



Sliding Gates

White Paper 1 Sliding Gate Safety Third Edition

Safety requirements for powered sliding gates

Jeremy Procter, Managing Director of Procter Sliding Gates, explains the safety requirements relating to powered sliding gates. This advice will help architects, specifiers and users to understand the issues and ensure that gates comply with the necessary legislation, regulations and standards.



Safety requirements for powered sliding gates

Powered sliding gates are available in a variety of sizes, styles and material specifications to suit different applications. Moreover, customers have a choice of access control system and safety measures, which makes this type of gate extremely versatile for domestic, commercial, industrial and public sector premises.

Compared with the more traditional alternative of swing gates, sliding gates require less space for opening and they can be more suitable for use with sloping entrance approaches, especially if a cantilevered style is chosen instead of the guidance track type. Sliding gates also achieve a higher level of security, can be used on very wide openings and often cost no more than swing gates.

Unfortunately there have been a small number of accidents involving powered sliding gates, mostly resulting in injuries but there have also been fatalities. Powered sliding gates have always been required to comply with the European Machinery Directive and CE marked as such but, with no 'CE Police' to monitor the market, the Directive's requirements have not been enforced. In the past, therefore, some powered sliding gates have been installed without the necessary safeguards in place. As of 29 December 2009, there is a new Machinery Directive (2006/42/EC), which is more explicit about the duties of national governments regarding enforcement.

Legislation and Regulations

Here in the UK, Statutory Instrument 2008/1597 *The Supply of Machinery (Safety) Regulations 2008* came into force on 29 December 2009 to implement the new European Machinery Directive 2006/42/EC. The 2008 Regulations replaced *The Supply of Machinery (Safety) Regulations 1992*, as well as the 1994 and 2005 amendments.

Newly installed powered gates (sliding and swing) fall within the scope of the Machinery Directive and must therefore be CE marked as machinery. Strictly speaking, suppliers in the UK must comply with the requirements of *The Supply of Machinery (Safety) Regulations 2008*, though these essentially restate the requirements contained in the Machinery Directive. There are European standards that are harmonised to the Machinery Directive; while compliance with these is not mandatory, to do so would normally be considered to be the best way to demonstrate compliance with the Essential Health and Safety Requirements of the Machinery Directive. (the harmonised standards are said to provide a 'presumption of conformity'). However, see the note below regarding standards and the state of the art.

Where powered gates are installed at a workplace they also fall within the scope of the following:

- Provision & Use of Work Equipment Regulations 1998 (PUWER 98)
- The Health and Safety at Work etc Act 1974
- The Management of Health and Safety at Work Regulations 1999

Note that if powered actuators or other forms of automation are retrofitted so as to upgrade existing manually operated sliding gates, the gates would need to be assessed and, if necessary, altered and enhanced, then CE marked in accordance with the Machinery Directive as if they were completely new.

Because powered gates are CE marked in accordance with the requirements of the Machinery Directive, they do not need to be CE marked to the Construction Products Directive as well.

Standards

As implied above, the most important product-related standards for powered sliding gates are those that are harmonised to the Machinery Directive 2006/42/EC, a full list of which is available via the European Commission website:

<http://ec.europa.eu/enterprise/policies/european-standards/documents/harmonised-standards-legislation/list-references/machinery/>

The key standards for powered sliding gates, most of which are harmonised to the Machinery Directive, are as follows:

BS EN 953:1997 +A1:2009	Safety of machinery. Guards. General requirements for the design and construction of fixed and movable guards.
BS EN 1760-2:2001+A1:2009	Safety of machinery. Pressure sensitive protective devices. General principles for the design and testing of pressure sensitive edges and pressure sensitive bars
BS EN ISO 13855:2010	Safety of machinery. Positioning of safeguards with respect to the approach speeds of parts of the human body
BS EN ISO 12100:2010	Safety of machinery. General principles for design. Risk assessment and risk reduction
BS EN ISO 13849-1:2008	Safety of machinery. Safety related parts of control systems. General principles for design.
BS EN ISO 13857:2008	Safety of machinery. Safety distances to prevent hazard zones being reached by upper and lower limbs.

