NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE SPECIFICATION

FENCING

CODE 382

MATERIALS AND CONSTRUCTION SPECIFICATIONS

INTENDED USE OF FENCE

Fences may be designed and installed for permanent or temporary use.

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 15 – 25 years. Permanent fences are used for exterior (boundary) fencing of property and for specific land uses.

Temporary, or moveable fences, are usually single wire and designed to be in place for short periods of time. Temporary fences are best used as subdivision fences for frequent movement or control of animals and where the exact location of the fence may not be the same from time to time. Wire type should be flexible enough to allow frequent movement without undue kinking or breaking, or stress on the operator. Temporary or moveable fences have to control the animals in the same manner as the permanent fence, but there is more risk of animals breaching the fence.

Fence type or style

Barbed wire fences are usually multiple wires used as permanent fences for perimeter or subdivision purposes. They may be used for most type of animals, but are not preferred for horses and small animals.

Woven, Net and Mesh wire fences are used as permanent fences for perimeter and subdivision purposes. The configuration of the wire spacing and height varies depending on the type of animal being controlled.

High tensile smooth wire fences are usually multiple wires used as permanent fences for perimeter or subdivision purposes. They may be used for all types of animals if properly spaced. Smooth wire may be steel or aluminum and it may be electrified or non electrified.

Electric fences may be permanent or temporary. Electric power is from 110 or 220 electrical current or battery; the battery may be recharged by solar or electrical current. The fences may be of smooth steel, aluminum, or metal woven with polyethylene or polypropylene fiber. Livestock must be trained to respect electric fences.

Board fences are usually wood or some type of composition board used for permanent fence for perimeter or subdivision purposes. Board fence is used primarily where aesthetics or animal safety is of concern. They are most often used for control of horses and for working facilities.

Other fence types include chain link, pipe, vinyl, galvanized panel, and cable fences. They are generally used around corrals and homesteads. They may be used to restrict access to unsafe areas such as lagoons, abandoned mines, and other unsafe or sensitive areas.

Special or non-conventional fencing

Common Sense Fence Systems and Electra-braid are acceptable when installed

to manufacturer's recommendation. These and other fence systems are often applicable for horses and other animals having special needs.

MATERIALS SPECIFICATIONS

Acceptable fence criteria for various management needs may be found in Table 1.

The materials used in construction of the chosen fence type must be in accordance with and meet or exceed size, strength, durability and lifespan of the requirements listed in Tables 2-8 of this document. The Tables present all of the specifications needed to select appropriate materials to meet the Standard 382.

Variations of what is presented in this document may be approved if alternatives will meet or exceed current specifications. Documentation should be provided to the Assistant State Conservationist for Technology.

CONSTRUCTION SPECIFICATIONS

Fence-Line Clearing

Prior to construction, the fence line shall be cleared of any obstruction that would hinder fence placement and operation. The soil surface along the fence line shall be relatively smooth such that placement of the bottom wire does not exceed the specified maximum wire spacing from the soil surface.

Setting posts

All post shall be set and maintained in a vertical position or leaning slightly (1-2" off vertical) away from direction of wire tension. *Posts in curves may be set up to 4" off vertical). Posts set on slopes greater than 21% may be constructed. Posts set with a driver in an auger-drilled pilot hole have about 5 times the holding strength of hand-set posts.* If hand set, holes should be at least 6" larger than the diameter of the posts and all backfilled material shall be thoroughly tamped in layers no thicker than 4 inches. The post hole shall be filled to the ground surface.

Concrete backfill is not necessary when posts are driven or hand set with proper tamping; however, if used it shall be rodded into place in layers not thicker than 12 inches and shall completely fill the post hole to the ground surface. No stress shall be applied to posts set in concrete for 24 hours.

Line Posts

Specifications of line posts are found in Table 3. Spacing of line posts is found in Table 1 and will be the same for all types of posts. Spacing may vary somewhat depending on terrain and pressure from livestock.

Installation shall ensure that adequate fence height is maintained based on its purpose (Table 1).

Line Posts – Stream Crossing

Anchor posts are required on both sides of a stream crossing. For crossings less than 16 feet wide, standard line posts set on both sides will be adequate. For crossings wider than 16 feet, or when non-electrified heavy flood gate is used, a single H-brace assembly or other suitable brace shall be used.

- Where needed, flood gates will be attached below bottom wire and will be designed to allow water and debris to pass and still control livestock. Some type of hinged or breakaway floodgate works best.

