

## LIVESTOCK CONTROL ELECTRIC FENCE DESIGNS

### Introduction

A wire fence design refers to the physical description and spacings of the wire, line post and dropper components for a particular fence. The following specifications are typically required for an electric fence:

- description of wire
- number of wires
- wire spacings
- post spacing
- dropper spacing (if used)
- which wires are electrified
- and where applicable, which wires are grounded

These specifications must be chosen taking into account the various planning points; the three main ones being fence purpose, type of animal and site conditions. The other details of the fence such as post size, brace design, dropper type, insulator type, etc. are set by construction practice once the above specifications have been selected.

Six permanent designs and two temporary designs are outlined, each having their unique specifications.

### ELECTRIC FENCE DESIGNS FOR LIVESTOCK CONTROL

Electric fencing has additional concerns over non electric in that an electric circuit is being constructed. Not only are braces built, posts driven and wires strung but an electric circuit free of shorts and points of high resistance must be assembled. The quality of line post insulators, tie off insulators, wire connections and the fence controller will all determine the effectiveness and long term maintenance of the fence designs.

One concern of electric fences bears repeating here:

*“An electric fence may be inexpensive but it can’t be built cheap.”*

Electric fence designs should **not** be chosen only to save money. The problems with electric fences are usually the result of an inadequate design, inferior materials and poor construction.

For safety reasons, the following designs use either smooth steel wire (htsw) or “poly” wire. **Barbed wire should not be electrified.**

## Electric Fences for Cattle & Sheep

Controlling cattle and sheep with electric fences is mainly done for improved grazing. The majority of cattle and sheep fences may be non-electric but the cost saving advantages of electric fence designs are essential when considering intensified grazing systems. Both temporary and permanent designs are used on both the perimeter and cross fences

## Electric Fences for Horse

Electric fencing for horses is usually an electrified wire or two in problem areas, such as to prevent chewing of wood boards or rails. However, to discourage horses from pushing under a bottom wire or leaning over a top wire, a non-electric smooth wire design can be modified by electrifying the top and/or bottom wire. Refer to Factsheet 307.260-3 *Pasture Fencing for Horses* regarding non-electric pasture fences for horses that could be modified.

## Electric Fences for Game

Because Game Farm policy for perimeter fence design is for woven wire (non electric), only interior game fences will usually be totally electrified. Individual electric strands may be added to the perimeter fence for greater livestock or predator control. Locate these at a height for good animal contact.

Interior electric fences will be used mainly for grazing control or stock separation. At this time, experience with electric game fences is limited but they can be expected to react similar to other livestock. Woven wire game fences are not suitable to electrify but htsw designs can be made more effective. For instance, a 5 strand game fence is shown modified for use with either fallow deer, reindeer or bison on page 9.

## Comments on Electric Fence Design Information

Both permanent and temporary fences are outlined in the following designs. As the conductance of the ground varies with moisture content, circuits for both dry and moist (irrigated or greater than 24 inch precipitation) ground conditions are shown. Because frozen or snow covered ground has low conductance, use the low moisture designs for electric fences in winter. In the following figures:

- + = positive electrical charge
- = negative electrical charge or ground
- = insulator (for + wires)
- / = staples (for - wires)

Tensioners are optional in the following designs because of the low wire tension required in electric fences.

Detailed designs and specifications are located on the following pages for the main agricultural electric fences as listed below.

Table 1 Guide to Electric Fence Designs			
	Permanent Electric High Tensile Smooth Wire		Temporary electric Light Steel or Polywire
<b>Cattle</b>	4-strand 3-strand 2-strand	pg. 3 pg. 4 pg. 5	1- & 2-strand pg. 6
<b>Sheep</b>	4-strand 3-strand	pg. 7 pg. 7	2-strand pg. 8
<b>Fallow Deer/Reindeer/Bison</b>	5-strand	pg. 9	

