

# Guide To High-Security Perimeter Protection

A Specifier's Guide  
1st edition - March 2011



## Fencing

First Choice Solutions for Architects, Specifiers & Contractors



# Guide To High-Security Perimeter Protection

A Specifier's Guide



Perimeter security fencing is the first line of defence around an organisation's premises and is therefore vitally important. Furthermore, it is a significant factor in the first impression made on a visitor, so appropriate high-security fencing can act as an effective deterrent.

What many people do not realise is just how complex the subject of perimeter security is today. Not only are there legal requirements to be met, but each application has its own needs - so the solution to the problem is different in every case. In most cases, high-security perimeter protection requires a combination of measures, one of which is fencing, with others being one or more of electric pulse, electronic surveillance and CCTV systems.

This specifier's guide to high-security perimeter protection explains the different options available, presents the advantages and limitations of each, and steers the reader towards making the right decision that will provide the necessary level of security while taking into account other factors such as cost and aesthetics.

## Perimeter security achieves the following...

- Deters some would-be intruders
- Prevents some intruders from gaining access
- Detects and delays determined intruders when they attempt to access the site or remove property
- Aids the apprehending of would-be intruders

*Note that it is not possible to prevent the most determined intruders from penetrating perimeter security by cutting, climbing or burrowing.*



## Security Starts With A Risk Assessment

Before selecting what measures are required, it is vital to perform a risk assessment to establish the threats and the consequences of any breaches in security. The risk assessment will vary considerably, depending on the protection required - is the aim to prevent theft of high-value goods, prisoner escapes or terrorists gaining access to a military base, for example? Assessments should consider whether it is personnel or property that requires protection, the likelihood of an attempt to breach security, the likely frequency of attempted breaches, and the potential consequences of a breach in security.

# Guide To High-Security Perimeter Protection

A Specifier's Guide

After the perimeter protection measures have been selected, the risks should be re-evaluated to see if an acceptable level has been achieved (remembering that it is not possible to make premises 100 per cent secure). If not, either the proposed security measures need to be revised, or additional measures - such as security guards or CCTV - may be necessary. Again, the risks are re-evaluated, and the cyclical process continues until the risks have all been reduced to a level that is as low as reasonably practical (which takes into account the cost of implementing the security measures compared with the associated reduction in risk).

Risk assessments also need to be reviewed as follows:

- Periodically - to check that there have been no significant changes to the factors considered in the initial assessment
- In response to any changes in circumstances - such as an increase in the value of the property being protected, or a rise in the threat posed by terrorists.

If security managers or facilities managers are not familiar with performing risk-based security assessments, it is strongly recommended that the services of experts should be sought, as incorrectly conducted assessment will give misleading results that could result in inadequate security or excessive expenditure on an excessive level of security.

## Security Pitfalls To Avoid

Whatever security measures are implemented, be sure to avoid the most commonly encountered pitfalls. These include holes that are left unrepaired, trees that grow up adjacent to fencing that make it easy to climb over, fences that are constructed where vehicles can readily - and without attracting attention - be parked alongside to provide an easy route over the fence, and other items such as wheeled rubbish bins and pallets that can be moved to aid climbing. Regular inspections are necessary to check for any such potential problems, and remedial action taken where necessary.

## Choosing The Right Type Of High-Security Fencing

If the need is for high-security perimeter protection, then several types of fencing can be ruled out due to their insufficient security - such as timber fencing and most designs of railings. However, if aesthetics are of major importance, it is possible to use, for example, adequately designed timber fencing or railings, with additional security features to raise the overall security.

Standard palisade, weldmesh (welded mesh fencing) and some designs of railings and vertical bar fencing provide a reasonable level of security, but for true high-security perimeter protection the only viable options are chain link and weldmesh strained wire systems that comply with BS 1722-10, high-security palisade and high-security welded mesh panel fencing.

To help specifiers choose the right type of fencing for standard and high-security applications, Procter Fencing Systems has developed a risk-based Fencing Selector that is available free of charge on request (see *Useful Resources* below).