Posts that are set in low areas or gullies may need to be weighted or anchored to prevent lifting out.

Stays or battens between line post

Stays or wire spacers or battens may be used to maintain desired wire spacing between line posts; note that specifications for post spacing differs with and without stays (Table 1). Stays shall be secured sufficiently to remain in position along wire line.

Post Bracing

Bracing of anchor (pull) posts is required at all corners, gates, fence ends and at definite slope and alignment changes in the fence line. See Tables 4, 5 and 6 for selection criteria and design specifications of single and double brace assemblies.

Corner braces are required at all points where the fence alignment has a change of 20 degrees or more and the pull is from two directions. (In an 8-foot long section, 20 degrees is approx. 3 ft off the straight line).

End braces are required where fence ends and on both sides of gate openings and has pull from only one direction.

In–line pull post assemblies are located in straight sections of the fence line and where there are sudden changes in elevations, such as at the bottom and top of slopes. Posts that are set in low areas or gullies may need to be weighted or anchored to prevent lifting out.

Single post braces may be used with less than 4 HT electrical wire fence (Table 6).

Horizontal Compression Braces.

Refer to Table 5 for Compression Brace Criteria and Specifications.

- Placement of horizontal brace will be between the top two wires or a minimum 3 feet above ground and 8 inches from top of post.
- The brace post and anchor posts should be fastened to the compression brace using screws, nails, or steel dowel pin (drilled through vertical post and into end of horizontal brace, 2 inches deep).
- Do not notch vertical posts (wood) for stabilizing horizontal brace support as this will increase chance of wood rot.

Tension of Brace (Guy) Wires

- Two complete loops of 12 ½ gage HT wire or barbed wire or one loop of 9-guage wire.
- For horizontal braces, brace wire will be double wrapped and stapled to brace post at height of 4-6 inches above brace member and to the anchor (pull) post at a point 4 inches above the ground level.
- Brace (Guy) wire will be twisted to provide moderate tension using a twist stick of 18-24” and will remain in place approximately midway along brace wire. Another suitable method is to use a fence wire tightener or strainer.

Trees as posts

Trees may not be used as posts, except on areas too difficult to erect conventional posts, such as rocky areas or frequently flooded areas. The tree should be of durable wood type, relatively straight and free of rot and knots. Trees must be of sufficient size to minimize swaying. Swaying trees could potentially cause the fence to sag or stretch, thus adversely affecting function of the fence. Frequent observation and maintenance will be critical to the continued success of fence that uses trees for posts. Fence wire or insulators shall be stapled into a 2"x4" treated board secured to the tree by wrapping wire around 4 to 6 2”x4” boards and the tree. Alternately, secure the boards to the tree using nails long enough to penetrate the sapwood. *Trees shall only be used in situations where the use of posts is technically infeasible.*

INSTALLATION OF WIRE

Fence wire will be stretched to sufficient tension prior to being fastened to posts. Temperature variations must be considered (wire will tighten in cold weather and expand in hot weather).

Tensioning the wire

Woven Wire - In warm weather, wire shall be stretched until ¼ of the height of the "tension curve" is removed. In cold weather, remove ½ of the tension curve. *Fixed-Knot Woven Wire*- The tension crimp should be ½ the size of an un-tensioned crimp.

Barbed Wire - In warm weather, a 100 ft stretch of wire should sag no more than 4 inches in the middle and 2 inches in cold weather.

High Tensile Wire - Tension of wires should be sufficient to maintain the proper average height of the fence wires. Tension should be 200 lbs for cattle, horses and 300 lbs for goats and sheep.

Tension springs

In-line wire spring-tensioners are designed to indicate lbs of tension on the line, assuming placement within the line is appropriate. On most fences the use of one tensioner per pull will provide sufficient indication of the tension on adjacent wires.

Springs offer only 3-6 inches of elasticity therefore are of little benefit when something like a tree falls on the wire.

Staples and fasteners

Staples should be installed into post to allow free slippage of wire.

Staples shall be driven diagonally across the grain of the wood and at a slight downward angle (except in dips of landscape) and shall not be driven so tightly as to bind the wire against the post.

Electrically charged smooth wires must be attached to conductive posts with appropriate UV resistant HDPE (High Density Polyethylene) or HDPP (High Density Polypropylene) plastic insulators.

