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NEW ZEALAND ELECTRICAL CODE OF PRACTICE

for

ELECTRICAL INSTALLATIONS

ELECTRIC SECURITY FENCES

Issued by the Office of
The Chief Electrical Inspector,
Energy and Resources Division, Ministry of Commerce

THE ELECTRICITY ACT 1992

APPROVAL OF ELECTRICAL CODE OF PRACTICE

FOR

ELECTRICAL INSTALLATIONS - ELECTRIC SECURITY FENCES

Pursuant to Section 36 of the Electricity Act 1992 ("the Act")

On the 1st day of February 1993, the Secretary of Commerce issued the Electrical Code of Practice for Electrical Installations, Electric Security Fences ("the Code")

On the 4th day of February 1993, pursuant to Section 38 of the Act the Secretary published in the Gazette a notice of intention to apply to me for approval of the code, and there has been consultations with such persons (or their representatives) as will be affected by the Code and they have had the opportunity to consider possible effects and comment on those effects.

I have considered the comments concerning those effects and where necessary amendments were made to the Code.

Therefore Pursuant to Section 38 of the Act, I, John Luxton, Minister of Energy, have this day approved the Code as attached to this approval, which Code shall come into force on the 1st day of April 1993.

Dated this 18th day of March 1993.

John Luxton
Minister of Energy.

COMMITTEE REPRESENTATION

This Code of Practice was prepared by the Ministry of Commerce, Chief Electrical Inspector's Office with reference to the following organisations:

New Zealand Electrical Institute
Electrical Manufacturers' Federation
Electrical Contractors' Association of NZ Inc.
Communications and Energy Workers' Union
Telecom New Zealand
Electrical Consultancy Services
Occupational Safety and Health
Electric Security Fences Limited
New Zealand Police

REVIEW

This Code of Practice will be revised as occasions arise. Suggestions for improvement of this Code will be welcomed. They should be sent to the Chief Electrical Inspector's Office, Energy and Resources Division, Ministry of Commerce, PO Box 1473, WELLINGTON.

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INTRODUCTION

Electric security fencing is a form of security for property which is becoming increasingly popular to act as a deterrent to the intrusion of unauthorised persons onto private property. This Code has been produced as the result of requests from industry for clear parameters to be set for the design and installation of electric security fences.

In the formation of this Code the effects of electric shock on the human body, as well as legal aspects to such systems constituting mantraps, were addressed.

In setting requirements the Code takes into account the methods of construction already employed for security fences as well as the concerns of the industry and the public in regard to the protection of persons from inadvertent contact with live parts of the installation.

ELECTRICAL INSTALLATIONS ELECTRIC SECURITY FENCES

SECTION 1

SCOPE, APPLICATION, REFERENCED DOCUMENTS AND DEFINITIONS

1.1 SCOPE

- 1.1.1 This Code of Practice sets out safety requirements for the installation and operation of electric security fences and their associated equipment.
- 1.1.2 It covers electric security fences powered by electric fence energisers supplied from all types of electric power sources (e.g. batteries, solar cells, diesel generator sets and supply mains).
- 1.1.3 This Code does not apply to electric fences which are intended primarily for the control and/or containment of livestock.

1.2 APPLICATION

This Code applies to the installation of electric security fences and associated equipment.

1.3 REFERENCED DOCUMENTS

The following documents and standards are referred to in this Code.

NZS 6203-1	Mains Operated Electric Fence Energisers.
IEC 479-2	Effects of Current Passing Through the Human Body. Part 2 Special Aspects.
IEC 1011	Safety Requirements of Mains Operated Electric Fence Energisers.
IEC 1011-1	Safety Requirements for Battery Operated Electric Fence Energisers Suitable for connection to the Supply Mains.
IEC 1011-2	Safety Requirements for Battery Operated Electric Fence Energisers Not Suitable for Connection to the Supply Mains.
AS 3129	Approval and Test Specification for Electric Fence Energisers.
AS 1939	Classification of degrees of protection provided by Equipment enclosures.

