

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**FENCING**

(Feet)

CODE 382

**DEFINITION**

A constructed barrier to livestock, wildlife, or people.

**PURPOSES**

To (1) exclude livestock from areas that should be protected from grazing; (2) control livestock where permanent fencing is installed as a component of a rotational grazing system; (3) confine livestock on an area; (4) control domestic livestock while permitting wildlife movement; (5) regulate access to areas by people, to prevent trespassing, or for purposes of safety.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to sites or areas where livestock and/or wildlife control is needed, or where access to people is to be regulated. Fences are not needed where natural barriers will service the purpose. This standard applies to permanent fencing with a minimum functional design life of 20 years. This standard does **NOT** include portable fencing described in the prescribed grazing standard.

**CRITERIA**

Standard ([non-electric](#) barbed, woven wire, high tensile non-electric) or high tensile electric fences shall consist of acceptable fencing designs to control the animal(s) or people of concern and meet the intended life of the practice.

Boundary fences shall comply with state laws and standards for construction. ([See references.](#))

Fencing materials shall be of a high quality and durability, and the construction performed to meet the intended management objectives.

Fences shall be positioned to facilitate management requirements.

Material used shall be new and have a 20-year life expectancy.

Manufacturer's guidelines shall be adhered to during installation and meet the minimum construction specifications of each type of fence to ensure proper component assembly.

[Electrified fences will be identified with signs, particularly along roads, near houses, or other places where people may come in contact with the fence.](#)

**CONSIDERATIONS**

Consider installing fences in locations that will facilitate maintenance, avoiding irregular terrain such as gullies and/or water crossings.

Consider wildlife movement needs when locating fences.

Consider livestock management, handling, watering, [livestock shade structures](#), and feeding when locating fences.

<p>Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.</p>
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When using electric fences, training areas should be used to condition livestock to fences. Select a well-fenced area and construct a fence within it and on various terrains to allow animals to come in contact with it. Generally in 12 hours an animal will be trained and fully trained in 48 hours. When introducing sheep and goats make sure they are clean shorn prior to introduction to the well-charged fence.

Where applicable, clear right-of-ways will be established which facilitate fence construction and maintenance.

When live trees are used as posts, avoid short-lived or disease susceptible species (e.g., aspen, basswood, butternut). Also, avoid species that are considered valuable for timber production (e.g. white ash, oak, maple, etc.).

Consider soil erosion potential when planning and constructing a fence on steep slopes.

Consider raising lower wire of fences located in the floodplain.

Wire should be attached on the side of the post receiving the most animal pressure.

## PLANS AND SPECIFICATIONS

Plans and specifications are to be prepared for each specific field site based on this standard. Operation and maintenance requirements will be included. The Digsafe number (1-800-DIGSAFE) will be called by the planner and landowner to locate underground utilities before construction.

## OPERATION AND MAINTENANCE

Routine 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. Maintenance and repairs will be performed 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.

Electric fences will be regularly checked 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 fence lines to reduce voltage loss. Vegetative control can be achieved by herbicides applied per the manufacturer's label and according to state regulations. On electric fences signage warnings will be maintained in populated areas.

Construction and maintenance safety is a primary concern. Wire that is overstretched may break and recoil. Eye and hand protection should be worn.

## REFERENCES

Vermont Livestock Laws, Title 24, Part2, Chapter 109, *Fences and Fence Viewers*, [http://www.law.utexas.edu/dawson/fence/vt\\_fnc.htm](http://www.law.utexas.edu/dawson/fence/vt_fnc.htm)

Vermont Regulations for Control of Pesticides, <http://www.state.vt.us/agric/vermont%20regulations%20for%20control%20of%20pesticides.htm>

Fences, USDA Forest Service Technology and Development Program, USDI Bureau of Land Management.

Missouri Agronomy Technical Note MO-19 Installation of Electrified Hi-Tensile Fence Systems by James R. Gerrish.

