

**CAUTION
AUTOMATIC
GATE**

Do not obstruct whilst
in motion

Attention! Full Stoppage and will not be held liable for
any damage caused by obstruction.



GUIDANCE ON SPECIFYING MANUAL AND AUTOMATED GATES AND BARRIERS

A guidance paper for Architects,
Consulting Engineers, Integrators,
Temporary Works Engineers, Chartered
Surveyors, Quantity Surveyors, Technicians,
M&E Engineers, Specifiers, Principal
Contractors and Trades

**Jacksons
Fencing**

Guidance on specifying manual and automated gates and barriers

The cases of a child losing his fingertips in a park gate accident in Rochdale, the council worker killed when crushed by a gate in Limerick, the father-to-be killed by an unlatched parking barrier and the successful prosecution of the two companies responsible for installing and maintaining the electric gate which killed a child in Bridgend, are testament to the risks people face and the irreparable damage to reputation resulting from gates and barriers when they go wrong - whether by design, installation or inadequate maintenance.

While there's a wealth of published information on best practice for securing perimeters and boundaries with different types of fencing, relatively little is discussed on the options and methods for providing access to a site. It is little wonder that so much confusion exists on the types of gates available and their suitability for specific applications.

Gates act as a critical component in maintaining the security integrity of a site and perform a number of practical functions which include providing controlled access to and egress from the site as well as securing the site when required.

You may or may not be aware that gates and barriers will need to meet a wide variety of criteria to be considered appropriate and safe for use.

This document does not set out to cover the subject in exhaustive detail, rather to serve as aide memoire when reviewing and specifying access gates and barriers by providing you with information and insights to help inform your decisions in refurbishment or new build projects.

Scope of this document

Both pedestrian and vehicle gates and barriers are essential to the safety, security and accessibility of a site, they serve as a safety device and security checkpoint but also have the potential to present a high risk to site occupiers and visitors.

When designing access to a site and specifying equipment it is important to consider a range of factors; this White Paper will explore the following areas:

1. Gate types and applications
2. Risk assessment
3. Applicable regulations, legalisation and current best practice
4. Usage and operational considerations
5. Maintenance and repair
6. Applying common sense
7. Appendices



1. Gate and barrier types and suitability

Manual Swing Gates



Typically of single or double leaf, inward or outward opening, hinged-at-post design, these are by far the most commonplace for both pedestrian and vehicle access applications.

Pros

Proven, simple, widely available and cost effective.

Cons

Inefficient use of space, may be unsuitable for sites with sloping ground or exposure to high wind loading and for very large or heavy gate designs.

Manual Vehicle Barriers



Typically single or paired and of swing or pivoting rising arm design.

Pros

A low-tech, inexpensive barrier system for vehicular traffic management.

Cons

Ineffective as a pedestrian or anti-intruder barrier.

Tracked Sliding Gates



The majority of the weight of the gate is carried on wheels running in a linear direction on a fixed track set into the ground. Typically featuring automated operation and of either single or paired leaf or telescopic design for vehicle access control and site security.

Pros

Space efficient where space beyond the gate is restricted and suitable for high and heavy gate designs and where the gate(s) is required to span large gaps. Provides a good level of security.

Cons

Relatively higher maintenance requirement and more expensive than swing gates, unsuitable for uneven ground.

Cantilever Sliding Gates



A cantilever sliding gate design does not require tracks and can be of single or paired leaf design to span this type of gate is supported on post mounted rollers under the bottom rail and guide rollers at the top.

Pros

An effective solution for sites where there is insufficient space to accommodate swing gates, where the gates span uneven ground or where the ground slopes upwards behind the gate opening. Small cantilever gates are available for pedestrian access.

Cons

Overall length of gate is greater than the gap it spans to allow for the counter balance required on the trailing end of the gate.

Bi-Folding Gates (Speed Gates)



This type of automated vehicle access gate is typically used in applications where speed of operation and space efficiency are important e.g. car parks and in higher security sites to avoid tail-gating.

Pros

Ideally suited to environments where the gates will be subject to high wind loading or where there is insufficient space for swing gates to open into or where there is insufficient site frontage to accommodate sliding gates.

Cons

Relatively higher purchase price and associated maintenance costs.

Rising Road Blockers



Typically housed in-ground at vehicle entrances to sites and designed as a security barrier to mitigate against attack employing a hostile vehicle. For higher security applications in the UK, automated road blockers should be certified to PAS 68 or IWA 14-1:2013 and rated as such.

