

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

FENCE

(Feet)

(382)

DEFINITION

A constructed barrier to contain or control livestock, wildlife, or people.

shall consist of acceptable fencing designs to control the animal(s) or people of concern and meet the intended life of the practice.

PURPOSES

The fence practice may be applied as part of a conservation system to accomplish the following objectives:

Material used for permanent fence shall have a minimum life expectancy of 20 years.

Height, number, and spacing of wires will be installed to facilitate control and management of the animals(s) and people of concern.

- Exclude livestock and/or wildlife from areas that should be protected from grazing.
- Exclude livestock from environmentally sensitive areas such as water bodies, wellhead protection boundaries, and others.
- Subdivide land to permit use of grazing systems.
- Protect new seedlings and plantings until grazing is allowable.

Height, size, spacing and type of posts will be used that best provide the needs for the type of fence required and are best suited for the topography of the landscape.

NOTE: Material and workmanship not included in standard must be equal to or exceed the standard and specifications.

CONDITIONS WHERE PRACTICE APPLIES

Fence (382) practice may be applied on any area 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 serve the purpose.

CONSIDERATIONS

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

Consider wildlife movement needs when locating and constructing fences. Strands of wire spaced too close together at the top of a fence have entangled deer.

CRITERIA

General Criteria Applicable For All Purposes

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

Consider livestock management, handling, watering, and feeding when locating fences.

Fences shall comply with state laws and standards for construction (**Refer to IL Fence Act s 765 ILCS 130/1-21**).

Fences shall be positioned to facilitate management requirements.

Where applicable, right-of-ways will be cleared to facilitate fence construction and maintenance.

Standard or conventional (barbed or smooth wire), suspension, woven wire, or electric fences

When using gates of substantial weight consider supporting free end of gates, when open or

closed, to relieve constant pressure applied to post on hinged end of gate.

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

When using electric fences, training areas should be used to condition livestock to fences. Select a well-fenced area and construct an electric fence across, or around, the area to allow animals to come in contact with the electric fence. Normally, a minimum of 12 hours of exposure to the electric fence is required. Most animals will be trained fully in 48 hours. When animals are approaching the fence with caution, they are trained.

When using electric fence with sheep or goats, sheep or goats must be clean shorn prior to being introduced to the fence.

Check with respective companies prior to erecting electrified wires or ground wires near overhead power lines, telephone wires, or radio antennas. If electrified fences must cross power lines, etc. cross lines at as close to perpendicular as possible and keep top wire below 6 feet. Ground rods may be needed at each side of crossing.

Consider safety recommendations and cautions from suppliers, distributors, manufacturers, installers, dealers, power companies, electricians, etc. when constructing fences.

PLANS AND SPECIFICATIONS

Plans and specifications are to be prepared for specific field sites based on the NRCS National and State Fence Standards and appropriate state or local statutes or laws (**Refer to IL Fence Act s 765 ILCS 130/1-21**).

I. STANDARD FENCES (NON-ELECTRIFIED)

A. Barbed Wire

Barbed wire fences shall have a minimum of four (4) wires for farm borders. A minimum of three wires shall be used for interior fencing, cross fencing, or excluding livestock from special areas such as wildlife areas, forested tracts or other special use areas. Wires shall be spaced approximately equal distance apart. The height of perimeter fences (...suitable and sufficient to prevent ... and other stock from getting on the adjoining lands of another, shall be deemed legal and sufficient...) shall be according to IL Fence Act s 765 ILCS 130/2 (4 1/2 feet high). All other fences shall be at least 42 inches high and 2 – 4 inches below the top of post. The bottom wire shall be 12 to 18 inches above the ground level. Wire shall be spaced no more than 12 inches apart.

Each line wire will 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 barbs on approximately 4-inch centers, or 4-point barbs on approximately 5-inch centers. 4-

point barbs provide more deterrent to grazing animals. Attach wires to the side of the post closest to the livestock except on corners place wire on outside of corner posts.

DO NOT ELECTRIFY BARBED WIRE

B. Woven Wire

Top and bottom strands of standard or high-tensile woven wire shall be 12 1/2 gauge or heavier, and 14 1/2 gauge wire, or heavier, for intermediate strands.