For steel line posts, the fencing shall be fastened with either 2 turns of 14 gauge galvanized steel wire or the post manufacturer's special wire clips. For all other types of posts, attach as specified by manufacturer.

Tie off of wire or insulators: HT wire is tied off using the "thread through method" (a half hitch and 3 wraps) or with compression sleeves. A length of high tensile wire is fastened around the groove of the insulator then looped around the post and stapled on opposite side of post. An alternative is the tubular plastic insulator equipped with an internal metal strip to prevent damage to the plastic tube. All insulators must be rated for use with high tensile fence.

Wire attachment to posts

Attaching Fence Wire to Anchor (Pull) Post: For **Barbed and HT wire** fences, wires will be attached to anchor (pull) post by two complete wraps around post, stapled (wood posts) or wired (steel posts) and ends tightly twisted around stretched wire at least six times. Compression sleeves may be used to connect ends of brace wire.

For **Woven or Mesh wire**, determine amount of wire needed to fully wrap around post twice then remove enough vertical stays to provide that length. The wire ends are then attached as described in previous paragraph.

Fixed-knot woven fence shall be stapled to wood post or fastened to steel post at every horizontal wire using manufacturer's special wire clips.

Post side wire placement: the wire shall be placed on the livestock side of line posts and on the outside of corners and bends, or suspended from the inside of posts in corners and bends using ceramic donuts or appropriate UV resistant HDPE or HDPP plastic insulators.

High Tensile wire may be suspended from the inside of posts in corners and bends using ceramic donuts or appropriate UV resistant HDPE or HDPP plastic insulators.

Barbed wire shall be attached at each post with 1.5 inch stables driven to allow slippage.

Woven wire fencing shall be attached at a minimum to alternate horizontal strands. Staples shall allow slippage.

Wire Splicing

There are four basic ways to splice wire:

1. Figure 8 knot
2. Western Union splice
3. Reef knot
4. Crimping sleeve

Barbed wire and woven wire shall be spliced by means of a western union splice or by suitable compression sleeves applied with a tool designed for the purpose.

All wires on electrical fence should have positive electrical charge

In NC climatic and soil environments, all wires on electrical fences should be electrified to provide the maximum electrical conductivity and animal behavior modification. If heavy vegetation grows over the bottom wire, it should be fitted to allow it to be switched to a ground wire during that season.

Gates

Gates weighing less than 100 lbs may be hung from single end post properly installed. Heavy metal or wood gates more than 6" wide shall best be attached to the pull post of an H-brace.

Stream Crossings

-off switch and flood gate controller. Non-electric flood gates should be suspended 6" above normal water level and be hinged such that gate will swing with the rising water during storm events.

An electrified flood gate may be used to minimize debris problems on stream crossings. The electrified flood gate is constructed by stretching an electrified wire across the drainage above high water flow level. Attach, with compression sleeves, hanging galvanized chains or wire to the electrified wire at a spacing of 6 inches for goats, hogs and sheep or 12 inches for cattle and horses. Hanging gate should terminate approximately 6 inches above average normal water level. It is advisable to connect the gate to electric fence with double insulated cable through a cut

Stream Bank Protection

Permanent fencing will be placed at least 10 feet from the top of the stream bank and should allow for more area in meanders to minimize corner bracing and in areas with bank erosion.

Safety

Fencing operations can result in painful and serious injury. Wear heavy gauntlet leather gloves to protect hands and wrists, and boots or high-top shoes to protect legs and ankles. Tough, close fitting clothing will reduce risks of catching on wire. When stretching woven, fixed-knot, or barbed wire, stand on the opposite side of the post from the wire and stretcher unit.

It is dangerous to use a tractor to stretch wire fencing because of potential breaking of the wire resulting in serious injury from the recoil of the clamp bar, chain, or wire. Keep chains and wire stretching clamps in good condition.

Carry staples, nails, or other fasteners in a metal container or in an apron and not in your trouser pockets. Do not hold fasteners in your mouth which is a common but extremely dangerous habit.

If you handle preservative treated posts, do not rub your hands or gloves on your skin. Minimize the inhaling of sawdust.

Electrical fences should be clearly labeled or identified with the appropriate warning signs.

Considerations and helpful hints in construction

1. Woven wire for sheep and goats should have vertical wire wide enough (9" to 12") or narrow enough (<4") to minimize catching their heads. Otherwise use an electric offset wire to keep animals away from woven wire that might "entangle" them.

