

FENCE

(Feet)
Code 382

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

A constructed barrier to animals or people.

II. Purposes

This practice may be applied as part of a conservation management system to support one or more of the following purposes:

- exclude livestock or wildlife from areas that should be protected;
- confine livestock on an area;
- control domestic livestock while permitting wildlife movement;
- subdivide grazing land to permit use of grazing systems; or
- regulate access to areas by people, including vehicles, and/or to prevent trespassing for safety purposes.

III. Conditions Where Practice Applies

This practice may be applied on any area where livestock and/or wildlife control is needed, or where human access is to be regulated. Fences are not needed where natural barriers will serve the purpose.

IV. Federal, Tribal, State and Local Laws

Users of this standard shall be aware of potentially applicable federal, tribal, state and local laws, rules, regulations or permit requirements governing fences. This standard does not contain the text of the federal, tribal, state or local laws.

V. Criteria

A. General Criteria

1. Fencing shall consist of the acceptable type as defined by Table 1, Fence Selection Criteria, as necessary to adequately control the movement of animal(s) or people to meet the intended management objective.

2. Fencing shall consist of acceptable designs, materials, and methods as described in the Wisconsin Engineering Spreadsheet, Fence Design and Drawings; and Wisconsin NRCS FOTG, Section IV, Construction Specification 10, Fence.
3. Fences may be permanent, portable, or temporary and shall be positioned to facilitate the management requirements.
4. Boundary line fences (fence property line) shall comply with state laws and standards for construction (Ch. 90, Wis. Stats.).
5. Fencing materials shall be of a high quality and durability, and the construction performed to meet the practice design.
6. All permanent fences are to be constructed with the intent of being maintained for at least 10 years. Therefore, the criteria for all permanent fences require material, design, and construction that shall have a minimum life expectancy of 10 years with minimum maintenance.
7. Height, number, and spacing of wires will be installed to facilitate control and management of the animals and/or people, as shown in Table 1. Height, size, spacing, and type of posts used shall meet the needs of the planned fence type and the topography of the site.
8. Barbed wire shall not be electrified or insulated for electrification.
9. Manufacturer's guidelines shall be adhered to during installation and shall meet the minimum construction specifications for each type of fence to ensure proper component assembly.
10. If electric fences must pass under overhead high voltage power lines, cross the power lines as close to perpendicular as possible.

The maximum height of the top wire of the fence shall be 6 feet.

11. Gates shall be placed at corners or other convenient locations as necessary to facilitate livestock movement. Position gates on flat, firm ground to avoid erosion and water holes.
12. When the intended use of the fence system is to restrict access by people and animals to safety hazards, the fence and gates shall be a minimum of 48 inches above grade and shall not pass larger than a 6-inch sphere between any fence or gate member. The maximum distance between the bottom of the fence or gate and the ground shall be 6 inches. All fence openings shall have gates that can be shut and securely fastened. All materials shall have sufficient durability and strength for the intended use. Additional safety features may be required depending on the hazard classification and site conditions.
13. When the intended use of the fence system is to restrict access by vehicles, the spacing between fence openings and the height above the ground shall be appropriate for the vehicle type to be restricted. Horizontal cross members across fence openings may be used to increase fence openings. All materials shall have sufficient durability and strength for the intended use. Access point(s) for authorized vehicles may have gates that can be shut and securely fastened.

Barriers associated with roads shall be adequately marked to safeguard human safety and minimize the risk of liability.

VI. Considerations

- A. Consider installing fences in locations that will facilitate maintenance. Avoid irregular terrain such as gullies and/or water crossings if possible or include additional bracing or specially designed fence components. Where applicable, clear right-of-ways will be established to facilitate fence construction and maintenance.
- B. Fences should be installed at least 8 feet from wooded areas to minimize damage by windfalls.
- C. Consider wildlife movement needs when locating fences.