Fences constructed with woven wire equal to or less than 32 inches in height shall have at least 2 barbed or smooth wires above the woven wire, spaced evenly between the top of the woven wire and a minimum of 54" to the top wire. Single smooth wire will be 11 gauge, or 12 1/2 gauge if high tensile.

Fences constructed with woven wire greater than 32 inches in height shall have at least 1 barbed

or smooth wire above the woven wire spaced at least 4 inches above the top woven wire.

The base of the woven wire shall be placed within 2 inches of the ground surface.

The top wire shall be at least 42 inches above ground level and 2 – 4 inches below the top of post or according to IL Fence Act s 765 ILCS 130/2. All wires shall have Class III galvanization. The wire specifications for the barbed wire shall be the same as for a barbed wire fence.

C. Staples and Wire Fasteners (Barbed Wire or Woven Wire)

Staples shall be of 9-gauge steel or heavier with a minimum length of 1 1/2 inches for softwoods and a minimum length of 1 inch for close-grained hardwoods. Drive staples 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 should be left between staple and post to permit free movement of wire.

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

D. Posts (Barbed Wire or Woven Wire)

All wooden posts except red cedar, Osage Orange, or black locust shall be pressure treated with penta-chlorophenol (according to Section 1 of the AWPA Standard P-8), creosote (according to AWPA Standard C-5), or chromated copper arsenate (CCA) (according to AWPA Standard P-5). Certification labels may be required.

Pressure treatment shall conform to American Wood Preservers Association (AWPA) standards. Quality of treated wood shall provide sufficient strength and last for the expected fence life (20 years).

At least half the diameter of red cedar shall be heartwood.

LANDSCAPE TIMBERS ARE NOT ALLOWED.

1. Live trees as line, bracing, and corner posts.

Live trees shall be allowed only when application of standard wooden posts or steel posts is impractical because of restrictive soil depths due to parent material (rock, shale, etc.) and cannot be set or driven to the minimum depths required by the standard and specification.

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.

At no time shall live trees constitute more than 10 percent of the line posts used.

2. Corner, Gate, End or Pull Assembly, and Brace Posts. (Barbed Wire or Woven Wire)

All corner, gate, end or pull assemblies, and brace posts shall normally be wood with sufficient length for the construction of at least a 42-inch high fence or according to IL Fence Act s 765 ILCS 130/2 and permit setting the post at least 36 inches deep. Earth back fill or Ca6 "roadpack" 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 will be needed. Posts shall have a minimum top diameter of 6 inches. Reinforced concrete or metal posts of equivalent strength may be substituted if they have suitable means of attaching wires and braces.

3. Bracing (Barbed Wire or Woven Wire)

End bracing will be installed at locations where the fence ends and on both sides of gate openings when gate is located inline. Corner bracing will be installed where fence alignment changes 15 degrees or more. Driven series of single posts may be used on 10 foot centers when used for fence alignment changes of 15 degrees or less. Driven single posts must have

a minimum top diameter of 7" and driven at least 5 feet in ground.

Bracing is required at all corner, gate, pull, and end assemblies in a fence. The brace member shall (as a minimum) be the equivalent of a 4-inch top diameter post or standard weight galvanized steel pipe of 1 1/2-inch diameter installed in the upper 1/3 of the posts and below the top wire. The horizontal brace member length shall be 2 to 2.5 times the height of the fence. At least 3/8-inch diameter pins will be used to hold brace in place. A tension member composed of 2 complete loops of Class III galvanized 9 gauge smooth wire or Class III galvanized 12 1/2-gauge high tensile strength smooth wire may be used. H-Braces or Angle Braces will be used in standard fences (See Table 2, IL-800, IL-801, IL-803, IL-804, IL-805, IL-806, IL-808, IL-809, IL-810).

LANDSCAPE TIMBERS ARE NOT ALLOWED.

4. Pull Assemblies (Barbed Wire or Woven Wire)

Two posts with brace shall be spaced at intervals not to exceed 1,320 feet (80 rods) for barbed wire and 660 feet (40 rods) for woven wire in straight sections of fence (See Table 2, IL-811 Pull Assembly).

