

Advanced
Perimeter
Systems

ELECTRO-FENCE™

Code of Practice

Guidance document relevant to the minimum quality standards and HSE recommendations for Electrified Security Fencing.

January 2002

Advanced Perimeter Systems Ltd., 16 Cnningham Road, Springkerse Industrial Estate, Stirling, FK7 7TP
Tel: +44 (0) 1786 479862 Fax: +44 (0) 8700 512113/4
E-mail: sales@aps-perimeter-security.com Website: www.aps-perimeter-security.com



Index	Page No.
<i>1 Scope, objectives and fundamental requirements</i>	<i>1</i>
1.1 Scope	1
1.2 Objectives	1
1.3 Fundamental requirements	1
<i>2 Equipment Quality Standards</i>	<i>2</i>
2.1 Electrical Equipment	2
2.2 Mechanical Equipment	2
<i>3 Physical Barrier Construction</i>	<i>2</i>
3.1 Minimum Height	2
3.2 Barbed / Razor Wire	2
<i>4 Electrified Security Fence Construction</i>	<i>3</i>
4.1 Openings Size.....	3
4.2 Entrapment	3
4.3 Height above Physical Barrier.....	3
4.4 Safe Access	4
4.5 Zone Separation Barrier.....	4
<i>5 Installation of Electrified Security Fence</i>	<i>5</i>
5.1 Power and Communication Line Crossing.....	5
5.2 Protection from Electromagnetic Induction	5
5.3 Insulation from Buildings and Structures	6
5.4 Earthing.....	6
5.5 Underground Wiring.....	6
5.6 Connections.....	6
5.7 Warning Signs	7
<i>6 Fire Risk and Hazardous Areas</i>	<i>8</i>
6.1 Fire Risk.....	8
6.2 Hazardous Areas.....	8
<i>7 Maintenance</i>	<i>8</i>



1 Scope, objectives and fundamental requirements

1.1 Scope

This document sets out the Code of Practice and minimum safety requirements for the design; installation, maintenance and operation of multi-wire electrified security fences and associated equipment.

It covers multi-wire electrified security fences powered by electronic security fence energisers connected to all types of electric power supplies e.g. mains, batteries, solar cells, generators

It covers multi-wire electrified security fences used in all types of situations e.g. industrial, commercial, military and domestic sites.

1.2 Objectives

1.2.1 To ensure that the installation is safe for persons and animals.

1.2.2 To detail methods and practices meeting fundamental requirements for safety.

1.2.3 To ensure that departures from specified methods and practices do not occur.

1.2.4 To ensure only approved materials, equipment and methods are considered by designers and installers.

The result of adhering to these objectives will be a system of the highest quality in terms of both safety, reliability and operation.

1.3 Fundamental requirements

It is a fundamental requirement that electrified security fence systems are designed, constructed, installed, operated and maintained in accordance with this document so that they cause no danger to persons, animals or surroundings and minimise the risk of accidental contact, unless they attempt to climb or penetrate the physical barrier or are in the area without authority.



2 Equipment Quality Standards

2.1 Electrical Equipment

Energisers

All energisers shall comply with the British and European standard BS EN 60335-2-76 as appropriate

Alarm Control and communication

All alarm control and communication equipment shall comply with BS4737.

Wiring

All electrical wiring shall be in accordance with the current edition of the IEE regulations

2.2 Mechanical Equipment

Electric Fence Posts

All electric fence posts shall be hot dipped galvanised to BS 729.

Fence Wire

All electrified security fence wire shall be galvanised to BS 443.

3 Physical Barrier Construction

A physical barrier shall be used as a means of reducing the risk of accidental contact with an electrified security fence. The physical barrier can be either a fence or a wall.

3.1 Minimum Height

The minimum height of the physical barrier shall be 1.8 metres.

3.2 Barbed / Razor Wire

Barbed or razor wire or any other form of spiked topping shall not be used in the construction of a physical barrier which also has an electrified security fence attached to it.



4 Electrified Security Fence Construction

The electrified security fence shall be designed and installed so that persons will be protected from accidental contact with it under normal conditions of operation.

This requirement is considered to be met if the relationship between the opening size of the physical barrier and the horizontal spacing between the physical barrier and electrified security fence is as follows.

4.1 Openings Size

Mesh Size	Spacing (mm)
No openings	Up to 200 or greater than 1000
Less than 85mm	100 to 200 or greater than 1000
85 to 100 mm	Not Less than 1000

No opening in a physical barrier shall be more than 100mm.

