NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATIONS

FENCE
(ft.)
CODE 382

GENERAL MATERIAL AND INSTALLATION CRITERIA:

The following are minimum specifications. It is acceptable to construct a fence which exceeds these specifications. Only new materials will be used with the exception of steel pipe and utility poles in excellent condition.

1. Corner, Gate, End and Pull Posts for ALL FENCING

Trees, stumps or in-service utility poles cannot be used. Corner posts meeting the following specifications are required at direction changes of over 20 degrees and at slope changes greater than 8%, ends and gates. Pull posts meeting the following specifications are required every 1320 feet with barbed wire, 660 feet with woven wire, and 2640 feet with electric wire.

Wood

All wooden posts (except red cedar, Osage Orange, or black locust) shall be treated and labeled as specified in AWPA standard UC4A. Wood posts must have a minimum top diameter of 5 inches and normally be long enough for fence designed height plus 36 inches. Earth backfill and/or rocks shall be thoroughly tamped. Where the soil depth is restricted to less than 36 inches, concrete 24 inches deep and 6 inches around all sides of the post will be used, with deadman braces and bed logs recommended. Composite posts may be used if they fit the above specifications and are UV resistant.

Metal

All metal posts must be in good, sound, condition. Capping is required on metal pipe to slow rust. Use 2 3/8-inch or larger steel pipe driven 36 inches or set in concrete 24 inches deep and 6 inches around all sides of the post.

Pre-fabricated corners and braces for electric fencing

Several companies manufacture corners and bracing that may be used for electric fencing. These are quite effective and are mostly used for fences for small ruminants.

2. Bracing

Bracing is required for all fencing except low-tension electric fence with no more than 2 wires using single corner, end, gate and pull posts meeting above specifications.

H-braces

Any change of direction of 20 degrees or more will require a double H brace corner assembly. For end, pull or gates, a single brace assembly is sufficient. The 6 to 10 ft long horizontal brace will be at least a 3-inch top diameter wood post or standard weight steel pipe of 1-7/8-inch diameter installed between the top two wires. Wood brace posts must be placed in a groove in the corner post or attached with screws, nails, or steel dowel pin. Landscape timbers are not allowed.

A tension wire is required on all wood braces, consisting of two complete loops of 12 1/2 gauge or stronger wire. An in-line wire tightener, rebar, sucker rod, or pine/cedar twitch stick can be used and should remain in the fence so adjustments can be made to maintain tension. NOTE: Only one tension

wire is needed on a corner post assembly with the wire attached to the bottom of the corner post and the top of the support post in the H-brace.

Angle braces
Welded angle braces may be used with barbed or smooth wire. Double angle brace assembly required for in-line pull posts and corners with any direction change of 20 degrees or more. A single brace assembly is sufficient for ends or gates. All pipe will be at least 2 3/8 inch diameter. The diagonal brace should be placed at no less than a 30 degree angle from the vertical post and welded to both the corner post and the vertical end post. The corner post will be set in at least 3 feet of concrete and the vertical end post will be buried in at least 2 feet of concrete with 6 inches around all sides of the post.

Angle braces with wooden posts may be used for electric fences and are recommended for two wires or more. Both upright and angle posts will be at least 5" in diameter. The upright will be buried at least 3 feet in the ground or set in 2 feet of concrete with 6 inches around all sides. The length of the angle brace will be at least twice the height of the fence, with one end angled and mortised into a groove on the upright, and the other end angled to match the foot plate. The foot plate will be a flat concrete block, disc plate or treated bridge timber with a minimum of 200 square inches. The twitch wire is required to be two wraps of 12 ½ g or stronger wire wrapped in grooves on the upright and angle brace, below the bottom fence wire, and tightened with an inline strainer.

3. Line Posts
Spacing
Barbed wire fences must have line posts at least every 20 feet or 30 feet with stays.
Smooth wire electric fences with one or two wires will have posts spaced every 100 feet or as needed to maintain appropriate wire heights. Fences with more than two wires will have posts spaced every 60 feet.

Steel T posts
Steel T posts weighing not less than 1 ¼ lbs/ft of length may be used if driven to at least the top of the anchor plate. Posts shall be galvanized or painted with one or more coats of high grade weather-resistant steel paint or enameled and baked and should not be rusted or bent.

Wood
Wood line posts shall have a 3-inch diameter and set or driven to a minimum depth of 24 inches. All wooden posts (except red cedar, Osage Orange, or black locust) shall be treated with pentachlorophenol, creosote, or chromated copper arsenate (CCA) by a method to ensure complete penetration of the sapwood.

Electric
Fiberglass (minimum of 3/8 inch in diameter), eucalyptus and composite posts are also acceptable line posts with electric fence. Steel posts or rods may be used with UV protected insulators.

4. Wire
Barbed Wire
Barbed wire fences shall have a minimum of four wires for perimeter or interior fences for cattle and horses, and seven strands for sheep and goats. Each line wire must be two twisted strands of 12 ½ gauge malleable or 15 ½ gauge high-tensile wire, with either 2 or 4 point fixed barbs. Attach wires to the side of the post closest to the livestock except on corners.

Barbless Cable
At least 4 strands of twisted 12 ½ gauge barbless cable may be used instead of barbed wire where possible injury to horses is a concern. Do not over tighten any wire with horses. Pipe, rail and/or electric tape or braid fences are the safest fences for panicky animals.