# Guide To High-Security Perimeter Protection

A Specifier's Guide



## High-Security Palisade

Unlike standard palisade, which features either D or W-section pales, high-security palisade always uses W-section pales that are attached to the horizontals using security galvanised fasteners (eg 8mm shear-cone nuts on security bolts). For heights above 1.8m (which would be the case for the vast majority of high-security applications), the pales are triple-pointed at the top. Below that height, safe notched and round-topped pales are used. The thickness of the steel from which the pales are manufactured also varies with the height, from 2.0mm for 900mm high palisade to 3.0mm for 3.6m high palisade. For fences up to 3m high, two horizontal rails are used, but additional rails are used for higher fences to ensure the integrity of the fence. Posts are generally 102 x 44mm RSJ, increasing to 127 x 76mm for fences above 2.7m.

High-security palisade is very difficult to climb and the pales are resistant to cutting and bending. Procter Fencing Systems supplies its high-security palisade with a long-lasting galvanised coating to BS EN ISO 1461 and a range of standard RAL colours applied as a tough powder-coated finish (black, green, blue, white and red), with non-standard colours available to order.

All Procter high-security palisade fencing conforms to BS 1722-12, and swing gates and sliding gates, both automated and manually operated, are available in standard and custom sizes with palisade infill to match the fencing.

The main disadvantage of high-security palisade fencing is that visibility through the fence is restricted. This can be a problem for both CCTV and security guards. Furthermore, slender objects can be passed through the fence with relative ease.



## High-Security Welded Mesh Panel Fencing

A popular choice for high-security mesh panel fencing uses a mesh known as 358, with a 75 x 12.5 4mm fabric. The small apertures make it very difficult for would-be intruders to gain a finger or toe hold for climbing, and the apertures also prevent the use of most types of cutting tools.

Panels are attached to steel hollow section posts so as to give a bay length of 2450 mm. Full-height clamp bars and security fasteners help to protect the fence from malicious damage. Standard fence heights are 2m, 2.4m, 3m and 3.6m but other heights up to 6m are possible.

Procter Fencing Systems supplies both posts and 358 mesh panels in a galvanised and polyester powder-coated finish in any of a wide range of standard RAL colours, with non-standard colours available to order.

Compared with high-security palisade, high-security mesh panel fencing is similarly difficult to scale, harder to cut and makes it impossible to pass through all but very small objects. Mesh panel fencing can also be considerably higher (6 m rather than 4 m for palisade).

# Guide To High-Security Perimeter Protection

A Specifier's Guide

## Chain Link And Weldmesh Strained Wire Fencing

Depending on the security requirements, chain link and weldmesh strained wire systems may also be used where these conform to the requirements of the highest specification provided in BS 1722-10.

## Additional Security Features

### Fence Extensions

Vertical, cranked, Y-shaped or T-shaped extensions can be mounted on most concrete or steel posts for securing rows of barbed wire or rows or rolls of razor wire. There are also various purpose-designed rotating toppings, typically with metal or plastic spikes that revolve on bars fixed between posts. These extensions all significantly reduce the likelihood of intruders climbing over the fence.

However, great care must be taken when specifying toppings that could potentially cause injury. There is, for example, a legal requirement to mount the toppings visibly so that anyone can see them as they approach the fence, and, with certain toppings, there should be warning signs mounted on the fence at regular intervals; these signs should also be visible and lit at night. It is never recommended to use an anticlimb topping below 1.8 m and, additionally, local planning restrictions may not permit the use of certain types of topping.



### Buried Fencing

In some cases there is a risk that intruders may attempt to dig beneath a fence. To counteract this threat the fence can be buried in a formed concrete cill below ground level. This technique can also be effective if it is necessary to keep out rabbits or other burrowing pests.

Elsewhere it might not be necessary to bury the fence, but eliminating gaps adjacent to the ground by pinning can prevent items being slid beneath the fence.