For double post pull assemblies with brace (H assembly), wire must be tied off at pull assembly to the post opposite the direction of pull (refer to IL-811 Pull Assembly). Wire tension members must be installed in both directions and adhere to specifications under 3. Bracing.

Driven Single posts must have a minimum top diameter of 7" and driven 5 feet in the ground; and may be used at the same spacing as above.

5. Line Posts (Barbed Wire or Woven Wire)

Wooden line posts shall have a minimum 3-inch top commercial size (2 1/2-inch for Osage Orange).

Wood posts must have a minimum length to ensure for the construction of the designed

fence height with the posts set or driven to a minimum depth of 24 inches. When set, earth back fills or Ca6 "roadpack" 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 1.33 pounds per foot of length less the weight of the anchor plate, in lieu of wooden line posts. Steel posts 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 wire. Steel posts must have a length sufficient to:

- provide for the construction of at least 42-inch-high fence or height according IL Fence Act s 765 ILCS 130/2;
- be set solidly in the ground so that the top of the anchor plate is below the ground surface;
- shall be driven into the ground a minimum of 18 inches; and
- be a minimum of 5 1/2 feet long.

LANDSCAPE TIMBERS ARE NOT ALLOWED.

6. Line Post Spacing (Barbed Wire or Woven Wire)

Standard barbed wire fences shall have a maximum post spacing of 20 feet unless stays are used between posts and then shall not exceed 30 feet. The maximum spacing of wire stays shall be 15 feet. Standard Woven wire fences shall have a maximum post spacing of 15 feet. High-Tensile woven wire posts shall have a maximum spacing of 20 feet and be either wood or steel.

7. Driven Posts

A single 12-foot long 7-inch minimal top diameter post may be substituted for end panel, corner, and vertical change bracing, and pull post assembly. The 12-foot long posts shall be driven a minimum of 5 feet into the ground.

II. SUSPENSION FENCES (NON-ELECTRIFIED)

Fence construction, dimensions, and quality of materials used shall be in accordance with the requirements set forth in specifications for standard fences except as noted in the following:

Suspension fences shall be constructed in straight-line sections and properly braced at each point of directional change.

Line posts shall be spaced not more than 100 feet apart.

Wire stays shall be spaced a maximum of 15 feet apart between posts in the line fence. All stays shall swing free of the ground to permit the fence to sway when contacted by animals.

Fences shall have a minimum of four barbed wires spaced approximately an equal distance apart. Steel staples 1 1/2 to 2 inches long, driven diagonally to within about one-half inch of the post to allow for free movement of wire or special manufactured fasteners for suspension

fences shall be used. Wire clips that allow free sliding of wire shall be used for attaching line wire to steel posts.

To allow for maximum sway of the fence, tension on line wires shall permit about a 3-inch sag in 100-foot span of fence in warm weather.

Bracing is required at all corner, gate, end, and pull assemblies. In straight continuous sections of a suspension fence, pull assemblies shall be spaced at intervals not to exceed 1,320 feet (80 rods). Tie off all wires at pull assemblies and start new wires for the next section.

All corner, gate, end, pull, and brace posts shall be at least 8 feet in length and have a minimal top diameter of 6 inches. Posts must be set in the ground at least 36 inches.

High-Tensile fence (non-energized) wire must have a minimal breaking strength of 1300 lbs. (180,000-psi minimum tensile strength).

III. PERMANENT ELECTRIC FENCES (HIGH TENSILE WIRE)

Permanent electric fences are constructed with the intent of being left in place for at least 20 years and are the equivalent of any standard non-electric permanent fence. Therefore, the criterion for permanent electric fence requires materials, design, and construction that will last 20 years with minimal maintenance.

A. Wire (Energized)

BARBED WIRE WILL NOT BE USED ON ENERGIZED FENCES BECAUSE OF SAFETY HAZARD.

Wire shall be 12 1/2 gauge, single strand, minimum tensile strength of 140,000 PSI, and 1078 lbs. minimum breaking strength. All wire will have, as a minimum, Class III galvanization.