2. Never use household electrical wire for any part of an electrified fence. Splicing wires of different metals often results in oxidation and corrosion which causes short circuits and poor conductivity.

3. A digital voltmeter is essential to monitoring and maintaining electrical power fences.

4. Avoid placing electrical fences parallel with telephone or commercial power lines since static field can sometimes be created.

5. It is recommended that fences be located 20 feet or more from streams with a maintenance gate to allow for one-day “flash grazing” when soil is dry enough to minimize trampling damage. This distance can also lessen fence maintenance by reducing flood damage. Temporary fencing may be used to protect streambanks while using forage adjacent to the stream.

REFERENCES

Turner, J. H. 1997. *Planning Fences.* American Association for Vocational Instructional Materials. Winterville, GA.

Turner, J. Howard, and G. Smith. 1974. *Building Fences.* American Association for Vocational Instructional Materials

Planning and Building Fences on the Farm, Univ. of Tennessee, AES, PB1541

Fence Brace Assemblies, Circular 792, Institute of Food and Agricultural Sciences, Rev. 1992

ASTM STANDARD 116

Karsky, Richard. 1988. *Fences.* USDA Forestry Service Technology & Development Program. Prepared by Missoula Tech & Development Center.

Table 1. Fence Selection Criteria

Fence design and construction must meet the minimum requirements for controlling specific animal types.