1.4 INTERPRETATION

For the purpose of this Code of Practice, the definitions below apply:

- 1.4.1 Connecting lead - means an electric conductor used to connect the energiser to the electric fence element.
- 1.4.2 Degree of protection - means the extent of protection provided by an enclosure against access to hazardous parts, against ingress of solid foreign objects and/or against ingress of water and verified by standardised test methods in accordance with AS 1939.
- 1.4.3 Energiser - means an appliance intended to regulate and control the supply of electrical energy to an electric security fence.
- 1.4.4 Electric fence element - means a barrier for security purposes which includes one or more electric conductors, insulated from earth, to which regular electric pulses are applied by an energiser.
- 1.4.5 Electric fence earth system - means one or more electrodes together with connecting leads and accessories which are used to maintain part of the fence in effective electrical contact with earth.
- 1.4.6 Electric security fence - means a barrier for security purposes which:
- a) Includes one or more electric conductors, insulated from earth, to which regular electric pulses are applied by an energiser and an additional physical barrier, designed to prevent inadvertent contact; and
 - b) Is electrically isolated from the physical barrier component.
- 1.4.7 Fence circuit - means that part of an energiser circuit which is connected to the fence. An energiser may supply more than one fence circuit.
- 1.4.8 IP Code - means a coding system to indicate the degrees of protection provided by an enclosure against access to hazardous parts, ingress of solid foreign objects, or the ingress of water.
- 1.4.9 Physical barrier - means a barrier which prevents inadvertent contact with the pulsed conductors of the electric fence.

1.5 GLOSSARY OF ABBREVIATIONS USED IN THIS CODE

AS	Australian Standard
IEC	International Electrotechnical Commission
IP	Ingress protection code
kV	Kilovolts
m	Metres
mm	Millimetres
NZS	New Zealand Standard

SECTION 2**COMPONENTS****2.1 ENERGISERS AND ANCILLARY EQUIPMENT**

- 2.1.1 All energisers shall comply with IEC 1011, 1011-1 or 1011-2 as appropriate, however mains operated energisers may comply with NZS 6203 or AS 3129 together with clause 17 of IEC 1011.
- 2.1.2 All ancillary equipment connected to the fence circuit shall be designed to provide a degree of isolation between the fence circuit and the supply mains equivalent to that specified for the energiser in IEC 1011, 1011-1 or 1011-2.

2.2 INSULATION

Uninsulated electric fence elements and connecting leads shall be supported on insulators or insulating material of durable non-hygroscopic material rated at not less than 10 kV. This requirement does not apply to connecting leads consisting of cable with high voltage insulation to at least 10 kV.

2.3 BARBED/RAZOR WIRE

Electric fence elements and any associated equipment shall not contain barbed or razor wire.

SECTION 3

INSTALLATION

3.1 GENERAL

- 3.1.1 Electric security fence equipment shall be so designed, constructed, installed, operated and maintained in a manner that minimizes danger to persons, and reduces the risk of persons receiving an electric shock, unless they attempt to penetrate the physical barrier, or are in the area without authority.
- 3.1.2 Electric security fence systems shall be so installed that protection from mechanical damage is ensured. Protection from the weather shall be provided for the energiser and ancillary equipment, unless these components are certified by the manufacturer as suitable for use outdoors, and are of a type protected against the ingress of moisture with a minimum degree of protection IPX3.

3.2 SEPARATION BETWEEN ELECTRIC SECURITY FENCES

- 3.2.1 A spacing of not less than 2.0 m shall be maintained between uninsulated electric fence elements or uninsulated connecting leads supplied from different energisers. This spacing may be less where elements or connecting leads are covered by insulating sleeving rated to at least 10 kV, or consist of insulated cables rated to at least 10 kV.
- 3.2.2 This requirement shall not apply where the separately energized elements are:
- a) Separated by a physical barrier which contains no opening greater than 50 mm; and
 - b) Not lower in height than the highest adjacent uninsulated pulsed element.

3.3 UNDERGROUND WIRING

- 3.3.1 Mains supply wiring shall not be installed in the same conduit or tubing as any connecting leads or signalling leads associated with the electric security fence installation.
- 3.3.2 Where cables are run underground, a conduit of insulating material, or thick walled tubing suitable for underground installation shall be used.

3.4 INSULATION FROM BUILDINGS AND STRUCTURES

Electrified wires and connecting leads shall be installed so that a minimum clearance of 3 mm through insulation or 15 mm through air is maintained from any part of a building or structure (including pipes and wiring). Separation shall be maintained by means of insulators or insulating material of durable non-hygroscopic material rated at not less than 10 kV.

3.5 WARNING SIGNS

3.5.1 Electric security fences shall be identified by prominently placed warning signs securely fastened to fence posts, or physical barriers, or firmly clamped to the electric fence element at a spacing not exceeding 10 m, and at every gate or access point, and where electrical security fence elements are used with windows or skylights and be visible from both sides of the fence.

3.5.2 The sign shall be at least 200 mm x 100 mm with an indelible inscription taking the form the symbol shown in Figure 1 on Page 10. The sign shall be coloured yellow and the inscription coloured black.