# PERMANENT ELECTRIC FENCE DESIGNS FOR CATTLE

USE: cattle, perimeter; medium pressur

WIRE: 4 strands, htsw

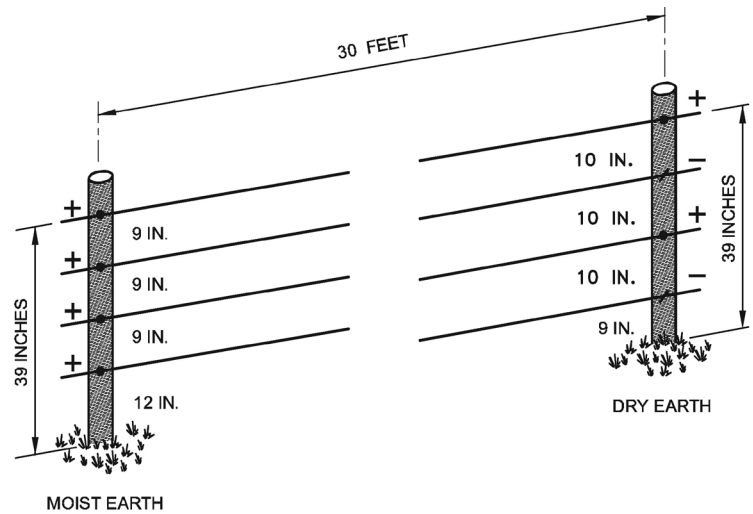
\*POSTS: spaced 30 feet

HEIGHT: 39 inches

DROPPERS: none

\*BRACES: spaced up to 1320 feet ( 4 per mile )

NOTES: Standard cattle permanent electric boundary fence



**Figure 1 Permanent Electric Four-Strand Cattle Perimeter Fence**

## Materials Required per Mile\*

Material	Quantity	Description
<b>Wire</b>	5.7 rolls	- single strand htsw, 3,750 ft per 100 lb roll - 12½ ga, Class 3 galvanizing (standard) - 1,350 lb breaking strength (min) - tensioned to 150 lb
<b>Line Posts</b>	*176	- 2 to 3 inch diameter x 6 feet long - pressure treated, pointed, domed - driven 2 feet (min)
<b>Brace Posts</b>	*8	- 3 to 4 inch diameter x 7 feet long (2 per brace) - pressure treated, pointed, domed - driven 3 feet (min)
<b>Brace Rails</b>	*4	- 3 to 4 inch diameter x 8 feet long (1 per brace) set at ¾ brace height
<b>Staples 2 wire:</b>	1/8 box	- for grounded wires (if used) - 1¾ inch, slash point, hot dip galvanized - angled across post grain by rotating away from the slash point - not driven home on line posts
<b>Tensioners</b>	16	- 1 per strand per brace section
<b>Line Insulators</b>	4 wires: *704 2 wires: *352	- for electrified wires (4 or 2 wires) - plastic material, strong - nail or screw onto post - have long “shorting” distance - easy to replace
<b>Tie-off Insulators</b>	4 wires: *32 2 wires: *16	- two per wire per braced section (8 per strand mile) - also required at change of directions



\* per mile of level terrain—rough terrain may require more posts, braces and insulators

USE: cattle, cross fence, medium pressure

WIRE: 3 strands, htsw

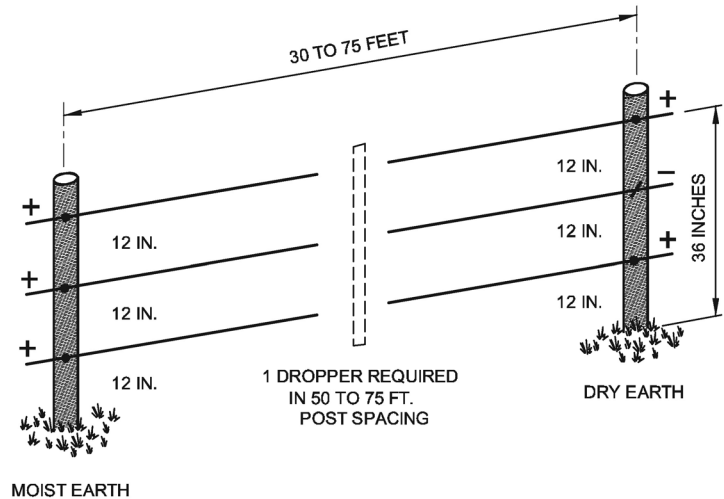
\*POSTS: spaced 30 to 75 feet

HEIGHT: 36 inches

DROPPERS: none on 30 to 50 feet  
1 on 50 to 75 feet  
post spacing designs

\*BRACES: spaced up to 1320 feet  
( 4 per mile )