Specifications for Farm Fence Construction, ASAE Standard EP250.2.

<http://www.wa.nrcs.gov/Eng/DesignAids/Drawings/Standard/LivestockFac.htm>

<http://www.attra.org/attra-pub/paddock.html>

High-Tensile Wire Fencing, NRAES-11. Revised 1987, Cooperative Extension Northeast Regional Agricultural Engineering Services.

Gallagher Power Fence manual. 10<sup>th</sup> Edition

Many fencing companies also have reference material available for recommendations.



## DEFINITIONS

*End Assembly* - A single or double span horizontal brace assembly at the end of the fence or gate opening, with a brace wire for tension from the bottom of the end post to the top of the brace post.

*High Tensile Wire* - High tensile wire exceeds 110,000 psi breaking strength. All high tensile wires shall have Class III zinc coating. Class III wire carries three times as much zinc coating per unit area as Class 1 wire.

*High voltage - Low Impedance* - An energizer, which has a pulse length of less than 0.003 seconds.

*Non-High Tensile Fence* - Any fence that does not fit the criteria for High Tensile Wire.

*Off Set Brackets* - Brackets used on barbed or smooth wire fences to renovate existing fence lines.

*Pull Assembly* - An in-line single or double span brace assembly, which aids in tightening the wires.

*Stay* - A post comprising wood, fiberglass or insul-timber, which is used between the line posts to maintain stability, desired fence height, and wire spacing within the fence.



**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**FENCING**

(Acre)

CODE 382

**I. STANDARD FENCES**

**A. Wire**

**1. Barbed Wire**

Barbed wire fences shall have a minimum of 4 wires for farm borders. A minimum of 3 wires shall be used for interior fencing, cross fencing, or excluding livestock from special areas such as wildlife, forested, or other special use areas. Barbed wire fences should not be used for hogs and sheep. Wire shall have Type III galvanized coating. Wires shall be spaced approximately an equal distance apart. The top wire shall be at least 42 inches high and 2 inches below top of post on wood posts and 1 inch below the top on steel posts. The bottom wire shall be 12 to 18 inches above ground level.

Each line wire shall consist of 2 twisted strands of 12 1/2-gauge wire or high tensile strength wire of 15 1/2 gauge. The barbs shall be either 2-point or 4-point barbs on approximately 4-inch centers, or 4-point barbs on approximately 5-inch centers. Wire shall be fastened to posts with galvanized staples.

**2. Woven Wire**

Top and bottom strands of standard woven wire shall be 11 gauges or heavier. Intermediate strands shall be 14 1/2 gauge, or heavier. Top and bottom strands of high tensile woven wire shall be 10 1/2 gauge or heavier. Intermediate strands shall be 12 1/2 gauge or heavier. Fences constructed with woven wire, 32 inches or less in height, shall have at least 2 barbed or smooth wires above the woven wire, spaced between 8 and 12 inches apart. Smooth wire may be 11 gauge, or 12 1/2 gauge if high tensile. Fences constructed with woven wire higher than 32 inches shall have at least 1 barbed or smooth wire between 8 and 12 inches above the woven wire. The base of the woven wire shall be placed near the ground surface. The top wire shall be at least 42 inches above ground level and 2 inches below the top of post on wood posts and 1 inch below top of steel post. All wires shall be galvanized. The wire specifications for both the barbed and high tensile wire shall be the same as for a barbed wire and high tensile fence. Wires shall be fastened to posts with galvanized staples.

**3. High Tensile Non-Electric Wire**

- 1) Fences will be constructed of at least 6 wires with the total height of the fence to the top wire not less than 42 inches. Wire will be new, smooth, and meet or exceed the following:
  - Tensile Strength - 110,000 psi (minimum)
  - Galvanizing - Type III
  - Gauge - 12 1/2

- 2) Spacing and Height - The following wire spacing and heights will be used. Adjustments in the number of wires and spacing may be made if they strengthen the effectiveness of the fence:

<u>Fence Description</u>	<u>Wire Spacing Beginning from the Ground</u> (In Inches, Reading Left to Right)
10 Strand Livestock Fence	4-4-4-4-4-4-4-4-5-5
8 Strand Livestock Fence	4-4-5-5-5-6-6-7
6 Strand Livestock Fence	10-5-6-6-7-8

- 3) Tension - 200-250 lbs. Each wire. Tension will be applied with an in-line stretcher on each strand. To gauge the tension, install a tension spring on at least one strand of wire.

