

**NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION**

**ELECTRIC FENCE (EF)
(Feet)**

CODE 382

**PERMANENT ELECTRIC HIGH-TENSILE
FENCE**

I. MATERIALS

A. Wire

Use only new wire that meets the following minimum specifications:

- Class 3 galvanized
- 12.5 gauge
- 170,000 psi tensile strength
- ¼" diameter poly rope with 3 copper and 3 stainless steel filaments

B. Line Posts and Stays

All line posts shall be a minimum of 6.5-foot long.

1. Steel

- Only new "T" or "U" posts, constructed of high carbon steel, and weighing a minimum of 1.25 lbs/foot exclusive of anchor plate.
- Studded, notched, or punched for wire attachment.

2. Wood

- All other wood posts shall be treated with a minimum of 0.4 lbs/ft³ of chromate copper arsenate (CCA-Type A, B or C), or equivalent.
- Minimum 3-inch diameter (2½-inch diameter for Osage orange; 1½-inch diameter for Australian ironwood).

3. Other

- Fiberglass, rigid plastic, and polyvinylchloride solid round sucker rod of at least 5/8 inch in diameter.
- Fiberglass T-posts of at least 1-inch cross-section.

4. Stays

- At least ¾-inch diameter steel, fiberglass, or rigid plastic.

C. Corner, Brace, and Gate Posts

1. Steel

- Minimum 3-inch diameter high-carbon steel pipe weighing at least 7 lbs/foot, is class 3 galvanized or coated with a rust-resistant metal paint. Pipe ends must have a water-tight cap.
- Horizontal brace pipe can be 2-inch diameter high carbon steel that weighs at least 3.6 lbs/foot and is galvanized or coated with a rust-resistant metal paint.

2. Wood

- All other wood posts must be treated with a minimum of 0.4 lbs/ft³ of chromate copper arsenate (CCA-Type A, B or C), or equivalent.
- Corner, brace, and gate posts must be at least 8' X 5^{1/2}".
- Horizontal brace members must be at least 6-½' X 3".
- Landscape timbers cannot be used for posts or brace members.

D. Insulators, Fasteners, and Offset Brackets

- Energized wires attached to steel and other conductive material posts shall have insulators constructed of high density polyethylene or high density polypropylene with ultra-violet stabilizer, or porcelain that withstands at least 10,000 volts.
- Non-energized wires shall be attached to wood posts, using staples that are at least 9 gauge, class 3 galvanized. Minimum length of staples for softwoods is 1½-inch, and for hardwoods is 1-inch.

- Non-energized wires shall be attached to steel line posts with manufactured clips, or minimum 14-gauge wire.
- Offset brackets made of galvanized high tensile spring wire and an insulator of high-density polyethylene with ultra-violet stabilizer or porcelain that withstands at least 10,000 volts can be attached to standard barbed wire or woven wire fence to provide transmission line and/or to protect a standard fence.

E. Energizers

Install electronic energizers or power fence controllers according to the manufacturer's recommendations. Installation shall meet the following minimum specifications:

- A high-power, low-impedance system with solid state circuitry capable of at least 5000 volt peak output and a short pulse that is less than 300 amps in intensity, finished within .0003 of a second, and a rate of 35-65 pulses per minute.
- A high impact weather resistant case.
- Be powered by either 12-volt battery capable of operating three weeks without recharging, solar cell, or household electric current of 110 or 220 volts. If the length of fence requires an energizer of more than 4 joules, a solar charger will be needed on the battery systems.

Voltage - The ideal voltage for control of all species is 2000 volts or more. The minimum voltages for livestock control are:

Cattle - 1600
 Sheep/Hair Goats - 2000
 Hogs/Horses/Meat Goats - 1200

Size – As a 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. Each joule will typically provide enough power to fence 25 to 40 acres of pastureland.

II. CONSTRUCTION

(See Florida Fence Drawings)

A. Corners, Braces, Ends, and Gates

1. Posts (See Specification Table 3)

- Set posts for all fence assemblies at least 42-inches deep, in holes with a diameter at least 2.5X the post diameter. The top of posts should be at least 2-inches above the top wire.
- Backfill wooden posts by thoroughly tamping soil around the post after every 4 inches of depth.
- Set steel pipe in concrete that extends 1-inch below the bottom of the pipe and slightly above the soil surface.

2. Braces (See Specification Table 6, FL Fence Drawing or Photos)

- H-braces are required for all corner, pull, end, and gate assemblies.
- Notch brace posts ½- to 1½-inches deep to provide a flat surface for placement of the center line of all horizontal brace members 6- to 9-inches below the top of the post.
- Anchor horizontal brace members to brace posts with a minimum 3/8-inch galvanized pin or spike driven through the post that penetrates the horizontal member at least 4 inches.
- H-braces must have a tension member consisting of 2 complete loops of 9-gauge smooth single strand, 12-gauge double strand, or 12.5-gauge high-tensile wire. One end of the loop is attached to the anchor (corner, end, or gate) post 4-inches above the soil surface, and the other end is attached to the brace post at the same height as the top of the horizontal brace member. Twist the loops to provide rigidity to the brace assembly, or use in-line strainers on high-tensile wire.

3. Corner and in-line pull assemblies

- Use a corner post assembly for any angle in an otherwise straight fence line.