Lower cost, non-certified versions are also available primarily for traffic flow management applications such as bus lanes, car parks or within a site to provide vehicle checkpoints.

Automated road blockers are typically of either rising kerb or bollard design and each have application specific advantages and disadvantages.

Pros

PAS 68 and IWA 14 certified road blockers provide a highly effective means to prevent a determined attempt to breach a perimeter using a vehicle, typically of up to 7.5 tonnes GVW at up to 60 km/h.

Cons

Certified models are relatively expensive unless the threat warrants their use.

Gate Automation



Most gates and vehicle barriers can be designed to be operated automatically. Automated swing gates will typically employ electric motors with pinion or geared drive or with electrically powered hydraulic rams either built into the gate posts, underground or attached between the gate leaf and post. Sliding gates will feature motors housed within cabinets, floor mounted alongside the gate track/rail.

Pros

Convenience and providing good access control and security (operation can be programmed to return to closed position on completion of cycle etc).

Cons

Automated gates are electro-mechanical devices and as such require routine checking and regular maintenance. They are also classed as machinery and great care should be exercised to ensure they are CE marked as compliant with the EU Machinery Directive 2006/42/EC, installed correctly and properly maintained (see Section 2 below) or they will be considered a danger to users and rendered illegal for use.

However if the gate is to be operated automatically, what mode of operation is to be used?

There are two basic types of operation:

Deadman - where the gate will only operate when the user holds a control - and the gate is visible throughout the operation of the gate.

Fully Automatic - where the gate will fully open or close once a control is activated (could be an intercom, radio control or time clock).

2. Risk Assessment

Often considered a sticking point, this key stage in the process provides you with the information you'll need when specifying the design and types of gates for your site. The Risk Assessment should be as comprehensive as possible and consider both the immediate and longer-term use of the site.

While much can be accomplished by working from drawings and plans, this process should however, always be supported by walking around the site and getting a feel for how the gates and access points need to be incorporated into existing fencing or walls. For sites where existing gates are being replaced or where a change or improvement to access is being considered, the process will allow you to visualise how the site will work.

Points to include in the Risk Assessment - and these are always specific to an individual site and its operational requirements would include:

Identification of hazards:

Natural, environmental, accidental or other non-malicious circumstances (including avoidable accidents and human error) which could present a potential source of harm and would have a negative effect on site safety and security.

Impact of hazards:

The consequences of an event caused by a hazard.

Threats:

Events brought about through malicious intent including theft, arson, vandalism, assault, abduction which all result in negative outcomes.

Risk identification:

Situation - Is the ground level where the gate will be sited? By reviewing the arc of the gate or where the gate will slide at the outset, additional safety features may not be necessary.

Risks:

Identification of risks to security, safety operations and reputation posed by the threats to each before implementation of appropriate measures.

Residual risk:

The risk remaining after implementation of appropriate protective measures.

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Risk appetite:

A term used for considering financial products but just as appropriate in this context, where decisions may be predicated on the level of risk that an organisation is prepared to accept when faced with making cost /performance / aesthetic / operational trade-offs.

Lowering risk:

A fully automatic gate should feature a minimum of two types of safety device: photocells; pressure edges or protection via the limitation of the forces that are used to operate the gate.

Statutory & legislation:

A company's risk appetite is always secondary to their duty of care, statutory principles of risk reduction and legislative requirements.

3. Applicable regulations and legislation

3.1 Automated gates and barriers (see appendix 1)

Automated gates and barriers as discussed earlier are required by law to comply with EU Machinery Directive 2006/42/EC which is implemented in the UK by the Supply of Machinery (Safety) Regulations 2008 and Supply of Machinery (Safety) Regulations (Amendment) 2011.

In addition, specifying an automated gate or barrier without taking equal care over installation procedure and ensuring an appropriate maintenance and repair regime is in place may leave you or your client exposed to operational failure, compromised security, potential litigation and imprisonment.

3.2 Manual gates and barriers

BS 5709:2006 covering Gaps Gates & Stiles, BS EN 12604:2000 covering Doors, Doorsets, Gates, Barriers, Industrial, Commercial, Garages (domestic), Mechanics, Specification (approval), Manually-operated devices Electrically-operated devices and BS EN 6180:2011 which gives recommendations and guidance for the construction of barriers in and around buildings all include elements which can be applied to manual gates and barriers however, there is little in the way of guidance, best practice and legislation specifically relating to manually operated gates and barriers.

This naturally makes manually operated gates easier to specify but at the same time shifts the burden of responsibility squarely into the hands of the specifier to ensure appropriateness, fitness for purpose and safety.

