PRACTICE SPECIFICATION
PERMANENT ELECTRIC FENCE

GENERAL

Plans and specifications for construction shall be in keeping with the standard for this type of fence and shall describe the requirements for proper installation of the practice to achieve its intended purpose.

Use NE-CPA-1 Fence Construction Job Sheet to document practice design and certification.

Applicable Nebraska Construction and Materials Specifications will be used in accordance with the following:

PAGE SIZE FENCE DRAWINGS (FOTG 382) (NE500-30-001 Permanent Electric Fence)

PERMANENT ELECTRIC FENCES

I. Post

A. Line Posts

i) Fiberglass posts will be a composite of marble, fiberglass, and polymer resins which have been treated to protect them from ultraviolet light, or high density wood posts specially designed for permanent electric fences

ii) A wood line post should be used on all high and low points. Wood posts shall be redcedar, Juniper, *osage orange (Bois d'Arc), black or honey locust, mulberry,* redwood, pressure-treated pine, or other wood of equal life or strength. All posts except osage orange, black or honey locust, redwood, and pressure treated pine shall be treated with creosote, pentachloraphenol or chromated copper arsenate (CCA) by a method such that complete penetration of the sapwood will be obtained. At least half the diameter of diagonal dimension of redcedar, juniper or redwood posts shall be heartwood. A “deadman” may be needed at all low points.

iii) Steel line posts shall be "tee" type with suitable corrugations, knobs, studs, or grooves for fastening line wires with attached anchor plate. They shall be painted or galvanized and have a minimum weight of 1.33 pounds per foot exclusive of anchor plate.

iv) Pull posts shall be constructed as an “H” brace or a single post deadmanned in both directions.

B. Size

i) Fiberglass posts shall be long enough for fence design and driven into the soil at least 1.5 feet except in loose sand where 2.0 feet may be required.

ii) Wood line posts shall have a minimum top diameter of approximately 3 inches, except osage orange, which can have a minimum top diameter of 2

inches. Minimum length of wood line posts shall be 6.5 feet and shall be set to a minimum depth of 2.5 feet in the ground. Porcelain ceramic insulators may be used or drill a 5/8” hole in post using a 0.5” pvc hose for insulators. Minimum length of steel line posts shall be 6 feet and shall be set to a minimum depth of 18 inches or more inches over the anchor plate. High quality commercial black polypropylene plastic or porcelain ceramic insulators will be used. Fiberglass posts shall have a minimum top diameter of approximately 1.25 inches. Minimum length of fiberglass line posts shall be 6 feet and shall be set to a minimum depth of 1.5 feet in the ground. High density wood posts specifically designed for permanent electric fences may be used.

iii) Steel “T” shaped posts shall be a standard “T” or “U” and have a minimum weight of 1.33 pounds per foot exclusive of anchor plate and of sufficient length for the height of the fence. High quality commercial black polypropylene plastic or porcelain ceramic insulators will be used. Minimum length of steel line posts shall be 6 feet and shall be set to a minimum depth of 18 inches in the ground.

C. Corner, Gates, and Brace Posts

i) All corner gate and brace posts shall be wooden, structural metal or of other material of equal strength and durability. All wood shall be treated as described for wood posts.

II. Wire

Outside perimeter fences or structural protection fences will be constructed of at least 4 wires.

Interior Cross fences can be constructed with a minimum of 2 wires.

Suggested wire spacing and heights are as follows (see “SPACING AND POLARITY” diagram on standard drawing no NE500-30-001).

2-wire, 34” to 40”
Hot Wire + and Ground Wire -

Wire Spacing From Ground Surface (Inches)	16”	34” to 40”
Polarity	-	+

3-wire, top wire 38”
All Hot Wire +

Wire Spacing From Ground Surface (Inches)	12”	22”	38”
Polarity	+	+	+

Hot + and Ground Wire -

Wire Spacing From Ground Surface (Inches)	12”	22”	38”
Polarity	+	-	+

4-wire, top wire 40”
All Hot Wire +

Wire Spacing From Ground Surface (Inches)	12”	20”	30”	40”
Polarity	+	+	+	+

Hot + and Ground Wire -

Wire Spacing From Ground Surface (Inches)	12”	21”	30” -	39”
Polarity	-	+	-	+

5-wire, top wire 36”
All Hot Wire +

Wire Spacing From Ground Surface (Inches)	12”	19”	26”	33”	40”
Polarity	+	+	+	+	+

Hot + and Ground Wire -

Wire Spacing From Ground Surface (Inches)	12”	19” -	26”	33”	40
Polarity	+	-	+	-	+

(NOTE: Wire tension indicators should be used with wire tension constructed at 175 to 200 pounds per wire. It is desirable to use in-line and end-post ratchet strainer devices on each wire to maintain the correct tension.)

