United States Department of Agriculture

Natural Resources Conservation Service

# Fences

*Alabama Job Sheet No. AL382*

## Definition

Fences are a constructed barrier to animals and people.

## Purposes

This practice facilitates meeting conservation management system objectives that treat the soil, water, air, plant, animal, and human resource concerns by controlling movement of animals and people.

The fences help to facilitate management of different land uses and special management areas within land uses such as ecological sites, pasture types, riparian areas, and critical eroding areas, etc.

The fences help facilitate handling, feeding, watering, and movement of livestock as part of grazing management and addressing related resource concerns.

## Application

For horses, avoid the use of barbed wire and steel Tee (T) posts when possible in order to minimize potential injury, especially when areas of confinement are small.

Consider introducing animals to electric fencing in a designated training facility. Normally, a minimum 12 hour exposure to the electric fence is required. Most animals will be trained in 48 hours.

When installing fences in areas of heavy wildlife activity (such as riparian areas), consider wire types and spacing that may benefit wildlife.

Where practical avoid areas such as rough and irregular terrain, excessive trees and brush, areas with long-standing water, and water crossings. This will help minimize maintenance and installation costs.

Consider fencing along the contour to minimize livestock trailing and subsequent erosion.

Temporary fences should be considered when installing interior fences for livestock management. They may help minimize costs and allow for system flexibility.

## Fence Types

There are several types of fences that can be used. They can be designed and installed as permanent or temporary. The overall effectiveness of each type of fence and the costs for installation and maintenance depends on the type of animal controlled, the number and size and types of wires or boards used, post types, and spacing.

**Permanent fence types** are designed to be in place for a period of many years with minimal maintenance requirements. Therefore,

components are designed for a life span of about 20 years. Permanent fences are used for exterior (boundary) fencing of property and fencing of specific land uses (such as cropland) as well as for interior division fencing.

**Temporary or moveable fences** are designed to be in place for short periods of time. Temporary fences are best used as division fences for controlled grazing and fencing of areas where livestock exclusion is needed for short periods.

**Standard post (treated wood posts or metal "T" posts) and wire fences (smooth barbed wire or high-tensile)** are the most common fence type used for controlling all types of livestock. They are suitable as permanent fences in areas that receive moderate to heavy pressure from livestock. They are typically barbed wire or high tensile smooth wire.

**Suspension fences** are a low cost variation of the standard post and wire fence and can be used as either boundary or interior cross fencing. They are typically used on large pastures with level terrain. They can be either barbed wire or smooth wire. The fence design allows it to sway (move) in the wind and when contacted by animals.

**Both hi-tensile and non hi-tensile woven, net, and mesh wire fences** are best suited in areas where tight control is necessary such as with sheep, goats, horses, hogs, people, or predator control. These fences consist of multiple rows of horizontal smooth wires held apart by vertical wires, usually of different sizes and configurations. Space between wires varies depending on designated use.

**Permanent energized (electric) fences** provide a low cost alternative and more flexibility to the other types of fences. They are mostly used for interior cross fencing but can also be used for boundary fences. They can be powered by a variety of types of energizers. Livestock must be trained to respect electric fences if they are to be effective.

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**Temporary electric fences** are only used for interior cross fencing and areas where pressure from livestock is not heavy. They can be easily attached to permanent fences and can be of high tensile smooth wire, or polyethylene twine and/or tape.

**High tensile, non-energized fences** are suitable as permanent fence in areas that receive moderate to heavy pressure from livestock but require more strands of wire than barbed wire to maintain the same level of control. These fences are safer for domestic animals, especially horses, and wildlife, than are the barbed wire fences.

**This document contains the following specific guidance and documentation tools:**

- Fence and Post minimum requirements for barbed wire, woven wire, high tensile electric and high tensile non-electric, temporary and board fences (Tables 1, 2, 3 & 6).
- Typical wire spacing (Table 4).
- Wood preservative treatment levels (Table 5).
- Forms:
    - Practice design and construction certification form
    - Fence Construction Check Sheet and certification form

**References**

NRCS AL Conservation Practice Standard: Fence (382), Construction Specifications, and Fence Drawings.