BS EN 60204-1:2006 +A1:2009	Safety of machinery. Electrical equipment of machines. General requirements.
BS EN 12453:2001	Industrial, commercial and garage doors and gates. Safety in use of power operated doors. Requirements.
BS EN 12444:2001	Industrial, commercial and garage doors and gates. Resistance to wind load. Testing and calculation.
BS EN 12445:2001	Industrial, commercial and garage doors and gates. Safety in use of power operated doors. Test methods.
BS EN 12604:2000	Industrial, commercial and garage doors and gates. Mechanical aspects. Requirements.
BS EN 12605:2000	Industrial, commercial and garage doors and gates. Mechanical aspects. Test methods.
BS EN 12635:2002+A1:2008	Industrial, commercial and garage doors and gates. Installation and use.
BS EN 12978:2003+A1:2009	Industrial, commercial and garage doors and gates. Safety devices for power operated doors and gates. Requirements and test methods.
BS EN 13241-1:2003+A1:2011	Industrial, commercial and garage doors and gates. Product standard. Products without fire resistance or smoke control characteristics.

Some of the standards applicable to powered gates were drafted many years ago and no longer represent the state of the art. In the light of investigations into recent accidents, the Health and Safety Executive (HSE) has challenged some aspects of the standards. Consequently, some of the current advice and recommendations from the HSE and the Door & Hardware Federation (DHF), which is the UK trade body representing manufactures, exceeds the requirements laid down in the standards.

Protecting against hazards

Architects, specifiers and users are unlikely to purchase copies of the standards listed above, hence it is worth highlighting the main hazards which should be addressed. BS EN 12604 includes a list of mechanical hazards in section 4.5 and also has a more extensive checklist in Annex A. The mechanical hazards are:

- Crushing
- Shearing
- Drawing-in
- Cutting
- Entanglement
- Trapping

There could also be electrical, hydraulic and other hazards, depending on the design of the gate and its operating mechanism. Note that the accepted principle when addressing hazards is to design them out where practicable, then provide guards (eg physical guards around hazardous parts of machinery, and safety light barriers to detect the presence of people in potentially hazardous areas) and, finally, reduce any residual hazards to an acceptable level by measures such as warnings and release mechanisms for use in the event of a person becoming trapped.

Powered sliding gates do not move particularly quickly but they are heavy and therefore possess considerable momentum when in motion. For that reason it is important that the gates are designed as far as reasonably practicable to eliminate the mechanical hazards. When it comes to guarding, the designer needs to consider the harmonised standards relating to reach distances and minimum gaps to avoid crushing. Note, however, that machinery safety standards are not always written with a view to protecting children; for example, the scope of BS EN ISO 13857, *Safety of machinery. Safety distances to prevent hazard zones being reached by upper and lower limbs*, excludes children under the age of 14 except for upper limbs reaching through openings, whereas it should be assumed that children will have access to the gates and misuse them (eg by attempting to ride on them while they are in motion).

Examples of measures that can be taken to design-out and safeguard against hazards include:

- Force limitation measures to ensure that an obstruction will not experience forces greater than the values specified in BS EN 12453. This applies to the leading edge of the moving leaf and other crushing, shearing and drawing-in points.
- Either a pressure-sensitive strip or a protected infrared beam on the leading edge of each leaf.
- Safety strips on the leading edges of the inside and outside of the guide posts, hardwired to the control box.
- Sheet infill or mesh to protect the gap between the guide posts, both inside and outside. Mesh apertures should be sized in accordance with table 5 of BS EN ISO 13857.
- Infrared safety beams either side of the gate to detect the presence of pedestrians, vehicles and other obstructions.
- Enclose the run-back area of the gate by fencing 1m away from the gate, or additionally use mesh of a suitable aperture size at least 2m high and positioned in accordance with table 5 of BS EN ISO 13857 to prevent hand/arm access.
- Position the run-back line of the gate at least 1m from the external fence, or ensure that the fence is infilled with additional mesh cladding of a suitable aperture size in accordance with table 5 of BS EN ISO 13857 for the length of the gate run-back to prevent hand/arm access.

More detail is provided in standards such as BS EN 12453 and BS EN ISO 13857.

Before a powered gate is specified, designed or installed, it is essential that a risk assessment is performed (likewise, a risk assessment can reveal any shortcomings in the safety of existing gates). BS EN 12453 identifies factors that can influence the level of risk and, in particular, three categories of users and four types of control for which the safeguarding at the leading edge can be different (the following is paraphrased from the standard):

- A limited group of people who are trained to operate a gate that is not in a public area;
- A limited group of people who are trained to operate a gate that is in a public area;
- Any person who is free to operate a gate that is located in a public area.

Gate controls:

- Hold-to-run switch located in sight of the gate;
- Impulse switch (press and release to operate) located in sight of the gate;
- Impulse switch not located in sight of the gate;
- Automatic.

Depending on the combination of users and controls, the required safety measures range from nothing to either:

- force limitation and a means to detect a person or obstacle on the floor at either side of the gate; or
- a means of presence detection to ensure that a person cannot be touched by the gate under any circumstances.