Wires will be attached to line post by a method that allows them to slip. If stays are used, wires will be attached to prevent stay slippage along the fence.

Splicing of high tensile wire will be accomplished by using the adequate number of crimping sleeves to equal or surpass the minimum breaking strength of the wire (usually require 2 per splice), "figure eight knots", "square knots", or other acceptable tying methods. (See Table 2, IL-814 Methods of Tying High Tensile Strength Wire).

Positive charged wires must be insulated when coming into contact with conductive material (i.e.: posts, corners, trees, etc.).

Tying of high tensile wire to end post will be accomplished using "thread through method" or

the number of crimping sleeves that equal or exceed the minimum breaking strength of the wire to be spliced (usually require 2 per splice). (See Table 2, IL-814 Methods of Tying High Tensile Strength Wire).

Tension of wires will be approximately 200 pounds. Where sheep and hair goats are fenced, approximately 300 pounds of tension should be used. Where wild animal pressure is likely, tension should be increased, especially on bottom wires to 300 pounds.

In-line strainers/wire tighteners will be installed on each wire to obtain/maintain the correct tension.

The tension on each wire shall be maintained according to type of grazing animal or season. A tension spring will be used on at least one wire strand as a guide in maintaining proper tension.

Where electrified fences come into proximity or trees/woods all wire strands shall be installed with tension springs.

Use of tools designed for handling and constructing high-tensile fence is recommended for safety and ease of installation.

B. 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 polarity for different kinds and classes of animals. When multiple wire systems are used, spacing of wires should be designed to ensure head electrical contact when animal attempts to place head between wires.

Farm border fences must be constructed of at least five wires, with the total height to the top wire not less than 42-inches or according to IL Fence Act s 765 ILCS 130/2. Cross fences will 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 roadside fencing.

TABLE 1: Number of wires, animals, fence height, wire spacings and wire charge.

Wires	Animal	Fence Height in Inches *	Spacing from Ground in 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, 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+

* Or according to IL Fence Act s 765 ILCS 130/2

+ = positive charged wire, - = ground wire, and +/- = positive or ground wire

C. Line Post and Offset Brackets.

Line post and stays will be either:

Australian ironwood (eucalyptus), 2 inches in diameter. Attach wire to post by loose clips or running through holes in post. Attach to stays with tight clips to hold in place.

Fiberglass reinforced and polyvinylchloride solid round sucker rod of at least 3/4 inch in diameter. Attach wire to post with loose wire clips or by running through holes in post. Attach to stays with tight clips to hold in place.

Fiberglass reinforced plastic T-post and stays of at least 1-inch in cross-section. Attach to post with loose wire clip or by running through holes in post. Attach stays with tight clips to hold in place.

Wood post of black locust, red cedar, Osage Orange, redwood, pressure treated pine or other wood of equal life and strength may be used. At least one half of the diameter of the red cedar and redwood post shall be heartwood. Pressure treatment shall conform to American Wood Preservers Standards. Wire shall be attached by insulators, **see F. Insulation**, for guidance. Line post shall be at least 3 1/2 inches in diameter at the small end.

Steel posts may be used. They may be "T" or "U" post that are new, painted or galvanized and a minimum of 1.33 pounds per foot of length. Charge wire must be attached with insulators **see F. Insulation**, for guidance. Increased maintenance will be needed with steel posts to ensure functionality of fence insulators.

Posts for 1 and 2 wire fences shall be long enough to be set at least 18 inches in the ground and extend 2 – 4 inches above the height of the fence. On sandy loam and more coarse textured soils the post shall be at least 24 inches in the ground. Post for 3 or more wire fences shall be set at least 24 inches into the ground.

Spacing of line post 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 90 feet apart with no stays required. Three and four wire fences may have line posts spaced up to 30 feet with no stays or up to 90 feet with stays every 30 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 1/2 inch) set to sufficient depth to resist pull out.

Offset Brackets

Offset brackets made of galvanized high tensile spring wire with insulator of high density polyethylene with ultraviolet stabilizer or porcelain can be attached to standard barbed wire fence or woven wire fence to provide transmission line and/or to electrify a standard fence. Place Offset Brackets no further than 70 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 grounding will occur.