Animal Type to Control	Fence type	Purpose of Fence			Spacing above ground	Line posts & Stay (maximum spacing)		
		Perimeter (boundary)	Access lanes & stream crossings	Interior subdivision & stream exclusion		post w/o stay	post with stay	Stay spacing
		Minimum Criteria			Inches	Feet		
Cattle	Barbed 3-wire	NO	NO	Meets	18, 28, 38	16.5	30	10
Cattle	Barbed 4-wire	Meets	Meets	Exceeds	16 to 46 evenly spaced	16.5	30	10
Cattle	Barbed 5-wire	Exceeds	Exceeds	Exceeds	12 to 48 evenly spaced	16.5	30	10
Cattle	Non-Electric 4-wire HT smooth	NO	NO	Meets	16 to 42 evenly spaced	30	60	15
Cattle	Non-Electric 5-wire HT smooth	NO	Meets	Exceeds	16 to 48 evenly spaced	30	60	15
Cattle	Non-Electric 6-wire HT smooth	Meets	Exceeds	Exceeds	12 to 48 evenly spaced	30	60	15
Cattle	Electric 1-wire HT smooth	NO	NO	Meets	32	50	NA	NA
Cattle	Electric 2-wire HT smooth	NO	Meets	Exceeds	20,32	50	100	25
Cattle	Electric 3-wire HT smooth	NO	Exceeds	Exceeds	18,30,42	50	100	25
Cattle	Electric 4-wire HT smooth	Meets	Exceeds	Exceeds	12 to 42 evenly spaced	50	100	25
Cattle	Electric 1-wire Polywire or Polytape	NO	Meets	Meets	32	25	NA	NA
Cattle	Electric 2-wire Polywire or Polytape	NO	Meets	Meets	20,32	25	NA	NA
Cattle	Woven wire with 1 to 2 HT or Barb above	Exceeds	Exceeds	Exceeds	32" min; HT or Barb at 6" spacing to 48"; HT may be Electrified; Woven wire 3" > ground level	16.5	NA	NA
Cattle	HT Woven wire with 1 to 2 HT or Barb above	Exceeds	Exceeds	Exceeds	32" min; HT or Barb at 6" spacing to 48"; HT may be Electrified; Woven wire 3" > ground level	25	NA	NA
Cattle	Wood or Composition boards (6" wid	Exceeds	Exceeds	Exceeds	bottom of plank at 12,24,36,48	8	NA	NA
Goats & sheep	Barbed 5-wire	NO	NO	NO	6 to 32 evenly spaced	16.5	30	10
Goats & sheep	Barbed 6-wire	NO	Meets	Meets	6 to 36 evenly spaced	16.5	30	10
Goats & sheep	Barbed 7-wire	Meets	Exceeds	Exceeds	6 to 42 evenly spaced	16.5	30	10
Goats & sheep	Non-Electric 5-wire HT smooth	NO	NO	NO	6 to 32 evenly spaced	30	60	15
Goats & sheep	Non-Electric 6-wire HT smooth	NO	Meets	Meets	6 to 36 evenly spaced	30	60	15
Goats & sheep	Non-Electric 7-wire HT smooth	Meets	Exceeds	Exceeds	6 to 42 evenly spaced	30	60	15
Goats & sheep	Electric, 3-wire, HT smooth	NO	NO	Meets	8,18,30	50	100	20
Goats & sheep	Electric, 4-wire, HT smooth	NO	Meets	Exceeds	6, 14, 24, 34	50	100	20
Goats & sheep	Electric, 5-wire, HT smooth	Meets	Exceeds	Exceeds	6, 12, 18, 28, 38	50	100	20
Goats & sheep	Woven wire with 1 to 2 HT or Barb above	Exceeds	Exceeds	Exceeds	32" min; HT or Barb at 6" spacing to 48"; HT may be Electrified; Woven wire 3" > ground level	16.5	NA	NA
Goats & sheep	HT Woven wire with 1 to 2 HT or Barb above	Exceeds	Exceeds	Exceeds	32" min; HT or Barb at 6" spacing to 48"; HT may be Electrified; Woven wire 3" > ground level	25	NA	NA
Horses	Electric 2-wire HT smooth	NO	Meets	Meets	28, 38	50	100	25
Horses	Electric 3-wire HT smooth	NO	Exceeds	Exceeds	28,38,48	50	100	25
Horses	Electric 4-wire HT smooth	Meets	Exceeds	Exceeds	18 to 48 evenly spaced	50	100	25
Horses	Electric 1-wire Polywire or Polytape	NO	Meets	Meets	34	25	NA	NA
Horses	Electric 2-wire Polywire or Polytape	NO	Meets	Meets	28, 38	25	NA	NA
Horses	Woven wire w/1-3 wire HT above	Exceeds	Exceeds	Exceeds	32" + HT Smooth at 6" spacings to 54"; Woven wire 3" > ground level	16.5	NA	NA
Horses	Mesh, "No climb" 2"x4" spacing	Exceeds	Exceeds	Exceeds	48" + HT Smooth at 6" spacings to 54"; Mesh wire 3" > ground level	16.5	NA	NA
Horses	Wood or Composition boards(1"x6")	Exceeds	Exceeds	Exceeds	18,30,42(ht to bottom of boards)	8	NA	NA
Hogs	Electric 2-wire HT smooth	NO	NO	Meets	8,18	20	30	15
Hogs	Electric 3-wire HT smooth	Meets	Meets	Exceeds	8,16,24	20	30	15
Hogs	Woven wire with 1 barb 2" off ground	Exceeds	Exceeds	Exceeds	32 "+ Barb at 2" above ground and 2" below the woven wire	16.5(25)	NA	NA
Hogs	Woven wire 32" w/ 1 HT electric inside	Meets	Meets	Meets	32" + 1 electric HT 12 inside & 12" off ground	16.5(25)	NA	NA
Deer	HT Woven wire	Meets			to 96"	25	NA	NA
Deer	Electric 7-wire HT smooth wire Slanted	Meets			see diagram of slant measurements	30	100	25
Deer	Electric 9-wire HT smooth wire	Meets			8, to 72" evenly spaced	30	100	25
Deer	Electric 15-wire HT smooth wire	Meets			to 96" evenly spaced	30	100	25
Buffalo	Electric 4-wire HT smooth	NO	NO	Meets	12 to 42 evenly spaced	30	100	25
Buffalo	Electric 5-wire HT smooth	NO	Meets	Exceeds	12 to 48 evenly spaced	30	100	25
Buffalo	Electric 6-wire HT smooth	Meets	Exceeds	Exceeds	12 to 52 evenly spaced	30	100	25
Chickens & Turkey	Mesh, "No climb" 2"x4" spacing	Meets		Meets	72"	16.5	NA	NA
Emu and Ostrich	Woven wire	Meets		Meets	72"	16.5	NA	NA
People	Chain Link				96" with 1 Barb above	8-10	NA	NA
People	Electric 6-wire HT smooth				12 to 60" evenly spaced	30	60	15
People	Woven wire with 1 to 3 HT or Barb above				32" min; HT or Barb at 6" spacings; HT may be Electrified; wovern >3" above soil	16.5	NA	NA
People	Wood or Composition boards				24",12",12", 12" to top of fence	8	NA	NA
Varmint Control	Mesh, "No climb" 2"x4" spacing	Meets			48"; HT or Barb at 6";HT may be Electrified; 1 electric HT 8" outside & 8" off ground	16.5	NA	NA
Varmint Control	Electric 8-wire HT smooth	Meets			3, 6, 10, 14, 20, 26, 34, 42	30	100	25

Table 2 **Wire Specifications**.