Manual swing gates and barriers can be large and heavy and are designed to operate freely. If they are left unchecked and without mechanical devices to hold them in both the open and closed positions, they can be lethal.

3.3 Equality Act, building regulation & BS 5709:2006 (see appendix 2)

The Equality Act 2010 (inclusive of the former Disability Discrimination Act) requires that public buildings provide access for people with disabilities. It is also prudent to design access to the site in line with Building Regulation Part M; while it deals with access to buildings specifically, its principles equally apply for access into a site.

BS 5709:2006 is, as with most British Standards, broadly based and can leave much open to interpretation, but applicable elements of the standard for consideration when designing equal access to a site through gates and barriers include:

Least restrictive option:

The standard states (for public footpaths) that in the absence of explicitly identified counter reasons, the following structures should be used in this order of preference - Gap, Gate, Kissing Gate, Stile. Where something beyond a gap is needed, a two-way-opening, self-closing gate is the preferred option as it makes life much easier for users with a bicycle, in a wheelchair, mobility vehicle, or manoeuvring for a child's buggy.



Manoeuvring space:

This is the space needed to be kept clear so as to allow users to get into position to open, pass through and close a gate or to negotiate a fixed structure. One-way-opening gates need more manoeuvring space than two-way opening ones and some mobility vehicles, wheel and push chairs may need as much as a three metre diameter space.

Protrusions:

Avoid any protrusions likely to catch on clothing or cause injury especially in consideration of those with restricted mobility.

Entrapment:

Ensure the gate type and its design are appropriate to and fit for the intended purpose - special care should be given to hinge, slam catches, latches and lock design to avoid finger or limb entrapment.

Site safety:

Pedestrians and vehicles should be kept safely apart and never share the same access point or routes into and around a site.

Catches and latches which allow a gate or barrier to be held securely in the open or closed position are essential safety devices.

Planning permission:

It is prudent to check with your local planning authority to ascertain if planning permission is required for the gate and barrier on your proposed site and any restrictions on gate and barrier types/designs/specifications/colours or other conditions.

3.4 Construction design & management regulations 2015

Construction Design and Management Regulations were introduced in 2015 and replace previous versions. Under these regulations the act of specifying a gate or barrier may result in that person having accountability for a 'design duty'.

The guidance in the regulations describes the 'designer' as an organisation or individual that prepares or modifies a design for any part of a construction project, including the design of temporary works, or who arranges or instructs someone else to do it and includes architects, consulting engineers, interior designers, temporary works engineers, chartered surveyors, technicians, specifiers, principal contractors and even some trades people.

The person who selects the product is the designer and must take account of the health and safety issues arising from the installation and use of those products. In contrast, manufacturers supplying standardised products for use in any construction project are not considered to be designers. The exception is when a manufacturer produces a design or develops a specification into a detailed design.

3.5 BS EN 1176 & RoSPA



The other important exception can be found in the standards and best practice for gates used in play areas where conformance to BS EN 1176 play fence standards and RoSPA approval apply (see Appendix 3).

In essence, gates specified for use by children in play areas need to be inherently safe from sharp edges, finger, neck and limb entrapment (hinges, slam posts, latches, pale spacing and gate design, locking devices etc) and should ideally incorporate in-ground, soft, self-closing mechanisms to maintain boundary safely and reduce the risk of animals entering and fouling the area.

A separate, lockable gate should be included within the boundary for access by maintenance staff with their equipment and careful consideration given to the positioning of user gates to avoid exit into the path of potential hazards e.g. car park or roads.

It should be noted that Playground Managers may held responsible for negligence if they fail to exercise reasonable care to ensure their playgrounds are safe and avoid accidents they could reasonably have foreseen would happen. Acts of Parliament and other statutory instruments which could apply to children's playgrounds include:

- Occupier's Liability Act (1957) and (1984)
- Health and Safety at Work etc. Act (1974)
- Management of Health and Safety at Work Regulations (1999)
- Workplace Health, Safety and Welfare Regulations (1992)

Given the vulnerability of the primary users and attendant risks, a much greater emphasis should be placed on safety, durability and resilience over aesthetics and headline cost and absolutely no cost cutting permitted in the inspection, maintenance and repair of playground gates.