Given that most gates are accessible on at least one side by members of the public (passers by), the majority of powered gates require the highest category of safety measures.

Although the subject of fail-safe controls is covered by the appropriate standards, it is worth highlighting this requirement in this present White Paper for those readers not familiar with control system design. With a fail-safe design, the failure of a safety device - such as an optical sensor or a pressure-sensitive strip - should result in the gate control system defaulting to a safe condition. Such a component failure may be due to damage (from a vehicle collision or vandalism, for example) or a mechanical or electrical failure of the device itself. In the event of a 'fail safe' situation occurring, the gate is likely to cease operating in its normal automatic mode, depending on the design of the control system. While this may be inconvenient for users, it is essential in order to maintain safety at all times. Powered gates will normally have a means by which they can be opened and closed in the event of the power supply being disconnected, but on no account should an attempt be made to bypass any safety devices.

A gate's safety-related detection devices, such as optical sensors and pressure-sensitive strips, are often vulnerable, so these should be vandal-proofed as far as reasonably practicable. For example, only suitably robust devices should be used, their location should discourage attack, accessible fasteners should be of tamper-resistant types and, if a CCTV system is installed, a camera can be trained on the gate as a further deterrent.

More information about the design of powered sliding gates is available in the DHF publication *Guide to gate safety legislation and standards* (see Further information below).

Installation

In general the manufacturer will install the gate, as it is only during installation that the gate becomes fully assembled and can therefore be checked and CE marked. It is vital that the gate is installed correctly if it is to perform as intended and with the required level of safety; this includes both the mechanical and electrical aspects, together with any associated access control system.

Architects and specifiers are strongly advised to use installers that are accredited by organisations and schemes such as CHAS (Contractors Health & Safety Scheme), Construction Line, Safe Contractor, Secured by Design, and that adhere to an ISO 9001:2008 quality management system.