3.6 CLEARANCES

3.6.1 If it is necessary to open an electric security fence at a place which is not accessible to the public, any parts of the fence liable to be handled shall be of insulating material or shall be insulated from the fence.

3.6.2 Fence connecting leads and security fence elements shall not cross above overhead power or communication lines.

3.6.2.1 Where an electric security fence is to be installed in the vicinity of an overhead power line the following clearances shall be observed:

Power line voltage	Clearance (minimum)
Low voltage	3m
Exceeding low voltage and up to 33,000V	4m
Exceeding 33,000V	8m

3.6.3 The electric security fence shall be erected in such a position that it is not possible to make simultaneous contact with it and any overhead line.

3.7 PROTECTION FROM ELECTROMAGNETIC INDUCTION

When an electric security fence is planned to run alongside or beneath a transmission line of 33 kV or greater, at an angle of 45 degrees or less, the induced voltage on the physical barrier or electrical fence elements shall not exceed 42 V peak.

3.8 EARTHING

3.8.1 Except where the electric security fence is associated with a graded earth-mat, the fence earth system shall not be connected to the earth electrode of any other earth system, protective earth, or to the lightning protection system or communications earth.

3.8.1.1 Except when associated with a graded earth-mat, the distance between any electric security fence earth electrode and other earth systems specified in clause 3.8.1 shall be not be less than 10 metres.

3.9 CONNECTIONS

3.9.1 All connections in electric security fence circuits shall have good electrical contact, shall be clamped, and provision shall be made to prevent loosening of the connectors.

3.9.2 Joints of dissimilar metals should be avoided. However where this is unavoidable the use of grease or other sealant is recommended to prevent corrosion.

3.10 CONSTRUCTION

3.10.1 The electric fence element of an electric security fence system shall be designed and installed such that under normal conditions of operation persons will be protected from inadvertent contact with the electrified conductors.

3.10.1.1 This requirement is considered to be met if the relationship between the mesh size of the physical barrier and the horizontal spacing between the physical and electrified fence components is as follows:

Barrier opening size	Spacing (mm)
No openings	Up to 200 or greater than 1000
$z = 50$	100 to 200 or greater than 1000
$> 50 < 100$	Not less than 100
No opening in a physical barrier shall be more than 100 mm	

- 3.10.1.2 The minimum height of a physical barrier in accordance with subclause 3.10.1.1 shall be 1.8 m.
- 3.10.1.3 Constructions for electric security fences shall correspond with one of the constructions of Figure 2, Page 11 of this Code.
- 3.10.2 To prevent a person becoming wedged between the electrified fence component and the physical barrier component, thereby being exposed to multiple shocks from the energiser, the dimension "Y" shown in Figure 2, Page 11 of this Code shall not fall in the range "200 mm-1000 mm".
- 3.10.3 The electric fence element shall be mounted on the inner surface of the electric security fence as shown in Figure 2, Page 10, or the window or skylight shown in Figure 3, Page 12 of this Code.
- 3.10.4 No electric security fence electrified wire shall be mounted on a support used for any distribution line, service main or distribution main.

SECTION 4

FIRE RISK AND HAZARDOUS AREAS

4.1 FIRE RISK

4.1.1 Experience indicates that vegetation or other material touching the electrified fence wire will normally not ignite and present a fire hazard. However, under certain unusual conditions, wires within 15 mm of earthed metal, such as other fence wires or metal parts can ignite fine dry material.

4.1.1.1 To reduce this risk in areas where fires may be a hazard it is recommended that:

- a) Separation between exposed electrified wires and earthed metal be maintained at 30 mm or greater along the shortest air path.
- b) Fence lines be kept well maintained and free from vegetation and other material.