NOTES: About 1/2 to 1/3 material cost  
of nonelectric designs for  
cross fencing



**Figure 2 Permanent Electric Three-Strand Cattle Cross Fence**

**Materials Required per Mile\***

**Description**

<b>Wire</b>	4.3 rolls	<ul style="list-style-type: none"> <li>- single strand htsw, 3,750 feet per 100 lb roll</li> <li>- 12½ ga, Class 3 galvanizing (standard)</li> <li>- 1,350 lb breaking strength (min)</li> <li>- tensioned to 150 lb</li> </ul>
<b>Line Posts</b>	30 ft: *176 75 ft: *71	<ul style="list-style-type: none"> <li>- 2 to 3 inch diameter x 6 ft long</li> <li>- pressure treated, pointed, domed</li> <li>- driven 2 ft (min)</li> </ul>
<b>Brace Post</b>	*8	<ul style="list-style-type: none"> <li>- 3 to 4 inch diameter x 7 feet long (2 per brace)</li> <li>- pressure treated, pointed, domed</li> <li>- driven 3 feet (min)</li> </ul>
<b>Brace Rails</b>	*4	- 3 to 4 in diameter x 8 feet long (1 per brace) set at ¾ brace height
<b>Droppers</b>	50 ft: 106 75 ft: 71	- non-conducting material such as polyethylene pipe
<b>Staples</b>	1 wire: 1/16 box	<ul style="list-style-type: none"> <li>- for grounded wire (where used)</li> <li>- 1¾ in, slash point, hot dip galvanized</li> <li>- angled across post grain by rotating away from the slash point</li> <li>- not driven home on line posts</li> </ul>
<b>Tensioners</b>	12	- 1 per strand per brace section
<b>Line Insulators</b>	3 wires: 30 ft *528 75 ft: *213 2 wires: 30 ft *352 75 ft: *142	<ul style="list-style-type: none"> <li>- for electrified wires (3 or 2 wires)</li> <li>- plastic material, strong</li> <li>- nail or screw onto post</li> <li>- have long “shorting” distance</li> <li>- easy to replace</li> </ul>
<b>Tie-off Insulators</b>	3 wire: *24 2 wire: *16	<ul style="list-style-type: none"> <li>- two per wire per brace section (8 per strand mile)</li> <li>- also required at change of direction</li> </ul>

\* per mile of level terrain—rough terrain may require more posts, braces and insulators

USE: cattle, cross fence; low pressure

WIRE: 2 strands, htsw

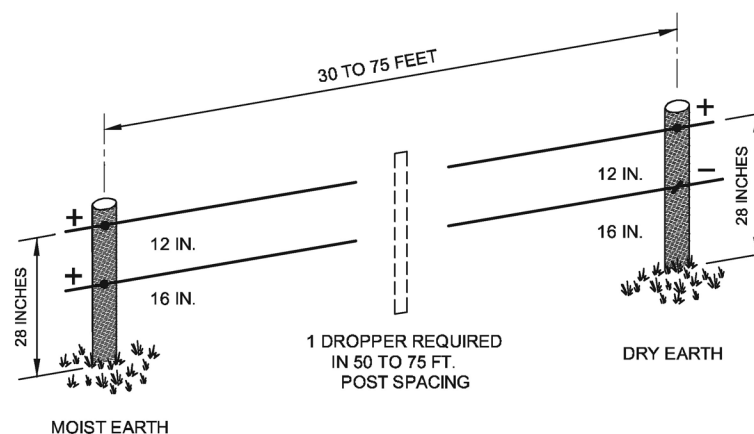
\*POSTS: spaced 30 to 75 feet

HEIGHT: 28 inches

DROPPERS: none on 30 to 50 feet  
1 on 50 to 75 feet  
post spacing designs

\*BRACES: spaced up to 1320 feet  
( 4 per mile )

NOTES: About  $\frac{1}{2}$  to  $\frac{1}{3}$  material cost  
of nonelectric designs for cross fencing