**Table 1. Barbed Wire and Electric Fence Minimum Requirements for Cattle or Horses**

| Type | Gauge | Description | Minimum # of Strands | Maximum Post Spacing With Stays | Maximum Post Spacing Without Stays | Minimum Height of Top of Wire | Notes |
|---|---|---|---|---|---|---|---|
| Barbed | 12 1/2 | Galvanized double strand | 3 for cross fencing otherwise 4 | 30' | 16' | 42" | All fences: Bottom wire set a minimum of 14" above the ground with middle wires at 10" to 14" apart. For four or more strands: top wire set at least 42" above the ground. Maximum stay spacing is 15'. Barbed wire is not recommended for horses, but smooth wire is.<br><br>Pull assemblies should be placed as landscape, fence turns, boundaries and other considerations dictate. The maximum pull assembly spacing in level terrain:<br>15.5 gauge wire – 1320 feet.<br>12.5 gauge high tensile wire – 660 feet. |
| | 15 1/2 | High tensile steel class III galvanized, double strand | Same as above | 30' | 16' | 42" | |
| Barbed (suspension) | See above | See above | See above | 100' | na | 42" | Place stays evenly up to 50 feet apart. Do not allow them to touch the ground, allowing the fence to sway. Fences are typically located where ground is nearly level for long distances. |
| Woven (net/mesh) | 12 1/2 top and bottom strands, 14 1/2 intermediate, and stay wires not more than 12" apart | Galvanized coating | | 16' | na | 42" | Example: Set 32" woven wire set near ground level. Add additional wires above the woven wire 4" to 6" apart to achieve the 42" height or higher fence height if desired. The additional wire strands help to minimize animal damage to the fence. Barbed wire or smooth high tensile wire may be used. The smooth high tensile wire may be electrified with proper insulation. |
| | 14 1/2 | High tensile steel class III galvanized | | 50' if electrified otherwise 25' | na | 42" | |

**Table 1**
**(continued)**

| Type | Gauge | Description | Minimum # of Strands | Maximum Post Spacing With Stays | Maximum Post Spacing Without Stays | Minimum Height of Top of Wire | Notes |
|---|---|---|---|---|---|---|---|
| Smooth high tensile electric or non electric | 12 1/2 | High tensile steel with tensile strength of 170,000 psi and class III galvanized or aluminum coating | 2 | 150' | 50' | 30" to 60" See notes and fence chart. | Refer to table 4: Typical Wire Spacing. For two wire electric fences one wire should be hot and one grounded. When more than two wires are used alternate hot and ground wires. Where consistent soil moisture conditions prevail, one strand of hot wire may be used. For boundary fences, use at least 5 strands with the top wire set at 50" to 60" above ground and the bottom wire set 10" to 20" above the ground. |
| Temporary | Electroplastic twine or tape | Twine or tape will be woven with at least 6 strands of aluminum or stainless steel strands. | 1 | na | na | See notes | Electroplastic twine or tape with 6 strands of wire may be run up to 1/2 mile. If 9 strands are used, the wire may be run up to a mile. Two strands of twine or tape will be needed under dry conditions. One strand should be positive (+) and the other strand negative (-) or the ground. Place posts as needed and for the intended purpose. Place at least one wire at nose height. |
| Temporary | 14 gauge | Smooth steel or aluminum | 1 | na | na | See notes | |

**Table 2. Barbed wire, woven wire and electric fence requirements for hogs, goats and sheep.**

| Type | Gauge | Description | Minimum # of Strands | Maximum Post Spacing With Stays | Maximum Post Spacing Without Stays | Minimum Height of Top of Wire | Notes |
|---|---|---|---|---|---|---|---|
| Barbed | 12 1/2 | Galvanized double strand | 5 | 30' | 16' | 36" | All fences: Bottom wire set 4 to 6 inches above the ground with middle wires at 12", 18", and 26" above ground. Maximum stay spacing is 10'. |
| | 15 1/2 | High tensile steel class III galvanized, double strand | 5 | 30' | 16' | 36" | |
| Woven (net/mesh) | 12 1/2 top and bottom strands, 14 1/2 intermediate and stay wires not more than 12" apart | Galvanized coating | na | 16' | 16' | 40" | At a minimum 32" woven wire set at ground level. Two wire strands shall be installed above the top of the woven wire, each 4” to 6” apart. For woven wire at least 39” tall then at least one wire strand shall be installed about 4’ to 6” above the woven wire. Woven wire weave dimensions: 2 inch wide weave or 6 inch X 12 inch weaves are recommended. Avoid 6 inch x 6 inch weave spacing’s. |
| | 14 1/2 | High tensile steel class III galvanized | na | 25' | 25’ | 40" | |
| Electric smooth | 12 1/2 | High tensile steel with tensile strength of 170,000 psi and class III galvanized or aluminum coating | 3 to 4 | 150' | 50' | 18 “ to 36" | TABLE 4. TYPICAL WIRE SPACING. Wires should alternate between ground and positive. Stays should be evenly spaced 50 feet apart or closer. |