	Minimum Wire Size			
Barbed, Standard Double Strand	12 1/2 gauge with 14 gauge or heavier two-point barbs spaced 4-6 inches apart.	Class I zinc coating per ASTM-116	170,000 psi or 950 lbs.	
Barbed, High-Tensile Double Strand (Gaucho wire)	15 ½ gauge- 4 barb points	Class 3 zinc coating per ASTM-116 .	170,000 psi or 950 lbs	
High Tensile Smooth single strand	12-1/2 gauge	Class 3 zinc coating per ASTM-116	170,000 psi 1300 lbs.	May be used as lead-out from energizer to fence or as underground if protected with plastic coating or inserted into PVC or HDPP pipe.
Galvanized Steel	14 gauge	Galvanized Steel	170, 000 psi / 690 lbs.	Use for 1 or 2 wire temporary fences.
Standard Woven Wire The label shall indicate the wire meets ASTM A-116 or ASTM A-584 standards.	Top & Bottom wires: 10 gauge. Intermediate & Stay Wires: 12-1/2 gauge spaced 4 to 12" apart.	Class1 zinc coating per ASTM 116	Horizontal and vertical spacing should be appropriate for animal types. Interpreting wire identification: 1047-12 has 10 line wires is 47" high and has 12" vertical wire spacing.	
High Tensile Woven Wire	14 1/2 gauge	Class 3 zinc coating per ASTM-116		
Mesh Wire; such as Horse-No-Climb	Top & Bottom wires: 10 gauge Intermediate & Stay Wires: 12-1/2 gauge	Class1 zinc coating per ASTM 116	At least 48 inch high, less than or equal to 2 inch x 4-inch mesh spacing.	
Polywire or "Twine"-Type	Minimum of 9 strands of stainless steel or mixed metal wires	Wires interwoven with polyethylene or polypropylene fiber.	The polywire (twine-type), as compared to polytape is more durable under frequent movement. Polytape is best used where high visibility is needed. Do not use on fences more than 1 mile in length (low conductivity). Life expectancy is 3-5 years if moved frequently.	
Polytape or Tape-Type	Minimum ½ inch wide and 6 strands of stainless steel or mixed metal wire filaments			
Aluminum	12.5 gauge	Aluminum	May be used as one of the wires in a multi-wire fence or as single wire subdivision fence. May be used as lead-out cable from Power Energizer to fence. May be used as underground connector at gates and roads if protected with plastic coating or inserted into PVC or HDPP pipe.	
Equi-Fence	12.5 gauge, medium-tensile galvanized wire.	UV-resistant white polymer	Unique electrically conductive polymer (in black stripes) allows use as an electric fence wire.	

Table 3. **Line Post Specifications.**

Line Post Type	Minimum Diameter/ Weight	Minimum Setting Depths (inches)			Other
		Rocky Soils	Sandy Soils	All Other	
Wood: red cedar (>50%heartwood), black locust, catalpa, bois-d-arc,	3-1/2”	18	30	24	Minimum lengths will allow for minimum setting depth and fence height plus at least 2 inches of post above top wire. Posts will have appropriate treatment for rust and deterioration. Steel fence posts shall conform to the requirements of Federal Specification RR-F-221/3A.
Pressure treated. Wood Material Specification 585	3-1/2” Treatment in accordance with /FED. Spec No.TT-W-571i	18	30	24	
Standard steel “T” “Y”, “U”	1.25 lbs/ ft of length, exclusive of anchor plates	Anchor plate must be fully below ground surface (Post is Approx. 15-18 inches deep)			
Steel Pipe, galvanized	2” OD	18	30	24	
Fiberglass “T”	1 inch cross section	12 –18 inches or depth recommended by manufacturer, whichever is deeper.			Electric fences only.
Fiberglass Round	3/4 inch				
Manufactured ”Tread-in” Type posts; or fiberglass round	Rigid Plastic, PVC, fiberglass or other synthetic posts	For temporary fences only			
Stays (also called Battens, Droppers or Spacers)	Wire stays are of 12 Ga twisted for use on Barb wire. Fiberglass shall be ½ inch dia. Steel T Post. Wood 1.5” x1.5”	Stays may or may not be designed to touch the soil surface, but should be sufficient to maintain wire spacing.			Wire is usually used on barbed wire and does not touch the ground. Fiberglass, wood and steel may sit on soil surface and be non-conductive for electrical powered wire.
Live trees	8 inches	Only to be used in areas difficult to maintain or to erect conventional posts, such as rocky areas or frequently flooded areas. The tree should be of durable wood type, relatively straight and free of rot and knots. Swaying trees could potentially cause the fence to sag or stretch, thus adversely affecting function of the fence. Frequent observation and maintenance will be critical to the continued success of fence that uses trees for posts. Fence wire or insulators shall be stapled into a 2"x4" treated board secured to the tree by wrapping wire around four to six 2”x4”s and the tree. Alternately, secure the boards to the tree using nails long enough to penetrate the sapwood.			