### Ground-Level Razor Wire Coils

Multiple coils of razor wire installed at ground level act as a further deterrent and help to prevent intruders from approaching the fencing, whether their intention is to climb or cut it.



### Electric Pulse Systems

Electric pulse systems can be installed on new fencing and gates or retrofitted to enhance the security of existing fencing and gates. Such systems can either be installed along the top of the fence or full height, as an integral part of the fence.

As well as being an effective deterrent, electric pulse fences give a short, sharp, painful but safe electric shock to any would-be intruders who touch it.

Electric pulse systems are fully monitored so that any attempts at cutting, loading, short-circuiting or tampering are detected and alarms generated. Systems can also be integrated with CCTV networks so that operators can see the area in which the intrusion attempt has been detected.



# Guide To High-Security Perimeter Protection

A Specifier's Guide



## Perimeter Intruder Detection Systems (PIDS)

For high security premises, various perimeter intruder detection systems (PIDS) are available that utilise diverse sensing technologies to provide fully automated real-time security monitoring to detect if an intruder is attempting to climb, cut or force open a gap in a fence. Such systems can be highly reliable, with a very low rate of false alarms, and require virtually no maintenance.



## Security Lighting

Security lighting, either permanent or sensor-activated, can be an effective deterrent and aids in the apprehending of would-be intruders. Lighting is also a prerequisite for some types of CCTV and, as with CCTV, lighting is most effective when used with mesh-type fencing that provides good visibility.



## CCTV

Closed circuit television (CCTV) is a cost-effective deterrent and provides evidence to help secure convictions in the event of crimes being committed. Nevertheless, one of the main advantages of CCTV is that it provides an instant alert of an attempted intrusion. CCTV is most effective when used with mesh-type fencing that provides good visibility.



## Double-Row Fencing

In applications such as airports or military establishments, extra security fencing is usually installed inside the outer perimeter fence, and sometimes with sensors, detectors or a patrol road between the two. Alternatively a perimeter fence is used to provide a 'first line of defence', with secondary fencing installed to protect specific high-risk zones, buildings or items of equipment.

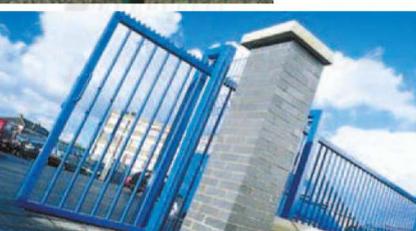


## Fence Posts

Timber is unsuitable for security fencing, which leaves either concrete or steel - with a choice of RSA (rolled steel angle), RHS (rectangular hollow section) or CHS (circular hollow section). Factors to consider include fence height, strength, cost, aesthetics, use of toppings, and if tamper-resistant barrel winders need to be concealed within a hollow section. Concrete is often used for coastal applications, as it is more corrosion-resistant than galvanised, powder coated or painted steel.

## Gates

Whenever there is a perimeter fence, there needs to be at least one access point. Manually operated and powered gates are usually available from the fencing supplier to complement the specified type and design of fencing. It is important to ensure that the gates' design and specification provides the same level of security as the fencing. While the size will depend on the type of access required (individuals, groups of people, or single or multiple vehicles), it is best practice to keep the access points as small in size and number as reasonably possible.



Hinged and sliding gates are typically used, though lifting barriers and road-mounted bollards or barriers are also appropriate in some circumstances.

# Guide To High-Security Perimeter Protection

A Specifier's Guide

Whatever type of gate or access is used, care must be taken to ensure that it is not vulnerable in comparison with the remainder of the perimeter security. For example, gates should be located where they are clearly visible, and all hinges and other mechanical components must be adequately protected and maintained.

See *Useful Resources* below for White Papers and other documents relating to sliding gates.