#### **B. Staples and Wire Fasteners**

Staples shall be of 9-gauge galvanized steel or heavier with a minimum length of 1 3/4 inches for softwoods and a minimum length of 1-inch for close-grained hardwoods. Drive staple diagonally to the wood's grain and at a slight downward angle, (upward if pull is up) to avoid splitting post and loosening of staples. Space shall be left between the inside crown of the staple and post to permit free movement of wire. Barbed staples shall be used for pressure treated posts.

Wires may be attached to steel posts by use of manufacturer's clips or by two turns of 14-gauge galvanized wire.

#### **C. Posts**

All wooden posts (except white cedar, red cedar, or black locust) shall be treated with a state approved preservative by a method to ensure that complete penetration of the sapwood is obtained. If working on certified organic land units, check to insure preservatives meets organic standards.

At least half the diameter of red cedar shall be heartwood. Quality of treated wood shall provide sufficient strength and last for the expected life of the fence.

Pressure treatment shall conform to NRCS Material Specification 585.

##### **1. Live Trees as Line, Bracing, and Corner Posts.**

Live trees used for corner, bracing, and line posts shall have a diameter breast height (DBH) equal to or greater than those prescribed for normal wooden posts. Some alignment variation shall be allowed, but caution should be taken to minimize offsets and prevent excess fencing needs. Wire or insulators will not be fastened directly to trees. A board or boards will be placed on the tree to keep the wire from contacting the bark. Wire shall not be wrapped around the tree. A fiberglass strip, plastic strip, or an untreated red or white oak board with a minimum size of 1" x 4" must be securely fastened to the tree with at least three 40 lb. pole barn nails. The board must be long enough to accommodate the wire. The fence will be fastened to the board with staples.

## **2. Corner, Gate, End or Pull Assembly and Brace Posts.**

All corner, gate, end or pull assemblies and brace posts shall normally be wood with sufficient length for the construction of the required fencing height and permit setting the post at least 36 inches deep. Earth backfill shall be thoroughly tamped. On areas where soil depth is restricted to less than 36 inches, additional anchors or deadman applied against the direction of pull may be needed. For three wire fences: corner, gate, end and brace post assemblies may be a single H-brace assembly. Four or more wire fences shall have a double H-brace assembly. Posts shall have a minimum diameter of 5 inches. Reinforced concrete or metal posts of equivalent strength may be substituted if they have suitable means of attaching wires and braces.

Two and one-half inch steel pipe with appropriate bracing or set in concrete at a sufficient depth may be used.

## **3. Bracing**

End bracing will be installed at locations where the fence ends and on both sides of gate openings. Corner bracing should be installed where fence alignment changes 15 degrees or more. Bracing is required at all corner, gate, pull, and end assemblies in the fence. The brace member shall be the equivalent of a 3-inch top diameter post or standard weight galvanized steel pipe of 2-inch diameter installed at least a minimum of 4 inches down from the top of the post to the top of the brace and at least 36 inches from the ground to the bottom of the brace. The brace member shall be at least 6 feet, but not more than 8 feet in length. A tension member composed of 2 complete loops of number 9 gauge smooth wire, 12-gauge double strand wire, or a single loop of 12 1/2 gauge high tensile strength smooth wire may be used.

H-Braces will be used in standard fences.

## **4. Pull Assemblies**

Pull post assemblies shall consist of two posts with brace and two tension members and shall be installed when the vertical angle exceeds 10 degrees and at intervals not to exceed 660 feet in straight sections of fence.