Table 4 **H-Brace Pull Post (corner, gate, and end) Specifications.**

Brace Post Type	Min. Diameter/Weight	Min. Setting Depths	Other
Wood – red cedar (>50%heartwood), black locust, catalpa, bois-d-arc. all 7-8' length	6 inches top diameter (Corners, Ends, Gates); 5 inches top diameter (In-Line pull assemblies)	36-42 inches	Posts larger than 4" may be sharpened to dull point if driven; an augured drill pilot hole is sometimes useful. Posts will have appropriate treatment for rust and deterioration. Minimum lengths will allow for required buried depth and fence height plus at least 2 inches of post above top wire. The assembly strength of a corner post set 2.5' deep is about half as much as for one set at 3.5' deep.
Pressure treated. Wood Material Specification 585			
Steel, round Pipe – braced	2 3/8 in. nominal, 7 lb./foot or equivalent	36 inches set in 12 inch diameter hole with concrete	
	4 in. nominal, 10lb./foot or equivalent	36 inches, Driven	
Steel, angle iron – braced	2.5-inch x 2.5 inch x 0.25 inch	36 inches set in 12 inch diameter hole with concrete	
Utility poles and railroad crossties	Normal and customary size	36-42 inches	Wood soundness should be sufficient for 15-20 years with proper O&M. Be aware of the potential health hazards when sawing and working with these posts.
Live trees	8 inches	Only to be used in areas difficult to maintain or to erect conventional posts, such as rocky areas or frequently flooded areas. The tree should be of durable wood type, relatively straight and free of rot and knots. Swaying trees could potentially cause the fence to sag or stretch, thus adversely affecting function of the fence. Frequent observation and maintenance will be critical to the continued success of fence that uses trees for posts. Fence wire or insulators shall be stapled into a 2"x4" treated board secured to the tree by wrapping wire around the four to six 2"x4"s and the tree. . Alternately, secure the boards to the tree using nails long enough to penetrate the sapwood. ***Trees shall only be used in situations where the use of posts is technically infeasible.***	

Table 5. Horizontal Compression Brace Specifications for H- Brace.

Brace Member Type	Minimum Diameter/Weight	Minimum Length	Other
Wood; red cedar, black locust; catalpa, bois-d-arc	4 inches	8 feet	Posts will have appropriate treatment for rust and deterioration and will be straight and free of splintering. The wider this brace, the stronger the brace. A single H brace with 10-12' horizontal brace may replace a double H brace.
Steel, round, pipe or tubular steel	2 .5 in., 3.65 lb./foot or equivalent	8 feet	
Steel, angle iron	2.5 inch x 2.5 inch x 0.25 inch	8 feet	

Table 6. Single Post Brace Specifications (1 to 3-wire fence).

Brace Post Type	Min. Diameter/Weight	Min. Setting Depths	Other
Steel, round pipe or tubular steel (galvanized)	2.5 inch (OD) schedule 40	24 inches set in 12 inch diameter hole with concrete	For single wire fences, concrete not needed if posts are driven 3 ft deep
Steel, angle iron	2.5 inch x 2.5 inch x 0.25 inch		
Steel	4 inch (OD)	Depth equal to or greater than height of top wire above ground not to exceed 42"	Concrete not needed.
Wood; black locust, red cedar, catalpa, bois-d-arc.	6 inch (for 3 wires) 4 inch (for 1-2 wires)		The strength of a corner post set 2.5' deep is about half as much as for one set at 3.5' deep.
Utility poles and railroad crossties	Normal and customary size		Wood soundness should be sufficient for 15-20 years with proper O&M. Be aware of the potential health hazards when sawing and working with these posts.
Specially Manufactured Hardware	***For use with temporary electric fences only*** – Commercially manufactured components that allow the use of steel fence posts for corner, end and fence line bracing.		