4.2 HAZARDOUS AREAS

4.2.1 Electric security fences shall not be installed in Hazardous Areas.

Figure 1

WARNING SIGN

Refer to clause 3.5.2 for size and colours

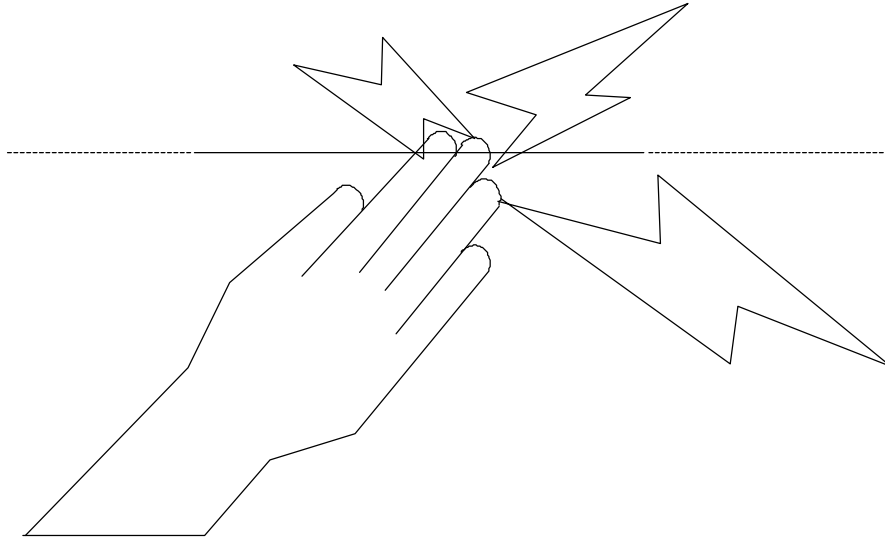


Figure 2

TYPICAL ELECTRIC SECURITY FENCE CONSTRUCTION
 Refer to Clause 3.10.2 for Dimension "Y"

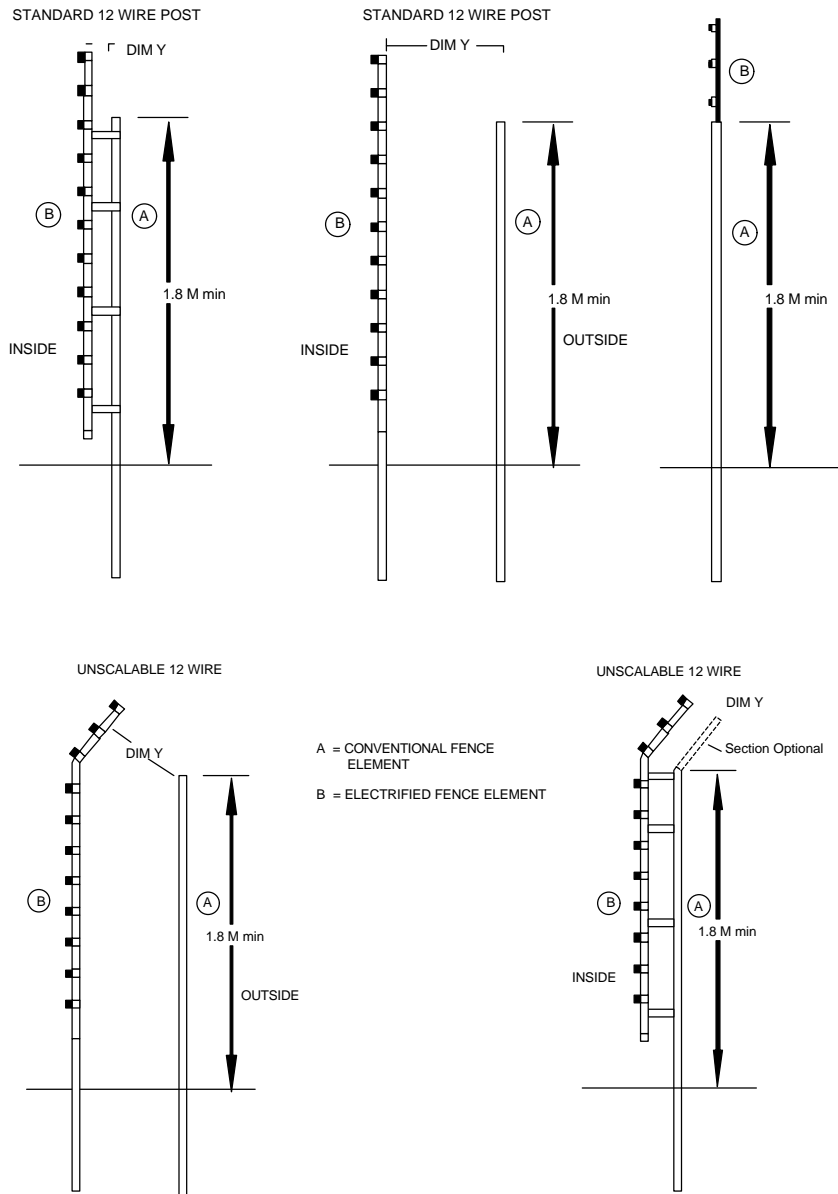


Figure 3

TYPICAL CONSTRUCTIONS WHERE ELECTRIC SECURITY SCREEN OCCURS TO WINDOWS AND ROOF LIGHTS