**Figure 3 Permanent Electric Two-Strand Cattle Cross Fence**

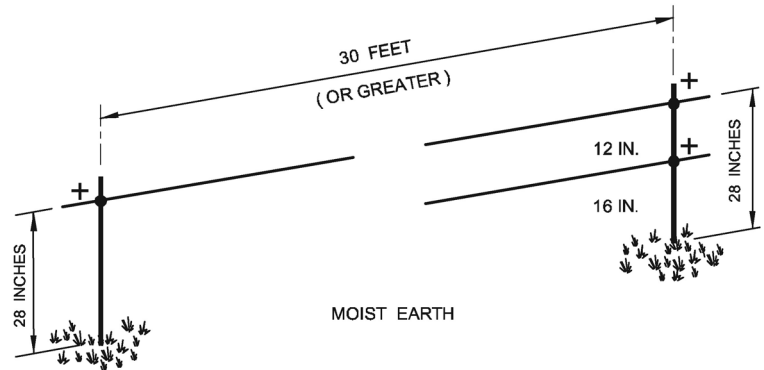
Materials Required per Mile*		Description
<b>Wire</b>	2.9 rolls	- single strand htsw, 3,750 feet per roll - 12½ ga, Class 3 galvanizing (standard) - 1,350 lb breaking strength (min) - tension to 150 lb
<b>Line Posts</b>	30 ft: *176 75 ft: *71	- 2 to 3 inch diameter x 6 feet long - pressure treated, pointed, domed - driven 2 feet (min)
<b>Brace Posts</b>	*8	- use line posts as above - driven 3 feet (min)
<b>Brace Rails</b>	*4 brace rails	- use line posts as above; set at $\frac{3}{4}$ brace height
<b>Droppers</b>	50 ft: 106 75 ft: 71	- non-conducting material such as polyethylene pipe
<b>Staples</b>	1 wire: 1/16 box	- for grounded wire (where used) - 1¾ in, slash point, hot dip galvanized - angled across post grain by rotating away from the slash point - not driven home on line posts
<b>Tensioners</b>	8	- 1 per strand per brace section
<b>Line Insulators</b>	2 wires: 30 ft *352 75 ft *142 1 wire: 30 ft *176 75 ft *71	- for electrified wires (2 or 1 wire) - plastic material, strong - nail or screw onto post - have long “shorting” distance - easy to replace
<b>Tie-off Insulators</b>	2 wires: *16 1 wire: *8	- two per wire per brace section (8 per strand mile) - also required at change of directions

**Note: In dry earth conditions the wires may be reversed; i.e., + for bottom wire and - for top wire.**

**\* per mile of level terrain—rough terrain may require more posts, braces and insulators.**

# TEMPORARY ELECTRIC FENCE DESIGN FOR CATTLE

- USE: cattle, movable grazing control; low to medium pressure
- WIRE: 1 or 2 strands htsw or polywire
- \*POSTS: spaced 30 feet
- HEIGHT: 28 inches
- DROPPERS: none
- BRACES: none – tie off onto perimeter fence post
- NOTES: Minimal fence for control of grazing cattle. Moist earth required as no ground return wire is used. See below.