## **5. Line Posts**

Wooden line posts shall have a minimum 3-inch diameter.

Wood posts must have a minimum length of 6 feet and set or driven to a minimum depth of 30 inches. When set, earthfill placed back around post shall be thoroughly tamped.

If soil restricts depth to less than 24 inches, use standard "T" or "U" shaped steel posts, weighing not less than 1.25 pounds per foot of length, in lieu of wooden line posts. Steel posts shall be rolled from high carbon steel and shall have a protective coating; either galvanized by the hot dip process, painted with one or more coats of high-grade weather resistant steel paint, or enameled and baked. Steel posts shall be studded, embossed, or punched to aid in the attachment of the wire. Steel posts must have a length sufficient to: (1) provide for the construction of at least 42-inch high fence; (2) be set solidly in the ground to the point that the top of the anchor plate is at or below the ground surface; (3) be driven into the ground a minimum of 18 inches; and (4) be a minimum of 5 1/2 feet long.

Plastic posts must be at least 4 inches in diameter, a minimum of 6 feet long, able to accept and hold a staple, and set or drive to a minimum depth of 24 inches. When set, earthfill shall be thoroughly tamped around the post.

Steel posts should be driven every 100 feet to act as a ground for lightning protection.

## **6. Spacing**

Standard fences shall have a maximum post spacing of 16.5 feet.

## **II. PERMANENT ELECTRIC FENCES**

### **A. Wire**

#### **1. High Tensile Electric Wire.**

Wire shall be high tensile, a minimum of 14 gauge, single strand, minimum of 110,000 PSI breaking strength, with Type III galvanizing or be aluminum or copper clad. Barbed wire shall not be used on electric fences because of safety hazard.

Wires shall be attached to line post by a method that allows them to slip. Wires shall be attached to stays in a manner that prevent stay slippage along the fence.

Splicing of high tensile wire will be accomplished by crimping sleeves, "figure eight knots", or "square knots".

Tying of high tensile wire to end post will be accomplished using "thread through method" or crimping sleeves. Tension of wires will be designed to maintain the proper average height of the fence wire and tightness to provide wire contact with animals. In-line wire tighteners will be used to maintain tension on wires.

The tension on each wire shall be maintained according to type of grazing animal. Use of in-line strainers will be used on each wire to obtain the correct tension. Strainers with tension springs are optional, but are helpful in maintaining proper tension and absorbing sudden shocks to the wire.

#### **2. Number of Wires and Spacing**

The number of wires and spacing shall be designed to accomplish the desired result of the fence. Table 1 suggests wire spacings and electrical charge for different kinds and classes of animals. When multiple wire systems are used, spacing of wires should be designed to ensure facial shock when animal attempts to place head between wires.

Farm border fences must be constructed of at least four wires, with the total height to the top wire not less than 42 inches. Cross fences can be constructed of one or more wires, with the fence height being 2/3 of the shoulder height of the grazing animal.

In instances where ground moisture is high, an all positive charged fence will normally suffice. If experience shows that the soil on site will dry to the point of not causing a shock to the animal, then a combination of positive (+) and negative (-) wires should be used.

One and two wire electric fences may be used for within-farm uses such as streamside fencing and subdividing pastures but may not be used for property line or be roadside fencing.

Two or more electric wires may be used for within-farm uses depending on class of livestock for protecting restricted use areas (CRP, FIP, WHIP, woodlands, cropland, ponds, manure storage structures, and streams) and for human and/or predator control.