4. Current best practice

- When designing gates and barriers for safety and security, current best practice, dependent on application would include, in no particular order:
- Minimising the number of entrances to a site
- Always be in a position to know who has entered a site and where they are at any given time
- Consider how authorised access is to be effected through gates and barriers - both entry and exit can be controlled by guards and/or electronic access control devices including simple keypads with individual PIN codes, magnetic cards, proximity tokens, biometric devices etc
- Where electronic access control is employed, ensure devices are not relying on IP connectivity to operate which could render them vulnerable to hackers
- Keep pedestrians and vehicles safely apart
- Ensure the site is accessible to all users
- Employ full-height, accessible style turnstiles for staff and visitors entering on foot
- Gates should be of a height to match adjoining fencing or structures and at minimum of 2.0m in height to perform as a security barrier
- Ensure gates are fitted to prevent entry and egress under its structure
- Gate hinges should be designed to prevent the gate from being lifted free
- Gate locks and ground bolts should be shielded to prevent use as steps to scale the gate or adjoining fencing and walls
- Gates and vehicle barriers should be secured by a lock conforming to BS 3621 protected by lock protection plates welded to the gate and the frame or by a padlock and padlock fittings conforming to grade 5 or 6 of BS EN 12320
- In higher security applications, consider separate entry and exit gates for vehicles and incorporating an air-lock system with two sets of gates or combination of gates and barriers
- To maintain security performance, always specify the use of LPS 1175 Certified, CPNI Approved and Secured by Design preferred gate and barriers in higher risk applications or when the gate or barrier is to be attached to a similarly certified/approved/preferred fence
- Where the site is considered at risk of attack by a vehicle, employ physical barriers which will reduce the approach speed and arrest a vehicle including PAS 68 and IWA 14 certified gates, barriers, blockers and bollards, hard landscaping of trenches and high kerbs etc
- Consider if it is necessary for gate locking and latching hardware to be used on both sides of the gate - ideally they should be inaccessible from the 'attack' side
- For safety, ensure gates and barriers are able to be held in the open position
- Ensure provision is made to facilitate rapid, unhindered evacuation of the site in the event of a major incident
- Ensure adequate access for emergency vehicles
- Design and specify gates and barriers for their intended purpose and in context with the risk assessment and expected and anticipated duty cycle
- Specify gates and barriers to comply with applicable legislation and certified standards
- Gates and barriers are mechanical or electromechanical pieces of equipment and are not "install it and forget" products, so ensure your specification process considers the operational impact and cost of regular inspection and planned maintenance and repair
- Gates and barriers, much like their adjoining fences, walls or other structures are a permanent or semi-permanent feature of a site, so it is prudent to specify products designed to provide a long service life and which are backed by a worthwhile manufacturer guarantee

- The usage frequency / duty cycle of the gate should be assessed to ensure a future proof installation is identified
- The specified gate must comply with the Machinery Directive 2006 /42/EC (formerly 98/37/EC) - in order to achieve compliance the gate should either have undergone a full risk assessment OR comply with all of the relevant British Standards. If adopting the Risk Assessment approach, it is recommended that the British Standards are used as a means to identify the various potential risks posed by an automated gate

5. Usage & operational considerations

Traffic levels

How often will the gate be expected to operate inside a 24hour period and how many times per hour at peak times.

Site expansion

If site expansion is likely in the future then the level of traffic would increase so the equipment specified should be future-proofed as much as practicable.

Forward planning is essential when implementing physical security and access control of any description:

- Manual or automated - if the gate or barrier is essential to daily site operations, will the user benefits from an automated option outweigh the lower initial cost of manually operated gates and barriers? Where a site requires an automated gate or barrier, it is best practice to install a battery back-up or uninterrupted power supply to ensure 100% availability of service.
- Access control - pedestrians should not use the same access as vehicles as they could be exposed to unacceptably high risks when the gate is in operation. Separate access should be designed to keep the pedestrians safety away from the main point of vehicle entry so that whenever possible, paths do not cross.
- The style of the gate must deliver a design which ensures that gaps above and below the gate should be 100 mm or under.
- The gaps between the gate post and gate frame should also be 100 mm or under not reducing down by any more than 25mm when the gate operates to prevent the creation of trap points.

Planned preventative maintenance



Whether heavy machinery or a car - all mechanical equipment requires inspection and maintenance in order to continue to operate at optimum efficiency. Gates are no different. The following section will provide an understanding of the specific elements an engineer should cover when servicing an automated gate or barrier, some of which apply equally to manually operated versions.

We would always recommend a complete reassessment of the existing gate or barrier since its last service. This allows the engineer to spot if the gate is still effective in its current state, for example there may have been structural changes in the nearby environment which would impact on the usability of the gate. During the service inspection, mains power to the device will be isolated, auxiliary back-up disconnected, all locks set to a 'safe' state and all electrical components tested to ensure the power is off.