**Table 3. Posts**

| Type | Use | Nominal Requirements | Minimum Depth | Notes |
|---|---|---|---|---|
| Wood | Corner/ gate | 5" diameter | 30" set with concrete<br><br>or 36" | Must be sufficient length needed to meet fence requirements. Wooden posts must be treated with creosote coal tar, pentachlorophenol, acid copper chromate, amoniacal copper arsenate, chromated copper sulfate or alkaline copper quat (ACQ). Do not allow aluminum components to contact ACQ treated posts due to corrosion. Posts may also be made from red cedar heartwood, pine heartwood, osage orange, black and honey locust, catalpa or mulberry. Red cedar posts shall have heartwood at least one-half the post diameter. Corner/gate/pull posts will be set 30" deep in concrete in 12" diameter hole or set 36" deep without concrete.<br><br>Note: For a 5” post set 30” in the ground in a 12” diameter hole, approximately 3 (80 lb.) bags of concrete will be needed.<br><br>At least 2" of wood post will extend above the last wire strand.<br><br>For bracing, use 3/8” metal pens or nails. Nails shall penetrate at least halfway into the upright post. **Pre-drill nail holes to avoid splitting of brace post.** |
| | Pull | 5" diameter | Same as above | |
| | Line | 3" diameter | 24" | |
| Metal | Line | Standard “T” or “U” high carbon steel. | 18" | Posts will have an anchor plate and be studded, embossed, or punched for wire attachment. Posts will be galvanized, enameled and baked, or painted with weather resistant steel paint. Posts will weigh at least 1.25 lbs. per linear foot. In sandy soil drive posts deeper than 18". |
| | Corner/ gate | Wire: 2.5" nominal diameter<br>Woven: 2.875” nominal diameter | 30" | Steel pipe must weigh at least 7 lbs. per linear foot and have a water tight end cap. Posts will be set in concrete in 12" diameter hole. Concrete must be slightly rounded on top. Posts will be galvanized or painted with a rust-resistant coating and repainted if rusting occurs. |
| Temporary | Line | | | Must have good insulation, be easily moved. Space posts to keep the fence at the desired height and provide reasonable support. The proper height should be about 2/3 the animals height or nose height. |
| Trees | Line, corner, gate, pull | Avoid if possible. Approval needed by NRCS prior to use. | | Only to be used in rocky or wet areas where post holes are impossible to dig or in frequently flooded areas where fences are difficult to maintain. Trees should be of sufficient size to minimize swaying and properly aligned. A buffer or treated board will be used between the wire and the tree, or when a buffer cannot be attached to the tree, staples will be driven into the tree and must completely penetrate the sapwood below the outer bark. Where trees are used as corner posts, thread wire through a 6” lag bolt instead of wrapping wire around the tree. |
| Wood + Plastic Composite | Line | 1” | Manufacturer | Follow manufacturer guidelines for installation. Use woven or smooth high tensile electric wire. Posts may be susceptible to damage from fire. |

**Table 4. Typical Strand Wire Spacing.**

| WIRES | ANIMAL TYPE | SPACING FROM GROUND (in.) |
|---|---|---|
| 1 | Cattle | 28 |
| 2 | Cattle, Calves | 18, 30 |
| | Hogs | 6, 18 |
| 3 | Cattle, Calves | 18, 30, 42 |
| | Cattle, Horses | 20, 34, 46 |
| | Hogs | 6, 12, 18 |
| 4 | Cattle, Calves | 12, 22, 32, 42 |
| | Cattle, Sheep, Goats | 8, 16, 24, 36 |
| 5 | Cattle, Horses, Sheep, Goats | 8, 16, 24, 36, 48 |
| 6-8 | Deer, Predator Control | 6, 12, 18, 26, 36, 46, 56, 68 |