**TABLE 1. Recommended Wire Spacing and Charge (+/-)**

WIRES	ANIMAL TYPE	FENCE HEIGHT (INCHES)	SPACING FROM GROUND (INCHES)
1	Cattle Hogs	26 to 32 12	26 to 32+ 12+
2	Cattle Cattle, Sheep & Goats Hogs	24 to 36 20 to 30 18	18 to 24+/-, 24 to 36+ 8 to 10+, 20 to 30+ 6+, 18+
3	Cattle w/calves and Division Fences Sheep, Goats Cattle, Horses Hogs	34 to 44 32 46 18	11 to 18+/-, 23 to 30-, 34 to 44+ 10+, 20+/-, 32+ 20+, 34+/-, 46+ 6+, 12+, 18+
4	Cattle Sheep, Goat	40 30 to 38	8+/-, 18+, 28+/-, 40+ 6 to 16+/-, 12 to 22+, 18 to 30+/-, 30 to 38+
5	Cattle, Horses, Sheep, Goats	50	10+, 20+/-, 30+, 40+/-, 50+
6-8	Deer, Predator Control	52 to 62	4-6+, 6-8-, 12+, 18-, 24+, 30+/-, 40+/-, 52+

## B. Posts

### 1. Line Post

- a) Australian ironwood (eucalyptus), 2 inches in width.
- b) Fiberglass, rigid plastic and polyvinylchloride solid round sucker rod of at least 5/8 inch in diameter.
- c) Fiberglass T-post of at least 1-inch in cross-section.

*For the above post, attach wire to post by loose clips or by running through holes in post. Attach to stays with tight clips to hold in place.*

- d) Wood post of black locust, red cedar, osage orange, redwood, pressure treated pine or other wood of equal life and strength. At least one half of the diameter of the red cedar and redwood post shall be heartwood. Insulators shall attach wire. **See E. Insulation** for guidance. Line post shall be at least 3 inches in diameter.
- e) Steel posts. They may be "T" or "U" post that are a minimum of 1.25 pounds per one foot of length. Charge wire must be attached with insulators. **See E. Insulation** for guidance.

*Post Length. For 1 and 2 wire fences, post shall be long enough to be set at least 18 inches in the ground. On sandy loam and more coarse textured soils the post shall be at least 24 inches in the ground. All wood posts will be at least 2 inches higher than the top wire of the fence to prevent splitting when attaching insulators. All posts of other materials shall be at least 1 inch higher than the top wire of the fence.*

## 2. Stays

Stays shall be at least 3/8 inch in diameter steel, fiberglass, rigid plastic, or eucalyptus.

Spacing of line posts and stays depends on terrain and number of wires. Maximum spacings are as follows. One and two wire fences may have line posts spaced up to 100 feet apart with no stays required. Line posts may be spaced 150 feet apart with stays or light posts at 50 spacings between the posts. Three or more wire fences may have line posts spaced up to 50 feet with no stays or up to 150 feet with stays every 50 feet. In undulating terrain, space posts and stays so that fence height is maintained. Posts in dips shall be constructed so that they will not pull out of the soil. Two-inch or smaller posts will be anchored or wooden posts (3 inch) set to sufficient depth to resist pull out.

## 3. Offset Brackets

Offset brackets made of galvanized high tensile spring wire with insulator of high density polyethylene with ultra-violet stabilizer or porcelain can be attached to standard barbed wire fence or woven wire fence to provide transmission line and/or to protect a standard fence. Place Offset Brackets no further than 60 feet apart and attach to wires of standard fence next to post. If control of animals is desired, place Offset Brackets at 2/3 the shoulder height of the animals to be controlled. Ensure that no wires of the old fence come in contact with the electric fence wire, as a short will occur.

## 4. Live Trees as Line, Bracing, and Corner Posts

Live trees used for corner, bracing, and line posts shall have a diameter breast height (DBH) equal to or greater than those prescribed for normal wooden posts. Some alignment variation shall be allowed, but caution should be taken to minimize offsets and prevent excess fencing needs. Wires or insulators will not be fastened directly to trees. A CCA treated 2" x 6", fiberglass strip, plastic strip, or an untreated white oak board with a minimum size of 1" x 4" must be securely fastened to the tree with at least two 20 or 40 lb. pole barn nails. The board must be long enough to accommodate the wire. The fence will be fastened to the board or 2" x 6" with staples. A board or boards will be placed on the tree to keep the wire from contacting the bark. Wire will not be wrapped around the tree.