Woven Wire
The top and bottom strands shall be 12 ½ gauge or heavier with intermediate strands 14 ½ gauge or heavier. Fences with 32" woven wire shall have at least one 12 gauge or 15 ½ gauge high-tensile barbed, barbless or 12 ½ gauge smooth wire at least four inches above the woven wire. The base of the woven wire shall be placed near ground level.

With horned goats and sheep, use either wire with at least 12 inch wide spaces to allow animals to free themselves or 4 inch spaces that prevent entrapment.

Electric
One and two wire fences may be used for interior fencing for cattle. A minimum of four strands are recommended for perimeter fence or sheep and goat fences. Wire shall be 12 ½ gauge smooth high tensile wire with 170,000/180,000 psi for hand-tying or up to 200,000 if using crimps instead of tying. Tension of wires will be maintained with in-line tighteners for the proper average height needed for animal control. The height of one-wire fences should be 2/3 of the shoulder height of the grazing animal or where the nose of the animal touches the wire when the head is extended (32-36 inches). Multiple wire electric fences should have the top wire 40-44 inches. Do not over tighten wire to avoid danger to horses.

5. Staples and Wire Fasteners
Staples shall be 9-gauge steel or heavier. Barbed wires and woven wire may be attached to steel T-posts by the use of manufacturer's clips or two turns of 14-gauge or heavier galvanized wire.

GENERAL MATERIAL AND INSTALLATION CRITERIA: PERMANENT ELECTRIC FENCES

NOTE: DO NOT ELECTRIFY BARBED WIRE

Energizers and Components
1. Energizers for permanent electric fencing must be high voltage/low impedance, short pulse units which can produce at least 3000 volts output with all livestock containment fences charged (on) when under maximum anticipated load. Fence voltage should be monitored with a digital volt meter.
2. A minimum of three (3), (1/2" diameter) ground rods must be installed at least 10 feet apart near the energizer. Six-foot ground rods are recommended, driven to ground level or refusal, with a minimum depth of 3 feet. In the case of refusal, additional ground rods must be added to provide a minimum of 18 feet of ground contact. The rods will be connected together with one continuous wire and clamps back to the charger terminal. Locate ground rods in moist, deep soil. Either galvanized or copper ground rods are acceptable. Rod connecting wires and clamps must be the same material as the ground rods. Avoid mixing dissimilar metals to prevent electrolysis. For large energizer systems (7 or more joules), use a minimum of 3 additional feet of ground rod per joule of energizer output capacity. Keep ground rods at least 25 ft from other grounding systems or well

casings.
3. Install a surge protector at the 110 volt connection to provide protection from power surges.
4. A lightning arrestor or lightning choke is suggested following manufacturer recommendations. When installing a ground system for the arrester/choke system, install one more ground rod than was used on the charger ground system.

Electrical Accessories

1. All underground wire installations must be double insulated, molded, high tensile strength steel 12-½ gauge or larger wire. Do not use regular household wiring. All gates should have underground insulated wire, protected in non-metallic conduit, so full voltage is carried to the rest of the fence even when the gate is open. The conduit should be buried deep enough to protect the wire from damage by rocks, animals and vehicle traffic.
2. Gates can be constructed of smooth high-tensile wire, cable, springs, polytape, polywire, polybraid or polyrope. Insulated gate handles with rust resistant metal parts recommended.
3. Insulators for steel and other conductive material posts must be high-density polyethylene or polypropylene with ultra-violet (UV) stabilizer, porcelain or other insulators, which can withstand a minimum of 10,000 volts or more in current leakage. Only insulators with a 10 year warranty are of sufficient quality.
4. Cutoff switches are recommended at each secondary fence feeding off the main fence.
5. Electric fence warning signs should be installed where the public has access to the electric fence.
6. Offset brackets made of galvanized high tensile wire with UV stabilized plastic or porcelain insulators can be attached to standard barbed wire or woven wire fence, at least every 60 feet, to protect fence or carry charge to another stretch.
7. Electric fence can be used to restrict access to a pond with a floating access. Use 2 to 4 inch plastic pipe for three sides of a square or bend into a semi-circle with 3 foot high vertical pipe connected with "T's" to carry the electrified wire. All elbows, fittings and ends will be sealed to prevent water from getting into the pipe. The floating frame should be attached to the anchor posts using a rope with slack to allow for movement of frame. Steel "T" posts with a plastic pipe sleeve placed over them can be used as guide posts.

GENERAL MATERIAL AND INSTALLATION CRITERIA APPLICABLE TO TEMPORARY ELECTRIC FENCES ONLY

1. Temporary electric fence is constructed with the intent of being left in place for only a short time period. It is not constructed as an equivalent of a permanent fence. Therefore, the criteria for a temporary 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.
2. The number of wires and spacing will be designed to accomplish the desired result of the fence. Temporary net fence is available for animals such as sheep, goats, and crowding areas.
3. Portable or temporary electric fence systems include materials such as poly-wire, poly-tape, aluminum wire, 17 gauge galvanized wire, plastic, fiberglass, eucalyptus and composite posts, reels to roll up wire, and portable solar or battery-operated energizers that are high enough voltage to control livestock. All plastic materials must be made of ultra-violet (UV) stabilized plastic material. Temporary fences may be attached to permanent fences to further subdivide pastures. Follow manufacturer's directions for construction, use and operation.