During the inspection and servicing process, the engineer should cover the following steps include:

- Secure the area to ensure people are a safe distance from the gate or barrier
- Visual inspection of all earth connections
- Ensure the gate is safely secured by a start/stop device
- Visual inspection of cabling, conduits and trunking for any physical or environmental damage
- Checking over the gate structure for external damage ensuring there is no corrosion, cracks or weld failures
- Checking all fixtures, hinges to ensure safety
- Clean and lubricate all moving parts
- Check for the presence of travels stops
- Check the gate has free movement when travelling
- A visual inspection of all of the safety devices
- A visual check for oil leaks
- Test effectiveness of obstacle detection (force testing) safety devices
- A final visual check on all internal electrical components
- Record all test results
- Update the maintenance log
- Inform the client of any recommendations/findings

When safe to do so, return the gate to normal service, if not, ensure the gate is left in either the open or closed position and rendered inoperable with visible safety warnings signs posted.

All of our engineers and technical advisors have passed the 'Gate Safe Aware' training course to ensure they are up to date with the very latest standards and guidance in relation to gate safety.



Since an automated gate is technically a 'machine' the mechanical structure needs to be sufficiently robust to accommodate the automation equipment specified. Ram or underground operators are recommended for swing gates or bi folding gates. Tracked or Cantilever operators for sliding gates in addition to sound technical training Jacksons further advocate the following technical information which should be supplied by all high quality gate and gate automation manufacturers in manual format.

The technical file for the automated gate should include:

Risk assessment:

- List of Health and Safety Requirements that are applicable and how they have been controlled
- Design drawings including safety critical details like supports and hinges
- Calculations for loadings at hinges and rolling gear

Declaration of conformity:

- A complete listing of declarations from drives and controls
- A complete listing for conformity from safety device manufacturers

Manufacturer's label:

- CE mark

Installation/maintenance log book

- Detailed maintenance instructions for the user and descriptions of minor residual risk

Post handover of the gate:

- Demonstration of the safety device and explanation as to how they work
- Demonstration on how to operate the gate
- Demonstration on how to isolate the power
- Demonstration on how to manually release the system
- Explanation of the hazards associated with the gate

The cost should also include a training visit for the users of the gate.

This may incur an additional visit to site if the user of the gate is not available at the handover stage.

An automated gate should only be installed by a suitably trained operative and the electrical connection should be carried out by an electrician qualified to 17th edition of BS EN 7671, with a minimum of three years experience.

6. Common sense

We hope this document has proved useful and that armed with these insights, you are better able to specify correctly and with confidence.

However, there is only so much that can be communicated in words and illustrations and while we advocate all the practices covered in this guidance document, there is no substitute for the application of common sense and fully understanding how the gates or barriers will be employed in a real-life situation for a specific site.

7. Appendices

For more information and advice on manual and automated gates and barriers compliant with all legislation and best practice, please contact us.

In the interest of sharing information Jacksons recommend further reading around the subject of gates and barriers by accessing the links to the right. They will connect you to specific pages we feel enhance learning around the subject.

Finally, we cannot advise strongly enough the need to exercise caution during checks of any nature when using manual and automated products.

Appendix 1

Gate Safe

Gate installer training

Powered Gate Group

Raising awareness around the installation and maintenance of powered gates drawing attention to issues such as poor installation and maintenance

Powered gates

Work equipment, machinery and powered gates

Gates and automation

A simple guidance document to the dos & don'ts of owning manual and automated gates

Manual and automated industrial, commercial and garage doors and gates

An overview of the requirements for the components for industrial, commercial and garage doors and gates covering all mechanical aspects

EU Machinery Directive 2006/42/EC

A definition covering the EU Machinery Directive 2006/42/EC

The Supply of Machinery (Safety)(Amendment) Regulations 2011

The applicable regulations surrounding the supply of machinery (2011)

Barriers in and about a building

The code of practice for barriers in and about buildings

Appendix 2

Equality Act 2010

A definitive guide to the Equality Act

Building Regulations Part M:

A definitive guide to approved building regulations

BS5709:2006

British Standards for gates explained

Appendix 3

BS EN 1176-1:2008

A definitive guide to playground materials and equipment

RoSPA

Recommended playground equipment and the safety standards required

Health & Safety Liability Act 1957

The primary legislation covering occupational health and safety in Great Britain

The management of Health and Safety at Work Regulations 1999

A detailed document commenting on best practice for the management health & safety regulations at work

The Workplace (health, safety and welfare) Regulations 1992

The primary legislation covering workplace regulations