## C. Corners and Braces

Braces and end assemblies are required at all corners, gates, and angles in the fence line.

For 1 and 2 wire fences, corner, gate, end, and brace post assemblies may consist of the following:

- Steel "T" posts that are a minimum of 1.25 pound per one foot of length with appropriate knee, deadman, angle, anchor, or H-brace.
- Wood posts with a minimum top diameter of 3.5 inches set 36 inches in the ground with appropriate knee, deadman, angle, anchor, or H-brace.
- Wood, steel pipe, or fiberglass post with a minimum top diameter of 5 inches, set to a depth equal to or greater than the height of the post above the ground without any bracing.
- Steel pipe or fiberglass post with a minimum diameter of 2 inches, set 36 inches in the ground with appropriate angle, H-bracing, knee brace, deadman or anchor plate.

- Steel pipe or fiberglass posts with a minimum diameter of 2 inches if set in concrete to a depth of 24 inches.
- Steel pipe or fiberglass posts with a minimum diameter of 1 inch with appropriate angle bracing and sufficient ground anchoring to maintain wire tension, remain firmly anchored and stay erect.

For 3 wire electric fences; corner, gate, end and brace post assemblies shall be a single H-brace assembly. Four or more wire electric fences shall have a double H-brace assembly. Post will be 5-inch nominal wood, 2-inch nominal pipe (capped), 2-inch fiberglass or steel "T" posts with appropriate appurtenances for corner and end bracing. Posts must be set a minimum of 36 inches in the ground.

All wood posts will be at least 2 inches higher than the top wire of the fence to prevent splitting when attaching insulators.

All posts of other materials shall be at least 1 inch higher than the top wire of the fence.

#### **D. Energizers**

Electronic energizers or power fence controllers shall be installed according to the manufacturer's recommendations and will meet the following minimum specifications:

- High power, low impedance system with solid state circuitry capable of at least 5,000 volt peak output and a short pulse that is less than 300 mAmps in intensity, finished within .0003 of a second and a rate of 35-65 pulses per minute.
- High impact weather resistant cases.
- 110 volt, 220 volt, or 12-volt battery powered capable of operating three weeks without recharging. If the length of fence requires an energizer of more than 4 joules, a solar charger will be needed on the battery systems.
- The accepted figures for minimum voltage for livestock control are: cattle-1600v; sheep and hair goats-2000v; hogs, horses and meat goats-1200v.
- Safety pace fused to prevent over pulsing.

Size - Rule of thumb, the energizer should be capable of producing 1 joule of energy for each mile of planned fence when average energy loss to the system is expected. (Joules are units of electrical energy; one joule does about 0.74 ft-lb. of work. Watts x seconds = joules.)

##### **1. Ground**

All electric fences must be properly grounded. The energizer ground wire should be connected to a galvanized pipe or rod 1/2 inch or larger in diameter. Bury 3 feet of ground rod for each joule of energy output.

Ground rods should be buried where soil remains moist for best results. Drive sufficient 6 to 8 feet rods into the ground at least 10 feet apart to provide the required amount of ground rod. Connect a continuous ground wire from the energizer to each rod or pipe with a galvanized steel or aluminum clamp. Copper rods with copper wire may be used if the energizer terminals are stainless steel or copper. If energizer terminals are not stainless steel or copper, do not use copper ground rods due to corrosion at the connection and subsequent loss of electrical continuity. Use copper clamps with copper wire and copper rods.

The ground wire(s) of the fence may be connected to the same ground as the energizer or separate ground with the same size and depth requirement.

More ground rods may be needed for system to function properly. Follow the manufacturer's recommendations for the number of ground rods.

Do not use the grounding system for other existing applications, such as power poles, breaker boxes and milk barns. At least 25 feet should separate the fence grounding system from any other grounding system.

