

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATIONS
FENCE (ft)
CODE 382**

General Specifications

Procedures, technical details, and other information listed below provide additional guidance and supplement the requirements and considerations of selected components of Conservation Practice Standard 382, Fence.

Materials and Construction Specifications

Only new materials will be used with exception of steel pipe and utility poles in excellent condition.

The materials used in construction must be in accordance with and meet or exceed, in size, strength, and durability, the requirements listed. The participant is responsible for providing adequate documentation to ensure the material specifications are met.

1.1. Wire

A) 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.

B) Smooth, High-Tensile, Non-Energized

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. Pipe, rail and/or electric tape or braid fences are the safest fences for panicky animals. Do not over tighten any wire with horses.

C) Electric Fence

One and two wire fences may be used for interior fencing for cattle. A minimum of four strands are recommended for perimeter fence for 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. Do not over tighten wire to avoid danger to horses.

D) 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.

1.2 Wire Attachments

Barbed wire 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.

Staples shall be 9-gauge steel or heavier for barbed and woven wire.

Wire clips or drilled holes could also be used for fiberglass post.

Barbed wire attached to the brace post should be wrapped around the post at least once and sufficiently wrapped back around the barbed wire.

Fence wire will be stretched to sufficient tension prior to being fastened to posts.

Attach wires to the side of the post closest to the livestock except on corners.

2.1 Corner, Gate, End, and Pull Post for All FENCING

2.2 Wood Post

Wooden posts will be Osage Orange, red cedar, black locust or treated posts labeled as specified in AWWA standard UC4A.

Wood post must have a minimum top diameter of 5 inches and normally be long enough for fence designed height plus 36 inches.

Trees, stumps, or in-service utility poles will not be used.

2.3 Steel Pipe Post

Use the below pipe sizes and criteria for steel pipe posts.

All pipe will have the top closed to prevent rainfall from entering post.

All pipe should be in excellent condition.

All pipe post shall be standard weight steel pipe (ASTM A 53, Schedule 40). Follow the below requirements for a variety of pipe options for posts. Any additional specifications on sizes can be found by contacting an AR NRCS grazing lands specialist.

ASTM Steel Pipe Specifications			
Nominal Pipe Size	Outer Diameter	Wall Thickness (Required)	Minimum Weight (lbs)/Foot (Required)
2 ½"	2.875"	.203"	5.79
3"	3.50"	.216"	7.58
3 ½"	4.00"	.237"	10.79
4"	4.50"	.247"	12.53
4 ½"	5.00"	.258"	14.62

Drill stem pipe can also be used below. Below are minimum criteria for drill stem pipe.

Drill Stem Pipe Specifications		
Size (OD)	Wall Thickness	Minimum Weight (lbs)/Foot (Required)
2 3/8"	0.280"	6.65

2.4 Installation of Wood Post or Steel Pipe

Corner, gate, end, and pull post shall be placed in a minimum of 36 inches of soil or set in concrete 24 inches with a minimum of 6 inches of concrete around the post.

Earth backfill and/or rocks shall be thoroughly tamped.

Posts that have been set in concrete should not have any pressure applied to the post for a minimum of 72 hours after pouring concrete to allow the concrete to settle.

2.5) Bracing

Anchor/pull posts bracing—bracing of pull posts is required at all corners, gates, and fence ends, at certain specified distances, and at definite slope and alignment changes in the fence line.

Single Post Brace for Electric Fence

Single corner, end, gate or pull posts (at direction changes over 20 degrees, terrain changes over 8 percent, or every 2,640 feet) are allowed for one and two wire fences.

Electric fences over two wires must use H-braces, welded angle braces, or prefabricated corners.

Single H Brace End Panel Assembly (2 post)

Single H Brace End Panel Assemblies are required where fences end and on both sides of gate opening where the pull is only one direction.

Single H Brace End Panel Assemblies consist of a pull end post and 1 brace post extending in the direction of pull.

Double H Brace Corner Assembly (3 post)

Double H Brace Corner Brace Assemblies are required at all points where the fence alignment has a change of 20 degrees or more and the pull is from two directions.

Double H Brace Corner Brace Assembly consists of a pull post and 1 brace post extending in each direction.

Double H Brace In-Line Assembly (3 post)

Double H Brace In-Line Assembly consist of a pull post and 1 brace post extending in each direction of pull, in-line with the fence line.