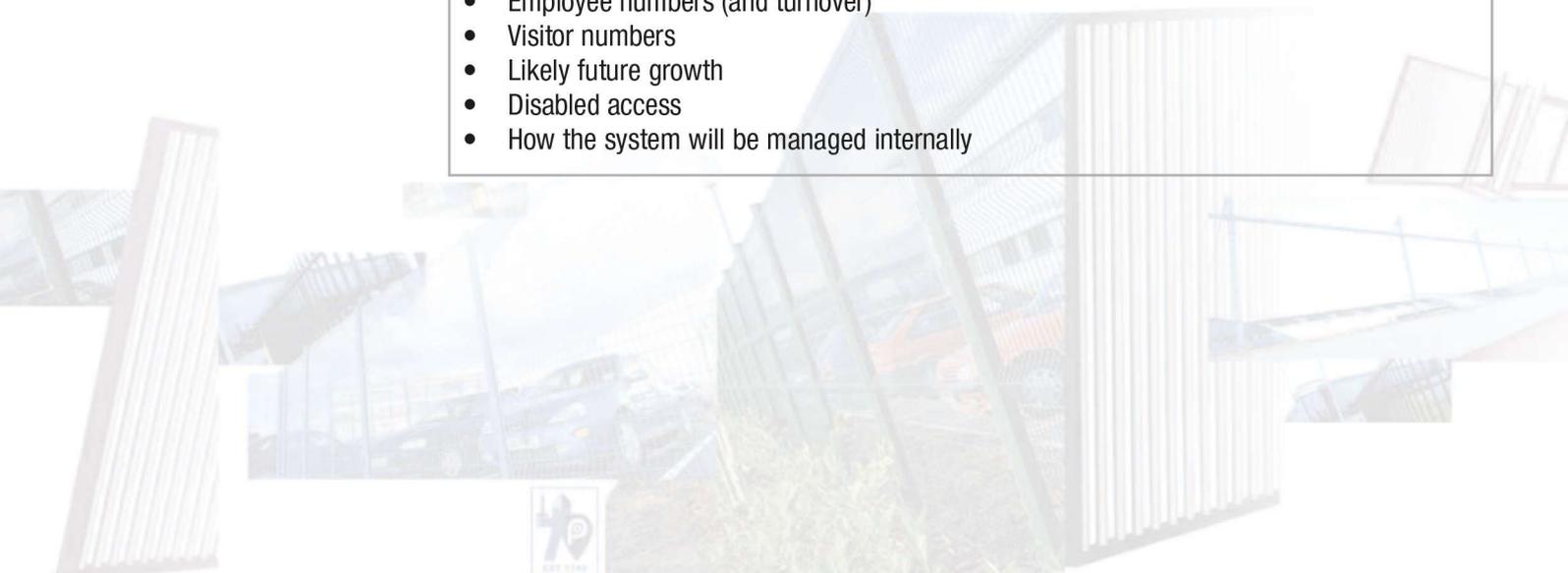
## Access Controls

While security fencing is effective at keeping intruders out, it is vital to maintain control of the access points for authorised vehicles and personnel. Depending on the technology employed, the level of control can vary enormously. For example, particular personnel may be permitted access through defined access points and at predetermined times.

Mechanical keys and swipe cards may be appropriate in some circumstances, and photo ID cards can be used when security staff are employed. However, Maximum security is provided by state-of-the-art technologies such as fingerprint recognition or iris recognition.

When considering the type of access control to use, bear in mind...

- Level of security required
- Number of areas and points to control - especially if more than one site is involved
- Site layout
- Employee numbers (and turnover)
- Visitor numbers
- Likely future growth
- Disabled access
- How the system will be managed internally



# Guide To High-Security Perimeter Protection

A Specifier's Guide



## The Importance Of Correct Installation

A fence is only as good as its installation. Poorly installed fencing will be less of a deterrent and may also be less secure. Furthermore, poorly installed fencing will be more likely to need repairs and maintenance earlier than would otherwise be necessary. In the worst case, an insurer may contest a claim if the security fencing was deemed to be unsatisfactory.

Installing fencing is a skilled job and specifiers should be aware that some fencing contractors hire unskilled labour on a project-by-project basis, rather than retaining a team of properly trained installers.

When electric pulse systems or electronic surveillance systems are being fitted, the installer should be recognised and approved by the manufacturer.