**Table 5: Wood Preservative Treatment Levels**

| | Retention (lb/ft3) | |
|---|---|---|
| **Wood Preservative Treatment*** | **UC4A** | **UC3** |
| **Creosote coal tar** | **8** | **8** |
| **Pentachlorophenol** | **0.4** | **-** |
| **Copper naphthenate** | **0.055** | **-** |
| **Ammoniacal copper zinc arsenate* (ACZA)** | **0.4** | **-** |
| **Chromated Copper Arsenate (CCA)** | **0.4** | **.25** |
| **Alkaline copper quat (ACQ)*** | **0.4** | **.25** |
| **Copper azole, type B (CA-B)*** | **0.21** | **.20** |
| **Copper azole, type C (CA-C)*** | **0.15** | **.20** |
| **Dispersed (micronized) copper azole (ESR reports)** | **0.15** | **.060** |

*AWPA Standards:
UC4A: General use, agricultural posts, cross bracing.
UC3: Exterior construction, above ground, uncoated or poor water run-off.

**Table 6. Board Fence Material Type, Size and Spacing.**

| Member | Rec.* Min. Fence Height | Kind of Post | Post Top Diameter (inches) | Post Length (feet) | Post Placement Depth (min.) | Rec. Post Spacing (feet) | Max. Post Spacing (feet.) | Rec. Board Height From Ground (inches.) |
|---|---|---|---|---|---|---|---|---|
| Corral Fence Posts (recommended post spacing is 6 feet) | | | | | | | | |
| Gate Post | 5 | Wood | 6 | 8 ½ | 42” | 6 | 8’ | 18, 32, 46 , 60 |
| Gate Post | 5 | Pipe | 4 | 8 ½ | 42” | 6 | 8’ | 18, 32, 46 , 60 |
| Line Post | 5 | Wood | 5 | 8 ½ | 36” | 6 | 8’ | 18, 32, 46 , 60 |
| Line Post | 5 | Pipe | 4 | 8 ½ | 36” | 6 | 8’ | 18, 32, 46 , 60 |
| Pasture Fence Posts (recommended post spacing is 8 feet) | | | | | | | | |
| Gate Post | 4 | Wood | 6 | 7 ½ | 42” | 8 | 10’ | 12, 24, 36, 48 |
| Gate Post | 4’ | Pipe | 4 | 7 ½ | 42” | 8 | 10’ | or |
| Line Post | 4’ | Wood | 4 | 6 ½ | 30” | 8 | 10’ | 18, 33, 48 |
| Line Post | 4’ | Pipe | 4 | 6 ½ | 30” | 8 | 10’ | |

| Boards | Material and Dimensions | Max. Space Between Boards |
|---|---|---|
| Corral | Min. 2 inch by 6 inch by 8 foot rough cut, treated plank (2”x6”x8’) | 12” |
| Pasture | Min. 1 inch by 6 inch by 8 foot rough cut treated plank (1”x6”x8’) | 12” |

*Rec. = Recommended

## Practice Design (planning process) and Construction Certification

**Landowner/Cooperator:** _____

**Field Office:** _____

**Farm/Tract Number:** _____

**All substitutions in materials or modifications in design from those given under specifications must be approved by NRCS prior to beginning construction.**

### Planned Fence Amounts and Construction Approval*

| Farm No. | Tract Number | Field Number | Fence Run Number | Planned Length | Applied Length | Meets Standards and Specifications/Approved by: | Date Fence Construction Approved |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
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**Additional Planning Notes:**

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_____

_____

**Approved Modifications:**

_____

_____

_____

_____

***Attach drawings or maps that identify planned fence run identification, locations, length and constructed location and lengths**.