- D. Consider livestock management, handling, watering, and feeding when locating fences.
- E. Consider soil erosion potential when planning and constructing a fence on steep slopes.
- F. Battery powered fences require more management to assure timely replacement of batteries. Extra batteries should be kept on hand to rotate during charging.
- G. Consider the use of solar powered energizers for electric fences in remote locations.
- H. Training areas should be used to condition new or young livestock to electric fences. Select a well-fenced area with an interior cross fence where the animals will come in contact with the fence. Normally a 24 hour exposure to the electric fence is adequate. When animals are approaching the fence with caution or staying a distance away, they are trained.
- I. Consider raising the minimum height of the lower wire of fences located in the floodplain.
- J. For electrified fences, consider safety recommendations and cautions from the manufacturer and supplier.
- K. Consider energizing an electrified fence 48 hours before turning in livestock to avoid damage by wildlife.
- L. If an existing fence must be removed during construction, recycle or properly dispose of the old fence materials.

VII. Plans and Specifications

Plans and specifications are to be prepared for each specific field site, based on this standard. The plans will include operation and maintenance requirements (see Section VIII below). The Diggers Hotline (800-242-8511) will be called by the landowner to locate underground utilities prior to fence construction. Fences shall be designed and constructed according to Wisconsin NRCS, FOTG, Section IV, Construction Specification 10, Fences.

The plan shall include the following.

- A map or sketch of the planned fence location. The type(s) of fence shall be specified by location.
- The type and quality of fencing materials.

- Estimated quantities of fence materials needed.
- Appropriate detailed design drawings for corner assemblies, gates, and specialized components like stream crossings.
- Location of existing fences to be used or removed.
- Details of fencing right-of-way site preparation needs and construction site erosion control.
- Disposal of old and/or scrap fencing materials.

VIII. Operation and Maintenance

- A. Routine inspection of fences should be part of an ongoing management program. Inspection after storm events is needed to ensure the function of the intended use of the fence.
- B. Perform maintenance and repairs as needed to facilitate the intended operation of the installed fence. Remove fallen limbs and maintain proper tension on the fence wires. Overhanging trees and limbs should be trimmed or removed as needed.
- C. Regularly check electric fences to determine the voltage on the fence. If voltage is not sufficient, determine the cause and correct. During dry weather, ground rods may need water applied to soil around them. Clear brush from the fence line to reduce voltage loss. Vegetation should be controlled to maintain proper voltage and prevent stray voltage.
- D. Electrified floodgates must be maintained and kept clear of debris. During extended flooding periods, switch off the electric power to floodgates.
- E. Safety during construction and maintenance is a primary concern. Eye and hand protection should be worn while performing fence maintenance.

IX. References

USDA, NRCS Wisconsin Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications.

Wisconsin Statutes, Chapter 90, Fences:
<http://www.legis.state.wi.us/statutes/Stat0090.pdf>.

High-Tensile Wire Fencing, Northeast Regional Agricultural Engineering Service, Ithaca, NY.

Fences, USDI-Bureau of Land Management, USDA, Forest Service. Publication No. 2400, Range 8824 2803. July 1988.

Cadwallader, T. Understanding Electric Fence in "Grazing References Materials Manual," University of Wisconsin, Center for Integrated Agriculture Systems. January 1997.

Missouri Electric Fencing for Serious Graziers, USDA-Natural Resources Conservation Service, Missouri.

USDA, NRCS Wisconsin Engineering Spreadsheet, Fence Design and Drawings:
http://www.wi.nrcs.usda.gov/technical/eng_spreads.html.

Table 1
Fence Selection Criteria

Fence design and construction must meet the minimum requirements for controlling specific animal types.