- Use an H-brace assembly with two crossed tension members at intervals not to exceed 660-feet and double H-brace >600-feet in straight line fence sections. Use braces at shorter distances in uneven terrain. (Typically, grade changes of > 15%).

B. Line Posts

Maximum spacing on all line posts is 16-feet without stays or 30-feet with stays.

1. Steel

- Posts shall be driven at least 18-inches into the ground. The top of the post must be at least 1-inch above the top wire.

2. Wood

- Posts shall be set at least 24-inches into the ground. The top of the post must be at least 2-inches above the top wire. When post holes are dug, the holes will be backfilled by tamping the soil around the post after every 4 inch of depth.

3. Other

- Drive fiberglass or other synthetic material line posts according to manufacturer's recommendation, or at least 18 inches in the soil. The top of the post must be at least 1-inch above the top wire.

C. Wire for Cattle (see Specification Tables for more information for cattle and for other classes of livestock)

1. Wire Spacing

- For cattle, use a minimum of three strands with the top wire 38-inches above the soil surface.
- Equally space the wires with the bottom 12-inches above the soil surface and the top wire at least 2-inches below the top of wooden posts and at least 1-inch below the top of steel posts. When more than three wires are used, it is not necessary to maintain equal spacing as long as top and bottom wire

positions are as above and no spacing is > 12 inches.

2. Fastening and Tension

- On perimeter fence, attach wires to the side of the post closest to the livestock, except on corners.
- In-line strainers shall be used on each wire to maintain at least 150 lbs. tension.
- Tension shall be monitored by installing a tension spring in the second wire from the top before applying tension to all the wires.
- Non-energized wires may be attached to steel posts by use of manufacturer's clips or by two turns of 14 gauge galvanized smooth wire.
- Wire should be able to move freely between the fastener and the line posts.
- If stays are used, attach stays to wires in a manner that prevents stay slippage along the fence.

D. Ground

- All electric fences must be properly grounded. Connect the energizer ground wire to a galvanized pipe or rod ½-inch or larger in diameter. Bury 3 feet of ground rod for each joule of energy output. Bury ground rods to the depth necessary to reach moist soil at the driest time of the year for best results. Drive sufficient number of 6- to 8-foot 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 to a separate ground

- with the same size and depth requirement.
- Additional ground rods may be needed for system to function properly.
- The grounding system shall not be connected to other existing applications, such as power poles, breaker boxes, and milk barns.
- The fence grounding system shall be installed at least 25 feet away from any other grounding system.

E. Lightning Protection

- External lightning arrestors shall be installed.
- Lightning arrestor grounding rods shall be at least 65 feet from those of the energizer.
- Install at least one 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 grounding system for 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.
- A spark gap may be used in lieu of a lightning arrestor. A spark gap is a small gap between a hot wire and a ground wire. Set the gap slightly beyond the point that electricity normally sparks.

F. Surge or Spike Protector

- Install a surge protector between the energizer and power supply to protect 110-or220-volt energizers.

G. Insulated Wire

- To cross gates and areas where electrical shocks to humans and livestock should be prevented (e.g., working facilities, watering facilities, etc.), use insulated galvanized wire.

- Do not use insulated copper wire due to corrosion at the splice and lack of tensile strength.
- For underground burial, use wire designed for burial.
- Placing buried wire inside plastic pipe helps to decrease the incidence of short-circuiting.
- Pipes will be installed in a manner that prevents water from collecting in the conduit pipe.
- When overhead transmission is used, height should be sufficient for movement of livestock and/or equipment.

H. 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 12.5-gauge wire attached to an insulated handle.
- The number of electrified wire gates necessary to close a gate opening is determined by the fence objective.
- Use overhead or underground transmission lines to carry electricity past the gate to the remainder of the fence.

I. Floodgates

- An electrified floodgate may be used instead of a non-electrified floodgate.
- The electrified floodgate is constructed by stretching an electrified wire across the drainage above high water flow level. Attach droppers of 12.5-gauge high tensile fence wire, galvanized cable, galvanized chains, or equivalent to the electrified wire at a spacing of 6 inches. Droppers should extend to within 10-inches above the average normal water level or to the normal recommended fence height above the stream bottom.
- Connect the floodgate to the electric fence with double insulated cable through a cut-off switch and floodgate controller. If flooding is

expected to last for an extended period, switch the floodgate off.

TEMPORARY ELECTRIC FENCE

Temporary electric fence may not be used for perimeter fence.

Temporary electric fence may be used to divide permanent pastures.

One of the following can be used to create an acceptable temporary electric fence:

- UV-stabilized, high-density polyethylene *twine* with at least eight stainless steel or aluminum filaments.
- UV-stabilized, high-density polyethylene *tape* with at least five stainless steel or aluminum filaments.
- 12.5-gauge smooth galvanized steel or aluminum wire.
- Electrified net wire can be used for small livestock.

Maintain a 30-inch minimum height. Additional wires will be needed for higher fences and/or smaller livestock.

Use posts that are good insulators and easy to move. Space posts to maintain 30-inch fence height. On level ground spacing will typically be 50 feet.

If the temporary fence is attached to a permanent electric fence, use an alligator-type clip for the connection.

Other criteria such as insulators, wire quality, and energizers will be the same as the permanent electric fence criteria.