

**NATURAL RESOURCES CONSERVATION SERVICE**  
**KENTUCKY CONSERVATION PRACTICE STANDARD**

**FENCE**

**(Feet) Code 382**

**DEFINITION**

A constructed barrier to animals or people.

**PURPOSE**

This practice facilitates the accomplishment of conservation objectives by providing a means to control movement of animals and people, including vehicles.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice may be applied on any area where management of animal or human movement is needed.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Fencing materials and type and design of fence installed shall be of high quality and durability. The type and design of fence installed will meet the management objectives and topographic challenges of the site.

Based on management and site location needs, fences may be: permanent exclusion fence (contain all target livestock classes), permanent interior fence (principal barrier for select livestock classes), or temporary portable fence (feasible to re-locate when needed).

For permanent exclusion fence construction, refer to Table 1 of this standard. For interior fence refer to Table 2. For temporary (portable) fence systems see Table 3.

Fences shall be positioned to facilitate management requirements. Ingress/egress features such as gates and cattle guards shall be planned. The fence design and installation should have the life expectancy appropriate for management objectives and shall follow all federal, state and local laws and regulations.

Height, size, spacing and type of materials used will provide the desired control, life expectancy, and management of animals and people of concern see Tables 1, 2, 3 and 4.

Gates installed or constructed must equal or exceed the fence construction materials and workmanship with regard to livestock control and durability.

Improve resource management by locating fences where they separate areas with differences in forage seasons of growth and palatability, land use, topography, or production potential.

Do not utilize woven wire for fences next to perennial streams because debris from flooding can lodge and destroy fence materials. Intermittent streams may flood as well and this criteria is dependent on the planner.

Fences across gullies or streams require special braces and designs. Breakaway fences or swinging water gaps allow debris and water to flow past the fence line without destroying the fence near the stream. Swinging, breakaway, or floating water gaps should span running streams.

Pasture/paddock divisions shall be consistent with grazing needs as projected by an NRCS Grazing Plan.

Plan fences to allow livestock easy access to water and handling facilities.

Generally stretch distances for all fencing shall be reduced on rough terrain.

If a wide stream or gully is to be crossed, the fence section will be terminated on one bank with a brace assembly and a new section started on the other bank. A floodgate or water gap will be installed across the stream or gully to restrain livestock and constructed so as to minimize debris buildup and prevent structural damage to the line fence on either side during flooding events.

### **Electrified Fence**

Utilize low or wide impedance electric fence energizer with a Joule and voltage rating sufficient to maintain charge over the entire fence length. Joule energizer ratings are inconsistent between manufacturers. Look for delivered voltage to the fence.

**Size the energizer to the operation and animal type: the voltage required for cattle is 3-5 thousand volts; horses require 2 to 3 thousand volts; and goats/sheep require 5-9 thousand volts. Younger animals and breeding stock require the upper range.** If selecting an energizer based on Joule ratings then you must base your decision on Joules delivered to the fence. As a rule of thumb, 1 output Joule per mile of fence works well under most conditions. The energizer also needs to be capable of maintaining the required voltage or Joules over the entire grazing season so choose accordingly.

Electric fences must be adequately grounded to ensure proper flow of electricity. Utilize a minimum of three ground rods a minimum of 6' long, at least 10' apart, with continuous wire run through the ground rod clamps to the fence charger. Install rods at an angle to maximize soil contact. Shallow or sandy soils will require more ground rods.

Use bull-nose type insulators should be used at pull assemblies for all electrified wires. Use insulators designed for the type of post being utilized. Nail on or screw in type insulators are commercially available for wooden posts. Insulators for steel "T" posts are also widely available. Install quality UV stabilized insulators to limit future maintenance issues. Some posts such as polymer coated and UV stabilized plastic fence posts serve as an insulator without further modification.

Utilize conductors that are of the same materials such as: galvanized wire, galvanized connectors, galvanized under gate wire, and galvanized ground rods. Unlike materials promote corrosion and electric fence failure.

Install lightning arrestors or spark gaps to limit damage to fence energizers.

Electric fences must have access to a dependable power supply, main line, solar power panel, or easily exchanged and properly sized deep cycle batteries. A ground rod should be installed at electric company's transformer pole (primary ground) and another ground rod installed at the electrical circuit breaker box (secondary ground), if they do not already exist.

Transfer of power around gate openings shall be performed by installing commercial available insulated under gate wire. Overhead wire electricity transfer should be avoided.

Insultube wire insulators are not adequate and will not meet the 382 fence lifespan without leakage.

### **CONSIDERATIONS**

The fence design should consider topography, soil properties, aesthetics, human access type, safety, management of livestock, moisture conditions, wildlife movement, durability of materials, flooding, and stream crossings.

When possible, fence should be installed a minimum of 20 feet away from the waterline and embankment for the protection of the embankment and vegetation as well as safety concerns.

When possible utilize a post driver to reduce labor and increase strength of the fence.