Animal Type to Control	Fence Type	Purpose of Fence		Spacing Inches Above Ground Level (WW fences start 2-7 inches above the ground)
		Perimeter Around Mgt. Unit	Interior Subdivision	
Cattle	Barbed 3-wire	NO	Meets	18 to 42
Cattle	Barbed 4-wire	Meets	Exceeds	18 to 42
Cattle	Barbed 5-wire	Exceeds	Exceeds	18 to 42
Cattle	Non-Electric 4-wire high tensile smooth	NO	Exceeds	18 to 42
Cattle	Non-Electric 6-wire high tensile smooth	Meets	Exceeds	12 to 42
Cattle	Non-Electric 8-wire high tensile smooth	Exceeds	Exceeds	6 to 48
Cattle	Electric 1-wire high tensile smooth	NO	Meets	32
Cattle	Electric 2-wire high tensile smooth	NO	Exceeds	18, 36
Cattle	Electric 3-wire high tensile smooth	Meets	Exceeds	22 to 42
Cattle	Electric 4-wire high tensile smooth	Exceeds	Exceeds	12 to 42, minimum 2 hot
Cattle	Woven wire plus one or more top wire	Exceeds	Exceeds	47 minimum including wire
Cattle	Wood or Composition boards (6" wide), 4 boards	Exceeds	Exceeds	54 height, 6, 6, 8, 10 between boards
Cattle	HT Woven wire plus one or more top wires	Exceeds	Exceeds	47 minimum, 6 maximum between top wires
Goats & sheep	Non-Electric 5-wire high tensile smooth	NO	Meets	6 to 32
Goats & sheep	Non-Electric 6-wire high tensile smooth	NO	Exceeds	6 to 36
Goats & sheep	Non-Electric 7-wire high tensile smooth	Meets	Exceeds	6 to 42
Goats & sheep	Electric 3-wire high tensile smooth	NO	Meets	8, 18, 30
Goats & sheep	Electric 4-wire high tensile smooth	NO	Exceeds	8 to 36, minimum 2 hot
Goats & sheep	Electric 5-wire high tensile smooth	Meets	Exceeds	8 to 38, minimum 2 hot
Goats & sheep	Woven wire plus one or more top wire	Exceeds	Exceeds	47 minimum including wire
Goats & sheep	HT Woven wire plus one or more top wires	Exceeds	Exceeds	47 minimum including wire
Goats & sheep	HT woven electric	Exceeds	Exceeds	47 minimum including wire
Goats & sheep	Wood or Composition boards (6" wide), 4 boards	Exceeds	Exceeds	6, 6, 8, 10 between boards
Horses	Electric 2-wire high tensile smooth	NO	Meets	28, 38
Horses	Electric 3-wire high tensile smooth	Meets	Exceeds	28, 38, 48
Horses	Electric 4-wire high tensile smooth	Exceeds	Exceeds	18 to 48, minimum 2 hot
Horses	Electric 5-wire high tensile smooth	Exceeds	Exceeds	18 to 54, minimum 3 hot
Horses	Electric 1-wire Poly-Coated High Tensile Wire	NO	Meets	34
Horses	Electric 2-wire Poly-Coated High Tensile Wire	Meets	Meets	28, 38
Horses	Woven wire w/ 1 wire HT on top	Exceeds	Exceeds	54 including wire
Horses	Mesh "No climb" 2"x4" spacing	Exceeds	Exceeds	54 including wire
Horses	Wood or Composition boards (6" wide), 3 boards	Exceeds	Exceeds	12 minimum, 18 maximum between boards, 54 height
Hogs	Electric 2-wire high tensile smooth	NO	Meets	8, 16
Hogs	Electric 3-wire high tensile smooth	Meets	Exceeds	8, 16, 24
Hogs	Woven wire w/ 1 wire barb or HT	Exceeds	Exceeds	32 + barb or HT = 38
Hogs	Woven wire w/ 1 HT electric inside	Meets	Meets	32 + 1 electric wire 8 off ground inside of fence
Deer	Woven wire 96" tall	Meets	Meets	96 including wire
Bison	Electric 4-wire high tensile smooth	NO	Meets	16 to 42
Bison	Electric 5-wire high tensile smooth	NO	Exceeds	16 to 48
Bison	Electric 6-wire high tensile smooth	Meets	Exceeds	12 to 52
Chickens/turkey	Woven wire 2"x4" 1 wire HT or barb above	Exceeds	Exceeds	72 including wire
Emu and ostrich	Woven wire 6"x6" 1 wire HT or barb above	Exceeds	Exceeds	72 including wire
Chickens/turkey	HT Woven wire 2"x4" 1 wire HT or barb above	Exceeds	Exceeds	72 including wire
Emu and ostrich	HT Woven wire 6"x6" 1 wire HT or barb above	Exceeds	Exceeds	72 including wire