**Figure 4** Temporary Electric One- or Two-Strand Cattle Cross Fence

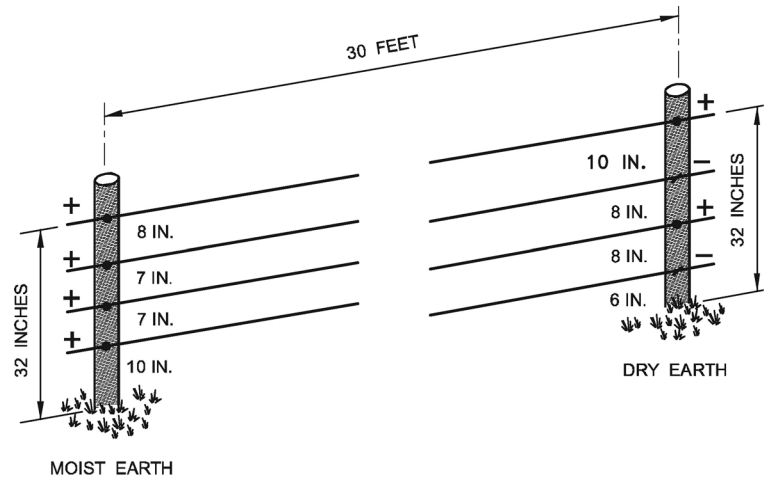
Materials Required per Mile*		Description
<b>Wire</b>	2 strand: 10,600 feet 1 strand: 5,300 feet	- standard 12-1/2 ga htsw, 16 or 17 ga htsw, or polywire - low (hand pull) tension
<b>Line Posts</b>	*176	- “push-in” type fibreglass, or 3/8 inch steel rebar x 3 feet long
<b>Insulators</b>	2 strand: *352 1 strand: *176	- one per wire per post if steel rebar posts are used - none required with fibreglass posts
<b>Wire Reels</b>	1 or 2 reels	- one per wire strand - allows windup for easy moving

**Note:** This two wire design is not given with the ‘dry earth’ option. The light duty materials used for portability should have the good circuit conditions of moist earth.

\* per mile of level terrain—rough terrain may require more posts and insulators.

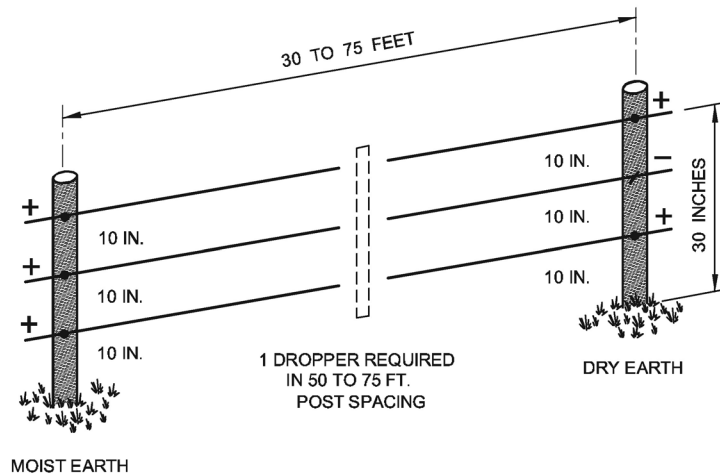
# PERMANENT ELECTRIC FENCE DESIGNS FOR SHEEP

- USE: sheep, perimeter;  
medium pressure
- WIRE: 4 strands, htsw
- POSTS: spaced 30 feet
- HEIGHT: 32 inches
- DROPPERS: none
- BRACES: spaced up to 1320 feet  
( 4 per mile )
- NOTES: Standard design for  
perimeter fence. Materials  
description and required  
per mile as for Cattle 4-Strand  
Permanent design; see Figure 1.



**Figure 5 Permanent Electric Four-Strand Perimeter Fence**

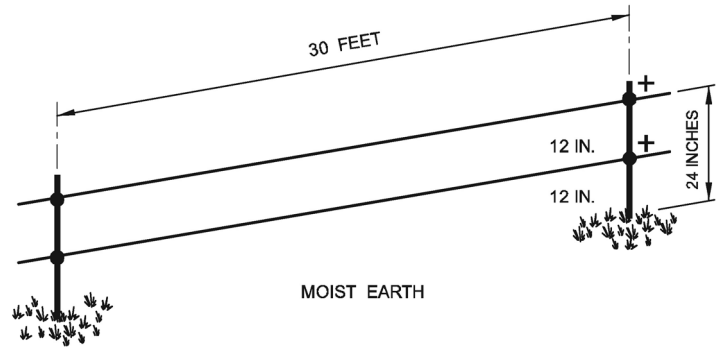
- USE: sheep, cross fence;  
medium pressure
- WIRE: 3 strands, htsw
- POSTS: spaced 30 to 75 feet
- HEIGHT: 30 inches
- DROPPERS: 1 on 50 to 75 feet  
Post spacing designs
- BRACES: spaced up to 1320 feet  
( 4 per mile )
- NOTES: Standard design for  
perimeter fence. Materials  
description and required  
per mile as for Cattle 3-Strand  
Permanent design; see Figure 2.