D. Corners and Braces

Braces and end assemblies are required at all corners, gates and angles in the fence line. Single post corner, angle or end brace assemblies, "H" Brace assemblies, or equivalent strength brace will be used. (See Table 2, IL-800, IL-801, IL-803, IL-804, IL-805, IL-806, IL-808, IL-809, IL-810) for specifications on corners, angles, or brace assemblies.

A single 12-foot long 7-inch minimal top diameter post may be substituted for end panel, corner, and vertical change bracing, and pull post assembly. The 12-foot long posts shall be driven a minimum of 7 1/2 feet into the ground.

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

Steel "T" post that are new, painted or galvanized and a minimum of 1.33 pound per one foot of length with appropriate knee, deadman, angle, or H-brace.

Wood posts with a minimum top diameter of 3.5 inches set 2-feet in the ground with appropriate knee, deadman, angle, or H-brace.

Wood post with a minimum top diameter of 5-inches, steel pipe, or fiberglass, set to a depth equal to, or greater than, the height of the post above the ground without any bracing.

Fiberglass posts with a minimum diameter of 2-inches, set 2 feet in the ground with appropriate angle or H-bracing.

All wood post tops will be 2 – 4 inches above 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.

E. Energizers

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

High voltage, low impedance that can produce at least 5,000-volt peak output and a short pulse that is less than 300 mAmps in intensity, finished within 0.0003 of a second and a rate of 35 - 65 pulses per minute.

High impact, weather resistant case.

Solid state circuitry. Snap in service modules provides for fast field repair.

Safety pace fuse, to prevent over-pulsing.

110-volt, 220-volt, or 12-volt battery powered system capable of working 3 weeks. If the length of the fence requires an energizer of more than 4 joules, a solar charger will be needed on the 12-volt systems.

Size - Rule of thumb, the energizer should be capable of producing one 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 must 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 (12.5 gauge, Class III galvanization) from the energizer to each rod or pipe with a galvanized steel clamp.

Use copper clamp with only copper wire and copper rod. Copper rods with copper wire may be used if the energizer terminals are stainless steel. If energizer terminals are not stainless steel do not use copper ground rods due to corrosion at the connection and subsequent loss of electrical continuity. Copper is not recommended.

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

More ground rods may be needed for system to function properly.

Install at least one ground rod at all breaks in the fence such as gates, gaps, flood control sections, etc.

2. Lightning

Lightning can cause damage to the energizer. Most energizers are poorly protected from lightning strike. External lightning arrestors are required and should be installed in conjunction with an induction loop, lightning diverter, and/or lightning choke for added protection. Lightning arrestor grounding rods have to be placed at least

65 feet from the energizer ground rods. (See Table 2, IL-812 Electric Fence and IL-813 Energizer to Electric Fence Connection and Grounding).

Install more ground rods for the lightning arrestor than for the energizer/charger and attach to the arrestor. Attach the lightning arrestor to the wires of the fence. Install a lightning choke/induction loop/lightning diverter in the fence line immediately between the energizer and lightning arrestor/fence (Refer to IL-812). The lightning arrestor ground must be lower impedance than the energizer ground to function properly.

3. Spike Protector

For protection of energizer, recommend for 120 or 240-volt energizers that a voltage spike protector be used. A surge protector must be installed between the energizer and power supply. Also, ground rod(s) should be installed at electric company's transformer pole (primary ground) and ground rod(s) installed at the electrical circuit breaker box (secondary ground), if they do not exist (**check with local power supply company to ensure applicability and installation**).

F. Insulation

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

All underground wire(s) installations must be double insulated, molded, aluminum, or high tensile strength steel 12 1/2 gauge or larger wire. The insulation must be high-density polyethylene with ultraviolet stabilizer or high-density polypropylene with ultraviolet stabilizer.

Insulators for steel and other conductive material posts must be high-density polyethylene with ultraviolet stabilizer, high-density polypropylene with ultraviolet stabilizer, or porcelain that withstands 10,000 volts or more without arcing.

