35. Electrical cables and conduits enter boxes from the side or bottom.
_____yes? _____no?*

*Cables and conduits entering from the top of a box allow condensation to drip onto electrical contacts. The result is

accelerated deterioration and increased risk of extraneous voltage problems, electrical shorts, or premature equipment failure. Corrosion can make circuit breakers non-functional.

36. All lighting fixtures are of an enclosed, gasketed, watertight and non-corrosive design.
_____yes? _____no?*

*Incandescent lighting fixtures must have non-metallic, corrosion-resistant boxes and screwed-in-place gasketed globe covers. Fluorescent lights must have gasketed covers. All light fixtures must be designed to be watertight.

37. All motors are equipped with a properly sized fused disconnect or circuit breaker located within sight of and within 10 ft. of the motor.
_____yes? _____no?*

*Properly sized circuit breakers or fused switches with Type S fuses sized at 1.25"-1".5 times the motor nameplate current draw (FLA) are needed to protect the motor circuitry and to provide safety during maintenance procedures. Use dual-element or time-delay fuses to carry starting currents.

38. The use of extension cords is kept to an absolute minimum. When an extension cord is needed, a heavy duty (Type S), grounded cord or equivalent is used.
_____yes? _____no?*

*Install equipment such as heaters with flexible cord or flexible non-metallic conduit with stranded conductors wired directly into the electrical supply box. Waterproof plugs and receptacles also may be used. Do not use light duty residential style two-conductor extension cords.

39. All heat lamps have cords short enough to prevent contact between the heat lamp and floor without first becoming unplugged, are installed in porcelain sockets and are supported by chains.
_____yes? _____no?*

*Use only porcelain sockets for heat lamps. To reduce risk of fire, make cords short enough to assure heat lamps cannot come into contact with the floor, pen partitions, etc., without first becoming unplugged. This is especially critical in buildings with wood floors or partitions, straw bedding, etc. Never support heat lamps by the electrical cord.

40. My buildings are free of damaged or chewed wiring and conduit.
_____yes? _____no?*

*Repair all damaged electrical wiring to help assure safe conditions for personnel and animals.

41. All motors are of a totally enclosed, farm service duty design, rated for continuous operation.
_____yes? _____no?*

*Improper use of motors increases the risk of premature motor failure, electrical shock and fire.

42. All electrical equipment is equipped with a separate grounding conductor.
_____yes? _____no?*

*The NEC requires a separate grounding conductor (bare copper or copper with green insulation) for all electrical equipment. The grounding conductor must be extended to the service entrance grounding bus. Under no circumstances should the grounded conductor ("neutral") and the grounding conductor ("ground wire") ever be interconnected except at the service entrance panel. Improper grounding increases the risk of electrocution and extraneous voltage. A ground rod at an electrically heated waterer is not a substitute for a properly installed grounding

conductor.

43. All metal building components, gates, metal floor coverings, feeders, and similar equipment within 8 ft. of the ground or floor surface are electrically bonded together and to the grounding electrode of the electrical system.
_____yes? _____no?*

*Failure to properly ground (bond) all metallic components within a building can allow a voltage to develop between two surfaces. The result can be electrocution if an animal or person touches both surfaces. The bonding conductor must be attached to the electrical system grounding network.

Summary

The asterisk following the "no" response to each question is intended to raise a caution flag. If you answered any of the questions with a negative response, you have a potential problem. Depending upon the severity of the violation, this could make your agricultural enterprise unsafe.

Good design, construction and system installation, and appropriate routine maintenance are required to ensure safety. We sometimes jokingly state that buildings have outlived their usefulness, but no building achieves that distinction in a safe condition without routine or periodic maintenance. Take time now to evaluate your facility and assure that your livelihood will not be jeopardized by unnecessary safety hazards to either you or your animals.

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