**Figure 6 Permanent Electric Three-Strand Sheep Perimeter Fence**

# TEMPORARY ELECTRIC FENCE DESIGN FOR SHEEP

USE	sheep, movable Grazing control: Low to medium pressure
WIRE:	2 strands htsw or polywire
POSTS:	spaced 30 feet
HEIGHT:	24 inches
DROPPERS:	none
BRACES:	none – tie off onto Perimeter fence post
NOTES:	A temporary movable sheep fence can also be constructed using “poly” netting rather than poly strands. Minimal fence for control of grazing sheep. Materials description and required per mile as for Cattle – 2-Strand Temporary. See Figure 4.



**Figure 7** Temporary Electric Two-Strand Sheep Cross Fence



# PERMANENT ELECTRIC FENCE DESIGN FOR GAME

USE: farmed fallow deer, reindeer, bison;  
Interior, medium pressure

WIRE: 5 strands, htsw

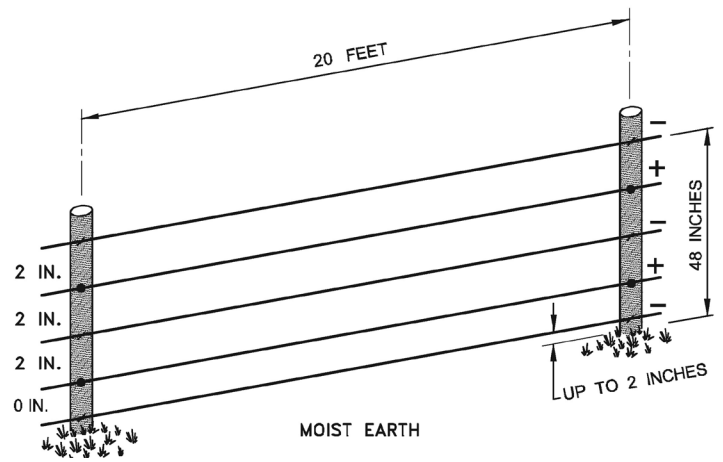
\*POSTS: spaced 20 feet

HEIGHT: 48 inches

DROPPERS: none

\*BRACES: spaced up to 1320 feet  
( 4 per mile )

NOTES: For interior use only. Effective Grazing control. MAY NOT CONTROL FAWNS. Non electrified wire(s) may be used as ground return in dry or frozen conditions. May be used to exclude deer from orchards. See Factsheet 307.251-1 *Deer Exclusion Fencing for Orchards and Vineyards Using Woven Wire*



**Figure 8 Permanent Electric Five-Strand Game Cross Fence**

## Materials Required per Mile\* Description

<b>Wire</b>	8.5 rolls	- single strand htsw, 3,750 feet per 100 lb roll - 12½ ga, Class 3 galvanizing (standard) - 1,350 lb breaking strength (min) - tensioned to 250 lb
<b>Line Posts</b>	*264	- 3 to 4 inch diameter x 7 feet long - pressure treated, pointed, domed - driven 2½ feet (min)
<b>Brace Posts</b>	*8	- pressure treated, pointed, domed - driven 3½ feet (min)
<b>Brace rails</b>	*4	- 3 to 4 inch diameter x 10 feet long (1 per brace) - optional 8 feet long set down to ¾ of brace height
<b>Staples</b>	1/3 box	- for grounded wires (3 wires) - 1¾ in, slash point, hot dip galvanized - angled across post grain by rotating away from the slash point - not driven home on line posts
<b>Line Insulators</b>	*528	- for electrified wires (2 wires) one per wire per post - plastic material, strong - nail or screw onto post - have long “shorting” distance - easy to replace
<b>Tie-off Insulators</b>	*16	- two per wire per brace section (8 per strand mile) - also required at change of direction



\* per mile of level terrain—rough terrain may require more posts, braces and insulators

## FOR FURTHER INFORMATION CONTACT

Phone: 604.556.3001  
Toll Free: 1.888.221.7141

## MINISTRY OF AGRICULTURE

1767 Angus Campbell Road  
Abbotsford, B.C. V3G 2M3