**Prepared By:** _____ **Date:** _____

**Landowner Signature:** _____ **Date:** _____

**Post Fence Construction Notes:**

**Prepared By:** _____ **Date:** _____

**Landowner Signature:** _____ **Date:** _____

**U.S. Department of Agriculture**

# Natural Resources Conservation Service

## AL - 3.16

## Fence Construction Check Sheet (Electric)

Landowner: _____

Field No: _____ Tract No: _____ by: _____

Fence No. _____ Length: _____ Date: _____

| | | Unit | Minimum | Planned/ Specification | Installed |
|---|---|---|---|---|---|
| **I.** | **Wire** | Total Footage | | | |
| | A. Size | Gauge | | | |
| | B. Strands | Number | | | |
| | C. Nominal wire height | Inches | | | |
| **II.** | **Brace Assemblies (See NRCS Drawings)** | Number | | | |
| | A. Post | | | | |
| | 1. Kind[1] | Material | | | |
| | 2. Length | Feet | | | |
| | 3. Nominal top diameter | Inches | | | |
| | 4. Depth to set | Inches | | | |
| | 5. Concrete (80 lb. bag) | Number | | | |
| | B. Cross-member (when required) | | | | |
| | 1. Kind[1] | Material | | | |
| | 2. Length | Feet | | | |
| | 3. Nominal top diameter | Inches | | | |
| **III.** | **Line Posts** | | | | |
| | A. Wood, composite, fiberglass | | | | |
| | 1. Kind[1] | Material | | | |
| | 2. Length | Feet | | | |
| | 3. Nominal diameter | Inches | | | |
| | 4. Spacing | Feet | | | |
| | B. Steel Posts | | | | |
| | 1. Kind [1] | Coating | | | |
| | 2. Length | Feet | | | |
| | 3. Weight per foot | Pounds | | | |
| | 4. Spacing | Feet | | | |
| **IV.** | **Power Unit** | Type | | | |

A. The energizer selected must be high voltage/low impedance, short pulse which can produce at least 4,000 volts. Output with all livestock containment fences charged (on) when under maximum anticipated load.

[1] Certificate required for new treated posts and metal pipe must be permanently capped and painted or galvanized.

**Vicinity Map/Diagram**: Attach as needed. Otherwise see conservation plan map.

**Remarks:** _____

_____

_____

**V. Refer to Attached Drawings:** _____

_____

_____

**This practice meets or exceeds USDA/NRCS specifications:**

**Signature:** _____ **Date:** _____

# U.S. Department of Agriculture

## Natural Resources Conservation Service

## AL - 3.16

## Fence Construction Check Sheet (Non-Electric)

Landowner: _____

Field No: _____ Tract No: _____ by: _____

Fence No. _____ Length: _____ Date: _____

| | | Unit | Minimum | Planned/ Specification | Installed |
|---|---|---|---|---|---|
| **I.** | **Wire** | | | | |
| | A. Barbed wire (galvanized) | Total Footage | | | |
| | 1. Size | Gauge | | | |
| | 2. Strands | Number | | | |
| | 3. Height of top wire | Inches | | | |
| | B. Net Wire (galvanized) | Total Footage | | | |
| | 1. Size (top and bottom strand) | Gauge | | | |
| | (intermediate and stay strands) | Gauge | | | |
| | 2. Height of net wire | Inches | | | |
| | 3. Height of fence (top wire) | Inches | | | |
| | 4. Strands above/below net wire | Number | | | |
| **II.** | **Corner, End/Gate, and H-Brace Posts (See NRCS Drawings)** | | | | |
| | B. Corner and End/Gate Post | | | | |
| | 1. Kind [1] | Material | | | |
| | 2. Length | Feet | | | |
| | 3. Nominal top diameter | Inches | | | |
| | 4. Depth to set | Inches | | | |
| | 5. Amount | Number | | | |
| | B. Cross-member | | | | |
| | 1. Kind [1] | Material | | | |
| | 2. Length | Feet | | | |
| | 3. Nominal top diameter | Inches | | | |
| | 4. Amount | Number | | | |
| | C. H-Brace, H+N Brace, post | | | | |
| | 1. Kind [1] | Material | | | |
| | 2. Length | Feet | | | |
| | 3. Nominal top diameter | Inches | | | |
| | 4. Depth to set | Inches | | | |
| | 5. Amount | Number | | | |
| **III.** | **Line Posts (2)** | | | | |
| | B. Wood posts | | | | |
| | 1. Kind [1] | Material | | | |
| | 2. Length | Feet | | | |
| | 3. Nominal diameter | Inches | | | |
| | 4. Spacing | Feet | | | |
| | 5. Amount | Number | | | |
| | B. Steel Posts | | | | |
| | 1. Kind | Coating | | | |
| | 2. Length | Feet | | | |
| | 3. Weight per foot | Pounds | | | |
| | 4. Spacing | Feet | | | |
| | 5. Amount | Number | | | |

[1] Certificate required for new treated posts and metal pipe must be permanently capped and painted or galvanized. **All gates used must meet or exceed standard for type of fence constructed.** **Vicinity Map/Diagram**: Attached as needed. Otherwise see Conservation Plan Map.

Remarks: _____

_____

**This practice meets or exceeds USDA/NRCS specifications:**

**Signature:** _____ **Date:** _____



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