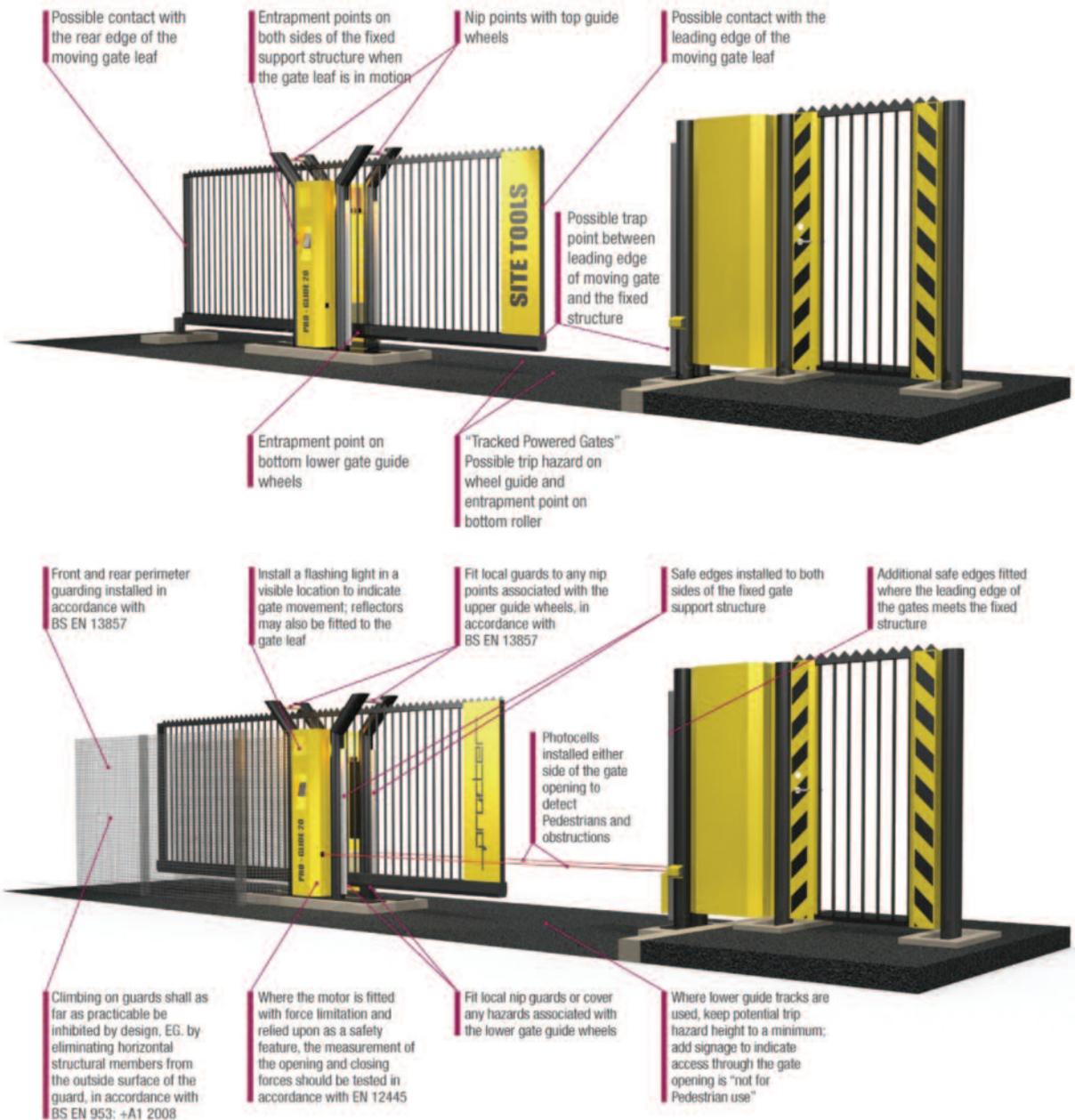
Documentation

When a new powered gate is installed, it should be CE marked to indicate compliance with the requirements of the Machinery Directive. In addition, the organisation that CE marks the gate (which may be the manufacturer or the installer, depending on the circumstances) should provide an EC Declaration of Conformity showing with which harmonised standards the gate complies, and a set of instructions that includes operation, maintenance, checking correct functioning, and residual risks. As part of the CE marking process, a Technical File should have been assembled, but there is no legal obligation to provide a copy of this.

Maintenance

As with any machinery, powered sliding gates require periodic maintenance. Today's gates are designed for a long, trouble-free life, but Procter Sliding Gates recommends that its gates are serviced annually or every six months, depending on the level of usage and the types of safety device installed. This servicing not only maintains the operating mechanism and guides in good condition but also checks the operation of the safety features. If the site owner/operator does not wish to undertake this work, facilities management companies can sometimes undertake the work or the gate manufacturer can often provide a maintenance service.

Appendix A - Examples of powered sliding gate hazards and protective measures



Powered sliding gates may also need:

- A pressure-sensitive strip on the leading-edge of the moving gate
- Stops at either end of the gate's travel to prevent overrunning
- Emergency release mechanism
- Automatic reversal of the direction of travel in the event of an obstruction being detected

Further information

The Door & Hardware Federation (DHF) has published a *Guide to gate safety legislation and standards*, which is available to download from the Procter Sliding Gates website or on request.

Three Safety Notices have been published by the Health and Safety Executive (HSE), all of which can be accessed from the HSE's website at www.hse.gov.uk:

FOD WSW 1-2010, *Risks to pedestrians from crushing zones on electrically powered gates*. This identifies potential safety risks to pedestrians and lists actions required by gate manufacturers and installers, construction companies, and estates and/or facilities management companies.

FOD 7-2010, *Risks to pedestrians from crushing zones on electrically powered gates - 2*. This reinforces and updates the information provided in FOD WSW 1-2010.

OPSTD 1-2011, *Powered perimeter gates*. This provides advice to landlords, commercial owners or facilities managers of properties with powered gates.

Procter Sliding Gates is a family-owned business with over 100 years' experience of expertly manufacturing and installing all types of entrance gates nationwide. Gates are designed and manufactured in-house to virtually any size and specification, and installed by Procter's own installation teams.

With Procter Sliding Gates you get:

- High-quality sliding gates direct from the manufacturer.
- A wide range of tracked and cantilevered gate design options and material specifications.
- A cost-effective and dependable service that covers the site survey, design, manufacture, installation and maintenance.
- Prices that are very competitive against those from European suppliers of powered sliding gates.
- Installation by fully trained, expert teams in accordance with ISO 9001 quality standards and industry-leading site safety standards.
- Gates that are CE marked and fully compliant with the requirements of the Machinery Directive 2006/42/EC.
- Reassurance of the highest standards of safety, quality and service through the company's membership of the Door & Hardware Federation (DHF).



Prestigious sliding gate installations by Procter include the Ports of Harwich, Barry and London, Leeds St James Hospital, Clogau Gold, Panasonic, Bournemouth and Bristol Airports, River Island, Carphone Warehouse and Sony.

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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 compliance with all applicable legislation when specifying powered sliding gates.

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