Table 7. Spacing of brace assemblies (straight and level pulls).

Fence Type	Distance between Anchor (pull) Posts (ft.)	End / Corner Brace Type	Inline Brace Type
Standard Barbed or Smooth Wire, none electrified	0 – 660	Single H or Diagonal Brace Assembly	N/A
	660 – 1320	Double H or Diagonal Brace Assembly	N/A
	> 1320	Double H or Diagonal Brace Assembly	Single H or Diagonal Brace Assembly
Energized Electric – Smooth HT wire	0 - 660	Single H or Diagonal Brace Assembly[1]	NA
	660 - 2000	Double H or Diagonal Brace Assembly[1]	Single H or Diagonal Brace Assembly[3]
	> 2000	Double H or Diagonal Brace Assembly[2]	Single H or Diagonal Brace Assembly
Woven (net) wire	0 - 200	Single H or Diagonal Brace Assembly	N/A
	200 - 660	Double H or Diagonal Brace Assembly	N/A
	>660	Double H or Diagonal Brace Assembly	Single H or Diagonal Brace Assembly

[1]Single post brace assembly (a post with bed log) can be used for fences with 3 wires or less.
[2]Single H or Diagonal brace assembly may be used for fences with 3 wires or less.
[3]Inline singly H or Diagonal only needed for 4 or more wires; Single post brace is not suitable for Inline brace.

Table 8. Specifications of other Fence Components.

Component	Description/Specification
Electrical Energizers or "Chargers	Energizers for permanent electric fencing must be U.L. or CSA approved and manufactured for the purpose of agricultural fencing. It is recommended that the energizer have a fence charge meter. Only one charger is allowed per fence. The unit shall include a high impact self-insulating weather resist case, a snap-in circuit panel, a safety pace fuse, a lightening arrester, have full power input and reduced power output. High power, low impedance with 300 milliamps (mAmps) in intensity, finished within 0.0003 of a second, and at a rate of 35-65 pulses per minute. May be solar, 110 or 220 volt, or 12 volt battery units. Safety pace fuse to prevent over pulsing. OUT PUT Joule rating high enough to provide a minimum shock at the farthest point in the fence as follows: a. Cattle, hogs and horses – 1.0 joule. b. Sheep and goats – 6 joules.
Electrical Insulators	Insulators should be made of high quality glazed porcelain or UV resistant HDPE or HDPP plastic. Galvanized 12.5 gauge wire may be used on fiberglass and other non conductive posts to secure wire to post. Tubular plastic insulators that wrap around end-posts must have an internal metal strip to prevent damage to the plastic.
Wire connecting energizer to fence or beneath gate or road	Double insulated cable or high tensile or aluminum wire enclosed in PVC or black plastic will minimize short circuits. Never use household or underground electrical copper wire with fence energizers.
Ground rod and installation	All energizers must be grounded sufficiently to test less than 300 Ohms on the last ground rod when the fence is "grounded" 300 feet from energizer; this may require a minimum of three or more ground rods. Galvanized ground rods for the fence must be driven into the ground a minimum of 6 feet. If this is impossible, alternative methods of grounding include putting rods in trenches surrounded with Epson Salt or Bentonite. Placing ground rods in damp areas will improve effectiveness.
Staples or fasteners	Staples used to fasten wire to wood post shall be 9 gauge galvanized with a minimum length of 1 ½ inches. Staples with barbs hold best. For steel line posts, the fencing shall be fastened with 14 gauge galvanized steel wire or the post manufacturer's special wire clips. For all other types of posts, attach as specified by manufacturer.
Stays, spacers or battens	Stays may be made of wire, fiberglass, high-polymer or wood and of sufficient length to maintain correct wire spacing.
Gates	Gates may be galvanized, fiberglass or treated wood, but materials should be new or durable enough to last 10 years with suitable maintenance. All non-electrified gates must be substantial enough to withstand expected pressures from livestock and wildlife. Gates between electrical subdivision fences may be of polywire, polyrope or coiled spring connected to spring loaded handles.