Insulators for end, corner, and angle braces must be high-density polyethylene with ultra-violet stabilizer, high-density polypropylene with ultra-

violet stabilizer, or porcelain that withstands 10,000 volts or more without arcing. Do not use insulated tubing for attaching around post of brace assemblies.

Insulated Cable

To cross gates and areas where electrical shocks to humans and livestock should be prevented (e.g. working facilities); use insulated galvanized wire (12.5 gauge). For underground burial, use wire designed for burial (12.5 gauge). Placing buried cable inside plastic pipe helps to decrease the incidence grounding. When overhead transmission is used height should be sufficient so as not to impede the movement of livestock. Do not use insulated copper wire.

G. Gates

Electrified gates may be constructed of a single straight wire 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. Over head or underground transmission lines will be used to carry electricity past the gate to the remainder of the fence.

H. 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 the 12 1/2 gauge high tensile fence wire or drop chains to the electrified wire at a horizontal spacing of 6-inches, stopping 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. (See Table 2, IL-Flood Gate drawing).

IV. TEMPORARY ELECTRIC FENCE

Temporary electric fence is constructed with the intent of being left in place for only a short time

period. The fence is not constructed as an equivalent of a permanent fence. Therefore, the criteria for an electric fence requires materials, design, and construction that will accomplish the intended purpose and last for the time period planned with no more maintenance than desired.

The number of wires and spacing will be designed to accomplish the desired result of the fence. (See permanent fence guidance for number of wires and spacing). Temporary plastic net fence is available for animals such as sheep, goats, hogs, and crowding areas.

Many companies provide portable fence systems that use such materials as polyethylene wire and tape with steel or aluminum wire woven into them, aluminum wire, plastic and fiberglass post, reels to roll up wire, and portable battery operated energizers that are high voltage, low impedance that can produce sufficient voltage to turn livestock. Temporary fences may be attached to permanent fences to further subdivide pastures. Follow manufacturer's directions for construction, use, and operation.

OPERATION AND MAINTENANCE

Regular inspection of fences is a 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

Voltage of Electric fences will be checked on a regular basis to ensure at least 3000 peak volts at the farthest distance from the charger. If voltage is not sufficient, determine the cause and correct. During dry weather, ground rods may need water applied to soil around them. Maintain between 200 to 300 lbs. tension on high tensile fence wires. Clear brush from fence lines to reduce arcing. Remove fallen limbs. Overhanging trees and limbs should be trimmed or removed as needed to prevent their falling onto the fence.

Electrified floodgates must be maintained and kept clear of debris. During extended flooding periods, switch floodgate(s) off.

REFERENCES

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

High-Tensile Wire Fencing. 1987. Northeast Regional Agricultural Engineering Service, Ithica, NY. A. Selders and J. McAninch

ASTM: A 854/A 854M - 98, Standard Specification for Metallic-Coated Steel Smooth High-Tensile Fence and Trellis Wire.

How to Build Fences with Max-Ten 200 High-Tensile Fence Wire, Kiwi Fence Systems, Inc., Koppers Company, Inc., Texas A&M University.

Fence Systems for Grazing Management, James R. Gerrish.

Many fencing companies also have reference material available for use. When looking at their recommendations, keep in mind that they are in the business to sell a product.

Table 2	
Drawing No.	Description
IL-800	Single Post Corner or Angle Brace Assembly
IL-801	Single Post End Grace (Slip Brace) Assembly
IL-802	Electric Flood Gate
IL-803	Steel, Welded, Single Post End Brace (Concrete or Driven)
IL-804	Deadmaned 3-Post Corner
IL-805	5 Post, H-Brace Corner, Without Deadman
IL-806	Wooden 3 Post double "H" Brace End Assembly without Deadman
IL-807	Deer Management Fence
IL-808	End Brace Assembly Deer Management Fence
IL-809	Welded Steel 3 Post Diagonal End Brace Assembly
IL-810	2 Post Brace with Deadman
IL-811	Pull Assembly
IL-812	Electric Fence
IL-813	Energizer to Electric Fence Connection and Grounding
IL-814	Methods of Tying High Tensile Strength Wire
IL-815	Electrical connection Through Fence Opening
IL-816	Setting Fence Post on Uneven Terrain