When planning and constructing a fence in flood prone areas, consider using high tensile electric fence. In these areas, high tensile smooth wire will collect less flooding debris and will greatly reduce maintenance issues associated with the fence. Woven wire will catch the most debris and should be avoided in these areas. Construct the fence with the fewest posts and wires as needed to control the animals of concern and meet the standard. Place the bottom wire as high as practical.

On steep slopes, locate fence where soil erosion from livestock trailing will be minimized. Plan additional bracing, posts, and labor will be required for rugged terrain.

When fencing with high tensile wire, consider purchasing 170,000 psi which is much easier to work with than 200,000 psi wire.

Place signs on the electrified sections of fence to warn visitors.

Consider wildlife movement needs when locating fences. Fence damage by wildlife and potential wildlife deaths can be reduced with consideration.

When human safety is a concern; add additional strands, change material, add electricity, or add height.

For sheep and goats an electrified offset wire (6" high and 8" away from fence) on the livestock side of the fence helps keep out predators and helps keep livestock from sticking their head through the fence.

## **PLANS AND SPECIFICATIONS**

Plans and specifications are to be prepared for specific sites. Plans and specifications for installing fences shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve all of its intended purposes. See Fence Construction Specifications in Table 1, 2, 3 and 4 and in Section IV of the FOTG under 382.

## **DOCUMENTATION AND VARIATIONS**

The completed work is to be checked and documented to verify that the practice is complete according to NRCS standards and specifications. Supporting data for documentation included those features of this practice that can be measured and observed such as: length of fence installed; type of fence; number of gates installed; type and capacity of charger; power fence is electrified at time of inspection; quality of all materials installed; and signature of the performance checker.

Variations from the above materials and installation specifications may be approved by the responsible technician provided it is determined that such variation would result in an installation that would equal or exceed a fence installed according to this specification.

Document any variations with the reason(s) why it will result in an installation that will meet or exceed one installed in accordance with the specifications.

## **OPERATION AND MAINTENANCE**

Regular inspection of fences should be part of an on-going management program. Inspection of fences after storm events is needed to facilitate the function of the intended use of the fence. For electrified fence, use a voltage tester to ensure adequate charge is being discharged along the entire fence span. Keep heavy vegetation away from fences, especially electric fences to avoid loss of charge. Installation of cut-off switches will assist in maintenance and repair of electric fences.

Maintenance and repairs will be performed as needed. Retain and properly discard all broken fencing material and hardware to prevent ingestion by animals or injury to equipment, people, or animals. Precautions should be taken to ensure the safety of construction and maintenance crews.

## **REFERENCES**

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**TABLE 1: EXCLUSION FENCE (PERMANENT)**

TYPE FENCE WIRE	TYPICAL WIRE STRANDS 1/	WIRE SPECIFICATIONS	MAXIMUM DISTANCE BETWEEN ASSEMBLIES 2/	MAXIMUM LINE POST SPACING 3/	MINIMUM LINE POST DIAMETER (D) POST LENGTH (L) AND DEPTH (d) 4/,5/,6
Barbed	5 or More Wires, Min. 42" high	15.5 Gauge Type III Galvanized or ZA Class 20 or higher	Less than 1,320' Apart Greater than 3.5" diameter Horizontal Brace 8' Long and Brace and Corner Posts 6-8" diameter, 8' long Brace Wire Minimum 15.5 ga Type III Galvanized or ZA Class 20 or higher	14' Apart 18' with Stays on 9' Spacing	Wood 4" D, 6' L, 24" Minimum Depth Steel 5.5' L, 18" D
Woven Wire or High_Tensile Woven Wire	Greater than 32" High Woven plus (1_or_2) Barbed Wires, For Sheep and Goats 4"x4" maximum openings is preferred (7) Min.42" Total Height of Fence	12.5 Top and Bottom- others 14.5 Gauge Type II Galvanized ZA class 20 or higher	Less than 330' apart Greater than 3.5" diameter Horizontal Brace 8' Long and Brace and Corner Posts, 6-8" diameter 8' long Brace Wire Minimum 15.5 ga Type III Galvanized or ZA Class 20 or higher	14' Apart Conventional Woven 25' Apart High Tensile Woven	Wood 4" D, 6' L, 24" Min. Depth Steel, High Density Wood, Fiberglass, or UV stabilized plastic or PVC 5.5'L, 18" Min. Depth
High_Tensile Electric or High_Tensile Woven Electric	4 or More Wires, for Sheep and Goats use a minimum of 6 strands, 9" to 11" spacing. (7), Min. 42" High	12.5 Gauge 170,000 psi Type III Galv. or ZA class 20 or higher	Less than 2,000' Apart Greater than 3.5" diameter Horizontal Brace 8' Long and Brace and Corner Posts, 6-8" diameter 8' long Brace Wire Minimum 15.5 ga Type III Galvanized or ZA Class 20 or higher	75' Apart with Light posts or non-conductive battens every 35'	Wood 4" D, 6' L, 24" Min. Depth Steel, High Density Wood, Fiberglass; UV stabilized plastic or PVC= 5.5'L Min.
High_Tensile (Non-electric)	7 or More Wires, Min. 42" High	12.5 Gauge 170,000 psi – Type III Galv. or ZA class 20 or +	Less than 2,000' Apart Greater than 3.5" diameter Horizontal Brace 8' Long and Brace and Corner Posts, 6-8" diameter 8' long Brace Wire Minimum 15.5 ga Type III Galvanized or ZA Class 20 or higher	12' Apart or 15' with Light Post or Stays Between	Wood 4" D, 6' L, 24" Min. Depth Steel, High Density wood, Fiberglass, UV stabilized plastic or PVC_5.5'L Min., 18" Min. Depth