Specifiers are strongly recommended only to use fencing contractors that are accredited to ISO 9001:2000. Other accreditations to look for are *Secured by Design*, the official UK Police initiative for 'designing-out' crime, and CSCS (Construction Skills Certification Scheme) for installations on construction sites.

## Standards And Specifications

Some applications require adherence to British, European and International Standards and additional specifications. In such cases, it is essential that the specifier is aware of the applicable standards and specifications. The following table lists those most commonly encountered in the UK.

BS 1722-1:2006	Fences. Specification for chain link fences
BS 1722-2:2006	Fences. Specification for strained wire and wire mesh netting fences
BS 1722-5:2006	Fences. Specification for close-boarded fences and wooden palisade fences
BS 1722-8:2006	Fences. Specification for mild steel (low carbon steel) continuous bar fences and hurdles
BS 1722-9:2006	Fences. Specification for mild steel (low carbon steel) fences with round or square verticals and flat horizontals
BS 1722-10:2006	Fences. Specification for anti-intruder fences in chain link and welded mesh
BS 1722-11:2006	Fences. Specification for prefabricated wood panel fences
BS 1722-12:2006	Fences. Specification for steel palisade fences
BS 1722-14:2006	Fences. Specification for open mesh steel panel fences
BS 1722-16:2009	Fences. Specification for powder coatings to be used as a plastics finish to components and mesh
BS 1722-17:2006	Fences. Specification for electric security fences. Design, installation and maintenance

# Guide To High-Security Perimeter Protection

A Specifier's Guide

BS 4102:1998	Specification for steel wire for general fencing purposes
BS 8220-2:1995	Guide for security of buildings against crime. Offices and shops
BS 8220-3:2004	Guide for security of buildings against crime. Storage, industrial and distribution premises
BS EN 10223-1:1998	Steel wire and wire products for fences. Zinc and zinc alloy coated steel barbed wire
BS EN 10223-2:1998	Steel wire and wire products for fences. Hexagonal steel wire netting for agricultural, insulation and fencing purposes
BS EN 10223-3:1998	Steel wire and wire products for fences. Hexagonal steel wire netting for engineering purposes
BS EN 10223-4:1998	Steel wire and wire products for fences. Steel wire welded mesh fencing
BS EN 10223-5:1998	Steel wire and wire products for fences. Steel wire woven hinged joint and knotted mesh fencing
BS EN 10223-6:1998	Steel wire and wire products for fences. Steel wire chain link fencing
BS EN 10223-7:2002	Steel wire and wire products for fences. Steel wire welded panels. For fencing
BS EN 12453:2001	Industrial, commercial and garage doors and gates. Safety in use of power operated doors. Requirements
BS EN 12839:2001	Precast concrete products. Elements for fences
BS EN ISO 1461:2009	Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods
PAS 68:2010	Impact test specifications for vehicle security barriers
PAS 69:2006	Guidelines for the specification and installation of vehicle security barriers

In addition to these standards and specifications there are others published by organisations involved with or with an interest in security. These include BSI, SEAP (Security Equipment Assessment Panel) and TRL (Transport Research Laboratory). Whether or not any of these are applicable will depend on the premises and threats.

# Guide To High-Security Perimeter Protection

A Specifier's Guide



## If In Doubt, Ask

Procter Fencing Systems is the one of the UK's leading specialist manufacturers of fencing and gates. From its sites in Leeds, South Wales and Brentwood, Procter Fencing Systems offers a comprehensive service to survey, design, manufacture and install fencing and gates nationwide. All products are designed in accordance with the requirements of ISO 9001 and all meet the appropriate health, safety and product standards. Installation is carried out by the company's own teams of skilled installers.

## Useful Resources

### Fencing Selector

A risk-based utility to aid in identifying the best type of fencing to protect against given threats.