## **2. Lightning Protection**

Lightning can cause damage to the energizer. Most energizers are poorly protected from lightning strike. External lightning arrestors and an induction loop (lightning choke) should be installed for added protection. Lightning arrestor grounding rods should be placed at least 65 feet from those of the energizer.

Install an additional set of ground rods and attach to a lightning arrestor. Use at least 1 more ground rod on the arrestor than was used on the energizer. Attach the lightning arrestor to the wires of the fence. Install a lightning choke in the fence line immediately between the lightning arrestor and the energizer. The lightning arrestor ground must be better than the energizer ground for it to function properly, because lightning will seek the least resistant route to ground.

## **3. Spike Protector**

A voltage spike protector is recommended for use with 120 and 140-volt energizers. Also, 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 exist. Additionally, a surge protector should be installed between the energizer and power supply.

## **E. Insulation and Insulated Cable**

Insulation used for positively charged wire(s) must be high-density polyethylene with ultra-violet stabilizer or high-density polypropylene with ultra-violet stabilizer.

All underground wire(s) installations must be double insulated, molded, aluminum, or high tensile strength steel 14 gauge or larger wire. The insulation must be high density polyethylene polypropylene with ultra-violet stabilizer.

Insulators for steel and other conductive material posts shall be capable of withstanding at least 10,000 volts of current leakage and shall be made of high-density polyethylene with ultra-violet stabilizer, high-density polypropylene with ultra-violet stabilizer, or porcelain.

Insulators for end, corner, and angle braces shall be capable of withstanding at least 10,000 volts of current leakage and shall be made of high-density polyethylene with ultra-violet stabilizer, high-density polypropylene with ultra-violet stabilizer, or porcelain. Red insulators should not be used as they might attract hummingbirds.

To cross gates and areas where electrical shocks to humans and livestock should be prevented (e.g. working facilities), use insulated galvanized wire. For underground burial, use wire designed for burial. Placing buried cable inside plastic pipe helps to decrease the incidence of short-circuiting. When overhead transmission is used height should be sufficient so as not to impede the movement of livestock or equipment. Do not use insulated copper wire due to corrosion at the splice and lack of tensile strength.

## **F. Gates**

### **1. Electrified Gates**

Electrified gates may be constructed of a single straight wire, galvanized cable, or polytape with a spring loaded insulated handle, or an expandable, coiled, high tensile, 12 1/2 gauge wire attached to an insulated handle. The number of wires shall be determined by the fence objective. The gate shall be constructed so that it is non-electrified when the gate is open. Overhead or underground transmission lines will be used to carry electricity past the gate to the remainder of the fence.

### **2. Flood Gates**

An electrified floodgate may be used in lieu of a non-electrified gate if desired. The electrified floodgate is constructed by stretching an electrified wire across the drainage above high water flow level. Attach droppers of 12 1/2 gauge high tensile fence wire, galvanized cable or galvanized chains to the electrified wire at a spacing of 6 inches above average normal water level. Connect gate to electric fence with double insulated cable through a cut-off switch and floodgate controller. If flooding is expected to last some time, switch the floodgate off.

## **III. FEEDLOT FENCE**

Feedlot and paddock fences shall be heavy-duty standard fence constructed of barbed wire, woven wire, high tensile non-electric wire or high tensile electric wire. All requirements for standard fence shall be followed with the following additional requirements:

- A. Wire height shall be a minimum of 54 inches.
- B. Barbed wire shall be a minimum of 6 strands.
- C. Woven wire shall have one barbed or smooth wire 8 to 12 inches above the woven wire.
- D. High tensile non-electric shall be 10 strands with the wire spacing of 10-4-4-4-5-5-5-5-5 inches.
- E. High tensile electric shall be 4 stands. See Table 1 for wire spacing.
- F. All posts shall have a minimum diameter of 5 inches and be 8 feet long.

## **REFERENCES**

Material Specification 585, NRCS National Engineering Handbook, Part 642