Insulated Cable: Use galvanized wire with two layers of insulation for underground burial or overhead transmission. Do not use copper insulated wire due to corrosion factor and tensile strength.

III. Wire Fence Fasteners

A. Fence fasteners or “clips” are to be galvanized and fastened to allow fence wire to flow or slide past line posts as necessary. A 10-gauge galvanized wire tied in a loop and fastened to the fiberglass post may be used in lieu of the specially designed manufacturer’s clip.

B. An alternative to fasteners is to drill properly spaced holes in the fiberglass posts. The holes should be of adequate size that wires can slide when tightened.

C. Insulators of porcelain ceramic or high quality black polypropylene plastic must be used on steel or wood posts or holes drilled in wood posts using PVC hose for the insulator

IV. Energizers

A. Energizers shall be Underwriters Laboratory (UL) listed. Installation shall be in accordance with manufacturer recommendations. The length of electrified wire shall not exceed capacity of the energizers. A portable voltmeter is desirable to monitor voltage on the line.

B. Electric energizers or electric fence controllers are to meet the following minimum specifications:

1. A minimum output of one joule and be high power, low impedance with 5,000-volt peak output, 2.3 millicoulombs charge, a pulse that is finished within 300-millionths of a second or less, and 54 to 60 pulse per minute.

2. High impact weather resistant case.

3. Snap-in circuit panels.

4. Full power in, with reduced power on output.

5. Safety pace fuse.

6. Lightning arrester.

ii) 110-volt and 220-volt; 6-volt and 9-volt solar powered chargers; or 12-volt battery powered system capable of operating 3 weeks without recharge.

V. Ground as shown on the standardized drawing NE-500-30-001.

All permanent electric fences must be grounded. Energizer ground wire must be connected to a galvanized pipe or rod ½ inch diameter or larger, driven into the ground a minimum of 6 feet. If soil depth prohibits this 6-foot depth, use two or more galvanized pipes or rods. Ground wires in the fence must also be connected to a galvanized pipe or rod. The ground wire attached to the fence may be located anywhere along the fence where a 6-foot depth can be obtained for the galvanized rod or pipe. Ground shall be in accordance to manufacturer recommendations. As a minimum, 20 feet total length of ground rod (optimum - three 8-foot rods with 10 feet between them).

VI. Stays

Fiberglass stays will be a composite of marble, fiberglass and polymer resins, which have been treated for protection from ultra violet light or high density wood stays especially, made for electric fences.

VII. Lightning Protection

Lightning can cause damage to the energizer. Most energizers are poorly protected from lightning strike. External lightning arrestors and an induction loop (lightning choke) should be installed for added protection. Lightning arrestor grounding rods should be placed at least 65 feet from those of the energizer.

Install an additional set of ground rods and attached to a lightning arrestor. Use at least 1 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 lightning arrestor ground must be better than the energizer ground for it to function properly, because lightning will seek the least resistance route to ground.

VIII. Gates

Gates shall be constructed in accordance with the specifications and to the dimensions shown on the drawings. The materials shall conform to the kinds, grades, and sizes specified for fences and shall include the necessary fittings and stays. The gate opener design shown on drawings is optional, and other appropriate designs may be used.

Wire gates shall be the appropriate types shown on drawing 5, E-22, 500.2-4, entitled type 4N Fence Details in Appendix 2 of the Engineering Field Handbook. They shall be constructed in accordance with the specifications and to the dimensions shown on this drawing. The materials shall conform to the kinds, grades, and sizes specified for fences, and shall include the necessary fittings and stays.

11” x 17” Standard Fence drawings:

TYPE 4N FENCE WITH STUB FENCE CATTLE BARRIER - NE500-70-001
(http://efotg.nrcs.usda.gov/references/public/NE/NE500-70-001.pdf)

TYPE 4N FENCE WITH HOG PANEL CATTLE BARRIER - NE500-70-002
(http://efotg.nrcs.usda.gov/references/public/NE/NE500-70-002.pdf)

TYPE 4N FENCE WITH PASS THROUGH GATE - NE500-70-003
(http://efotg.nrcs.usda.gov/references/public/NE/NE500-70-003.pdf)

(Note: The gate opener design examples shown on drawings (NE500-60-002 Metal Gate Closer and NE500-60-003 Metal Gate Closer) are optional and other appropriate designs may be used). Available online at:
http://efotg.nrcs.usda.gov/references/public/NE/TG382_Fence_Drawings.pdf