4.2 Entrapment

In order to prevent a person becoming wedged between the physical barrier and the electrified fence the electrified security fence should be placed either less than 200mm or greater than 1000mm from the physical barrier

4.3 Height above Physical Barrier

The minimum height of the electrified security fence above the physical barrier shall be as follows: -

Barrier Type	Standard Security	High Security
Wall	1.0metre	1.5metre
Fence	0.6metre	1.0metre



4.4 Safe Access

With the attachment of an electrified security fence to a previously non-electrified physical barrier, safe access from one side of the physical barrier to the other shall be provided. Parts liable to be handled shall be of insulating material or be suitably insulated from the fence.

4.5 Zone Separation Barrier

For any two adjacent electrified security fence zones fed from different energisers a spacing of not less than 2 metres shall be maintained between the zones.

This requirement shall not apply where the zones are separated by a physical barrier of at least 1 metre in length. The physical barrier shall not contain any openings greater than 50 mm. The distance between the end of the separation barrier and the electrified security fence shall be at least 1 metre.



5 Installation of Electrified Security Fence

5.1 Power and Communication Line Crossing

5.1.1 Crossings with overhead power lines shall be avoided wherever possible. If such a crossing cannot be avoided, it shall be made underneath the power line and as nearly as possible at right angles to it at distances specified in 5.1.2 being applicable. If crossings with overhead power lines cannot be avoided the appropriate electricity supply utility, company or authority should be advised.

5.1.2 If crossings with overhead power lines cannot be avoided the following separation distances shall apply.

Power Line Voltage	Minimum Separation
Low voltage	3 metres
Exceeding low voltage and up to 33Kv	4 metres
Exceeding 33 Kv	8 metres

5.1.3 Any electrified security fence or connecting lead shall not cross above overhead power or communication lines.

5.1.4 Electrified security fence wires or connecting leads shall not be fixed to poles or supports used for low voltage or high voltage overhead power lines or communication lines.

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

5.2 Protection from Electromagnetic Induction

When an electrified security fence is planned to run alongside or beneath a transmission line of 33KV or greater, at an angle of 45 degrees or less, the induced voltage on the physical barrier or electrified fence wires shall not exceed 25V-rms a.c. or 60V d.c.



5.3 Insulation from Buildings and Structures

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

5.4 Earthing

5.4.1 The electrified security 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, except where the electrified security fence is associated with a graded earthmat.

5.4.2 Except when associated with a graded earthmat it is recommended that the distance between the electrified security fence earth electrode and any other earth system shall be at least 10 metres.

5.5 Underground Wiring

5.5.1 High voltage connecting leads associated with the electrified security fence shall be installed in dedicated ducting or conduit. No other cables shall be installed in the ducting or conduit.

5.5.2 Mains supply wiring shall not be installed in the same conduit or tubing as any low voltage signalling cables.

5.5.3 If it is necessary to run cables underground, a conduit of insulating material or thick tubing suitable for underground installation shall be used.

5.6 Connections

5.6.1 All connections in electrified security fence circuits shall be clamped and have a good electrical contact. Provision shall be made to prevent loosening of connections.

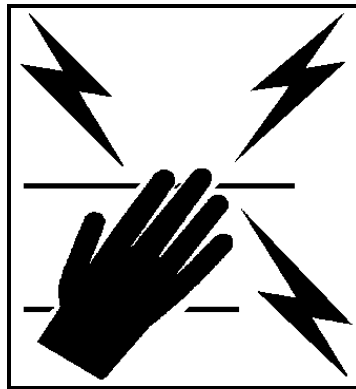
5.6.2 Joints between galvanically incompatible metals should be avoided or be protected against moisture.



5.7 Warning Signs

5.7.1 Warning signs shall be prominently displayed on all electrified security fences at a spacing not exceeding 10 metres and on every gate leaf or access point. The warning signs shall be securely fastened to fence posts or physical barriers or firmly clamped to the electrified fence wires.

5.7.2 The size of the warning sign shall be at least 200mm x 100 mm and shall be coloured yellow. The inscription on the sign shall be indelible; coloured black and take the form of the symbol shown below.





6 Fire Risk and Hazardous Areas

6.1 Fire Risk

6.1.1 Vegetation or other material touching the electrified security fence will normally not ignite and present a fire hazard

6.1.2 In order to reduce the risk of ignition even further in areas where fires may be a hazard the following recommendations apply

a) separation between exposed electrified wires and earthed metal is maintained at 30mm or greater along the shortest air path.

b) fence lines are kept well maintained and free from vegetation or other material.

6.2 Hazardous Areas

Electrified security fences shall not be installed in Hazardous areas.

7 Maintenance

The end user of the electrified security fence system shall enter into a maintenance agreement with an approved dealer. There will be a minimum of three maintenance visits per year.