Plank	Gaps between rails will be 10" or less and bottom rail will be at least 8" from the ground. Min. 42" high	Horizontal Boards shall be 1" x 6" (nominal) and at least 8 ft long.	Corner Posts, minimum 5" diameter 8' long	Posts will be 8 feet apart.	Wood 4" D, 6' L, 36" Minimum Depth, unless set in concrete then 30" depth
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**TABLE 2: INTERIOR FENCE (PERMANENT)**

TYPE FENCE	TYPICAL WIRE SPACING 1/	TYPICAL TYPE OF WIRE	AXIMUM DISTANCE BETWEEN PULL ASSEMBLIES 2/	MAXIMUM LINE POST SPACING 3/	MINIMUM LINE POST DIAMETER (D) POST LENGTH (L) AND DEPTH (d) 4/ 5/
Barbed Wire	3-4 Wires, 42" High	15.5_Gauge Type_III Galvanized or ZA class 20 or higher	≤ 1,320' Apart ≥3.5"dia.Brace 8' L 6-8" dia.brace_and corner Posts, 8' L	14' apart / 18' apart w/ stays for conventional wire. 30' w/ stays for h.t.	Wood 4" Dia. 6' Length, 24" Min. Depth  Steel 5.5' L, 18" Minimum Depth
High_Tensile Electric	1-3 Wires, Min. Ht. of Animal's nose at rest (Cows-26" to 32")	12.5_Gauge 170,000_psi Type III Galvanized or ZA class 20 or higher	≤ 4,000' Apart ≥ 3.5" dia. horizontal brace, 6-8" dia. brace and corner posts, 8' L	75' Apart	Wood 4"D, 6' L, 24" D  Steel, High Density wood, Fiberglass, UV stabilized plastic or PVC 5.5' L, 18" Minimum Depth

- 1/ Installed wire spacing will be as needed to contain the livestock.
- 2/ Corner and brace posts shall be 6" minimum and driven or set in the ground and tamped around 30" deep or set in 24" of concrete. New schedule 40 metal pipe 2" in diameter and 10' long can substitute for wooden brace posts.
- 3/ Closer post spacing may be needed to accommodate certain situations such as steep landscapes, fragile soils, deer crossings and other concerns.
- 4/ Gates will be new medium duty painted metal or galvanized gates.
- 5/ Commercially available brace wire or two loops of minimum 170,000 psi high tensile wire will be utilized to tighten braces. (Commercial fence strainers or tensioners should be used to tighten HT.)
- 6/ Use brace pins that are 3/8" diameter rebar or equivalent. Use galvanized fence staples that are a minimum of 1.5" long.
- 7/ ID-162 University of Kentucky Cooperative Extension Service Goat Production Basics in Kentucky

**TABLE 3: TEMPORARY FENCE (PORTABLE ELECTRIFIED)**

TYPE FENCE	TYPICAL WIRE SPACING	TYPICAL TYPE OF WIRE	MAXIMUM DISTANCE BETWEEN PULL ASSEMBLIES	MAXIMUM LINE POST SPACING	MINIMUM LINE POST DIAMETER (D) POST LENGTH (L) AND DEPTH (d)
Polytwine PolyRope Polytape	1-3 strands, at Ht. of Animal's nose at rest (Cows 26" to	Poly and wire braided strands or tape must carry sufficient charge.	No brace assemblies or permanent posts required unless site conditions warrant.	40' Apart, Add more tread-in posts_or_perma nent_as_terrain dictates.	None.
High Tensile Electric	1 Wire, at Ht. of Animal's nose at rest (Cows 26" to 32")	12.5 Gauge 170,000 psi Type III Galvanized or ZA class 20 or higher	No Brace Required Unless Site Conditions Warrant, However, Tie off Wire Every 4,000' or less.	75' Apart	Wood 3-4"D, 6' L, 24" d Steel, High Density wood, or Fiberglass 5.5' L, 18" Minimum Depth

**TABLE 4: MINIMUM REQUIRED FENCE BY LIVESTOCK TYPE**

LIVESTOCK	FENCE TYPE	HEIGHT OF FENCE	LIFE EXPECTANCY
Cattle	Barbed	Minimum 42"	20 yrs
Sheep	Woven Wire	Minimum 42"	20 yrs
Horses	High Tensile Wire	Minimum of 42"	20 yrs
Goats	Woven Wire	Minimum 42"	20 yrs