Double H Brace In-Line Assemblies are required in straight sections of the fence line where the distance between pull posts of corner brace assemblies and/or end panel brace assemblies exceeds 1,320 feet for standard fences.

Double H Brace In-Line Assemblies are also required where an upward angle will require additional embedment to properly anchor the upward pull of the stretched wire. Changes in slope exceeding 8% are to be considered for this type of brace assembly. The center post of this brace assembly will be set as near the point where the slope breaks as possible.

Welded Angle Braces

Welded angle braces may be used with barbed or smooth wire. All pipe must meet specifications in section 2.3. 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 post. The corner post will be set in at least 36 inches of concrete and the vertical end post will be buried in at least 24 inches of concrete with 6 inches around all sides of the post. The minimum size will be 2-3/8" pipe that meet standard weight steel pipe standards.

Welded Single Angle Brace

A single welded angle brace is sufficient for ends and gates.

Concrete is required for the welded single angle brace.

Welded Double Angle Brace

Concrete is required for the welded double angle brace.

Double angle brace assembly required for in-line pull post and corners with any direction change of 20 degrees or more.

Wood Floating Single Angle Brace for Electric Fence

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 1/2 gauge or stronger wire wrapped in grooves on the upright and angle brace, below the bottom fence wire, and tightened with an inline strainer.

Both upright and angle post will be at least 5" in diameter.

The upright will be buried at least 36 inches in the ground or set in 24 inches 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.

Wood Floating Double Angle Brace for Electric Fence

Both upright and angle post will be at least 5" in diameter.

The upright will be buried at least 36 inches in the ground or set in 24 inches 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.

Horizontal Cross Member

Wood Horizontal Cross Member

The 6 to 10ft long wooden horizontal cross member will be at least a 3-inch top diameter wood post 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 to achieve a secure fit.

Landscape timbers are not allowed.

Steel Horizontal Cross Member

The 6 to 10ft long brace steel horizontal cross member will be have minimum of a 1-1/2 inch standard weight steel pipe.

Steel horizontal cross member will be welded to steel brace and anchor post assemblies.

ASTM Steel Pipe Specification			
Nominal Pipe Size	Outer Diameter	Wall Thickness (Required)	Weight (lbs)/Foot (Required)
1 ½"	1.90"	0.145"	2.720
2"	2.375"	0.154"	3.656
2 ½"	2.875"	.203"	5.793

Tension Wire

An in-line wire tightner, 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.

The in-line wire tightner, rebar, sucker rod, or pine/cedar twitch stick should be positioned approximately midway between the brace wire.

A tension wire is required on all wood braces, consisting of two complete loops of 12 1/2 gauge or stronger wire.

3.1 Line Post

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 post spaced every 100 feet or as needed to maintain appropriate wire heights. Smooth wire electric fences with more than two wires will have posts spaced every 60 feet.

3.2 Steel "T" Post

Shall be of high carbon steel weighing not less than 1.25 pounds per foot of length.

Will have an anchor plate and be studded, embossed, or punched for wire attachment.

Will be galvanized, enameled and baked, or painted with weather resistant steel paint.

Steel post should be driven to at least the top of the anchor plate

Minimum lengths will allow for required buried depth and fence height plus at least 2 inches of post above top wire

3.3 Wood

Wood line post 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.

3.4 Electric

Fiberglass, plastic T post, eucalyptus, rigid plastic and composite post are acceptable line post with electric fence.

Steel posts or rods may be used with UV protected insulators.

All non-traditional electric fence post should have a 10 year manufactures warranty and have UV protection.

Do not use "step-in" post for permanent electric fence.

Electric Fence Line Post Specifications		
Type of Post	Minimum Size	Minimum Depth
Wood	3"	24"
Fiberglass	3/8"	16"
Plastic T Post	1.5"	16"
Composite, Plastic Post	1 1/8"	16"
Steel T Post	1.25lbs/ft	Driven to at least the top of the anchor plate.

4.1 Gates

Gates will be designed to accommodate cooperators objectives. Barbed wire gates shall be designed with the kind, grade, and size specified for the field fence.

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 3,000 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, (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 arrestor/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 are 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. In-line strainers should be used to maintain tension in permanent, high tensile steel, smooth wire fences.
5. Cutoff switches are recommended at each secondary fence feeding off the main fence.
6. Electric fence warning signs should be installed where the public has access to the electric fence.
7. 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.

8. 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 (Non-financial
assistance)**

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.