Email: [enquiries@proctercontracts.co.uk](mailto:enquiries@proctercontracts.co.uk)

Download: [www.fencing-systems.co.uk/specifiers-guides/view-category/](http://www.fencing-systems.co.uk/specifiers-guides/view-category/)

### White Paper: Planning a Fencing Project

Hints and tips for people new to planning fencing projects and those who are experienced but who want to minimise costs.

Email: [enquiries@proctercontracts.co.uk](mailto:enquiries@proctercontracts.co.uk)

Download: [www.fencing-systems.co.uk/specifiers-guides/view-category/](http://www.fencing-systems.co.uk/specifiers-guides/view-category/)

### White Paper: Safety Requirements for Powered Sliding Gates

A guide for architects, specifiers and users who need to be aware of the safety issues relating to automatic sliding gates.

Email: [enquiries@proctercontracts.co.uk](mailto:enquiries@proctercontracts.co.uk)

Download: [www.sliding-gate.co.uk/specifiers-guides/view-category/](http://www.sliding-gate.co.uk/specifiers-guides/view-category/)

### White Paper: How to Specify Sliding Gates

A guide for architects and specifiers to help ensure that sliding gates perform as intended, are safe to use and are economical to purchase and maintain.

Email: [enquiries@proctercontracts.co.uk](mailto:enquiries@proctercontracts.co.uk)

Download: [www.sliding-gate.co.uk/specifiers-guides/view-category/](http://www.sliding-gate.co.uk/specifiers-guides/view-category/)

### Sliding Gates Risk Assessment - Example

This document enables users to assess existing sliding gates in order to identify hazards and select suitable risk reduction measures.

Email: [enquiries@proctercontracts.co.uk](mailto:enquiries@proctercontracts.co.uk)

Download: [www.sliding-gate.co.uk/specifiers-guides/view-category/](http://www.sliding-gate.co.uk/specifiers-guides/view-category/)

# Guide To High-Security Perimeter Protection

A Specifier's Guide



## Further Information

### Procter Contracts

Website: [www.proctercontracts.co.uk](http://www.proctercontracts.co.uk)

Address: Northern England: Isabella Road, Garforth, Leeds LS25 2DY

Tel: 0800 2944 177 Email: [enquiries@proctercontracts.co.uk](mailto:enquiries@proctercontracts.co.uk)

Address: Wales and the South-West: Pantglas Industrial Estate, Bedwas, Caerphilly, CF83 8XD

South-East England

Tel: 0800 29 44 177 — Fax: 01277 213649 — Email: [fencing@procterbedwas.co.uk](mailto:fencing@procterbedwas.co.uk)

### BSI (British Standards Institution)

British, European and International Standards, and Publicly Available Specifications.

Tel: 020 8996 9001 — Fax: 020 8996 7001

Website: [www.bsigroup.com](http://www.bsigroup.com) — Email: [cservices@bsigroup.com](mailto:cservices@bsigroup.com)

### CPNI (Centre for the Protection of National Infrastructure)

Security advice for organisations making up the national infrastructure.

Website: [www.cpni.gov.uk](http://www.cpni.gov.uk)

### TRL (Transport Research Laboratory)

Research, consultancy, testing and certification for all aspects of transport.

Tel: 01344 773131 — Fax: 01344 770356

Website: [www.trl.co.uk](http://www.trl.co.uk) — Email: [enquiries@trl.co.uk](mailto:enquiries@trl.co.uk)

### LPCB (Loss Prevention Certification Board)

Assessment and certification of fire and security systems and services against standards.

Tel: 01923 664100

Website: [www.bre.co.uk](http://www.bre.co.uk) — Email: [enquiries@breglobal.com](mailto:enquiries@breglobal.com)

The information contained in this publication is intended as a guide only and is believed to be correct at the time of going to press. However, it is the reader's responsibility to ensure that all current legislation is complied with when specifying or installing perimeter security fencing.

Procter Fencing Systems, Pantglas Ind Est. Bedwas, Caerphilly. CF83 8XD

Tel: 029 2088 2111 — Fax: 029 2088 8544 — Email: [enquiries@procterfencing.co.uk](mailto:enquiries@procterfencing.co.uk)