Technical Specification

dhf Raising Standards Safety Assured

Code of Practice for the Design, Manufacture, Installation and Maintenance of Powered Gates and Traffic Barriers

DHF TS 011:2016

(incorporating corrigendum October 2016)

Contents

Revision	Description	Date
TS-011 v1	First edition	May 2016
Corrigendum 1	Typing error corrections to paragraph 1 in Annex A, Table B2, B9.1 and B10.1 in Annex B	October 2016

Foreword

This Code of Practice draws on information within the Supply of Machinery (Safety) Regulations 2008 which brings the European Machinery Directive into UK law, relevant European and British standards and industry best practice and seeks to assist all those involved in the powered gate and traffic barrier industry to meet their legal obligations by providing clear guidance on the design, manufacture, installation and maintenance of powered gates and traffic barriers.

The objectives of this Code of Practice are to:

i. Establish and maintain minimum safety standards for design, manufacture, installation and operation of powered gates;

ii. Provide guidance to assist designers, manufacturers and installers in the production of functional and compliant systems;

iii. Provide guidance on the installation, testing and Commissioning of systems;

iv. Provide guidance on the required level of user training and safety awareness;

v. Define the minimum requirements for technical documentation;

vi. Define a training and competency framework;

vii. Define the minimum requirements for the maintenance and repair of systems.

Powered gates and traffic barriers are classified as machinery under the EU Machinery Directive. The Supply of Machinery (Safety) Regulations, which brings the European Machinery Directive (currently 2006/42/EC) into UK criminal law, are primarily concerned with ensuring new and substantially modified powered gates and barriers are safe. The Machinery Directive requires the Responsible Person (normally the manufacturer or another 'deemed' to be the manufacturer for the purposes of the directive) to ensure that a conformity assessment is carried out, the Essential Health and Safety Requirements in Annex 1 of the directive have been met, a technical file is compiled, user instructions and maintenance instructions are provided to the operator, a declaration of conformity is issued and that the gate is correctly CE marked.

Once the gate or barrier is brought into use, any failings of the gate or barrier that cause or could cause injury to an individual can be prosecuted under UK criminal law. The major pieces of legislation of concern to manufacturers, installers and gate owners are the Supply of Machinery (Safety) Regulations 2008, Health and Safety at Work Act 1974, the Workplace (Health, Safety & Welfare) Regulations 1992, the Electricity at Work Regulations 1998 and Building Regulations (Part P England and Wales section 5.6/6 in Scotland). Installers, business and domestic owners are also potentially liable under UK civil law as the result of an incident with an unsafe powered gate.

We also draw your attention to the following legislation and standards, which shall be considered during the design, manufacture, installation and maintenance of powered gates:

The Equality Act 2010, which aims to protect disabled people and to prevent disability discrimination, and the Disability Discrimination Act 2005 (as amended), the Disability Equality Duty of which continues to apply

BS 7671, Requirements for Electrical Installations (also known as the "IET Wiring Regulations")

Building Regulations Part P England and Wales

Building Standards sections 4.5 & 4.6 in Scotland

Compliance with this Code of Practice cannot confer immunity from legal obligations.

This Code of Practice is based on best practice and aims to reduce the risks associated with the powered gate to as low as is reasonably practicable and so help achieve compliance with the minimum safety objectives of UK law.

1: Scope

This Code of Practice contains requirements and recommendations for the design, manufacture, installation, modification, repair and maintenance of powered gates and traffic barriers intended primarily for vehicles but may be accessed by persons. Throughout the code the term “powered gate” is used to describe powered gates and powered traffic barriers.

This Code of Practice excludes the following:

> Lock or dock gates, lift doors, vehicle doors, armoured doors, doors to retain animals, theatre textile curtains, industrial doors, garage doors, pedestrian doors in and controlling the entrance into buildings, railway crossing traffic barriers. Nor does it apply to traffic barriers where access by untrained persons is securely prevented (for example, motorway toll booths).

This code of practice does not cover the design or manufacture of control panels, drive units or safety devices. It does make reference to the minimum compliance requirements for these components where they are incorporated into powered gates and traffic barriers covered by this code.

Where specific legislation may be relevant, this is indicated at the start of or within the text of the relevant clause by identifying the relevant legislation or standard in bold italics.

Information intended to provide guidance or clarity is identified by narrow italics.

2: References

2.1. Normative

For companies that are involved in the design, manufacture and installation of bespoke powered gates the following documents provide information, which is supplementary to the requirements of the MD and this code of practice.

BS 7671 as amended, Requirements for Electrical Installations (also known as the “IET Wiring Regulations”)

BS EN 12445:2001, Industrial, commercial and garage doors and gates – Safety in use of power operated doors – Test methods

BS EN 12978:2003+A1:2008, Industrial, commercial and garage doors and gates – Safety devices for power operated doors and gates – Requirements and test methods

EN ISO 13849-1:2008, Safety of machinery – Safety related parts of control systems - Part 1 General principles for design

2.2. Informative

For companies undertaking the design and manufacture of mass produced or series production of powered gates, the following referenced documents describe the current state of the art.

EN 12604:2000, Industrial, commercial and garage doors and gates – Mechanical aspects – Requirements

EN 12453:2001, Industrial commercial and garage doors and gates – Safety in use of power operated doors – Requirements

EN 12635:2002+A1:2008, Industrial, commercial and garage doors and gates – Installation and use

EN ISO 13857:2008, Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs

EN 60204-1:2006, Safety of machinery – Electrical equipment of machines, general requirements

3: Definitions & abbreviations

For the purposes of this document the following definitions apply:

3.1. Definitions

3.1.1. Assembler
Individual or organisation who assembles a gate from components.

3.1.2. Certificate of Compliance
Document completed at commissioning by a competent person certifying a powered gate meets the requirements of this code of practice.

3.1.3. Competent Person
Person who by training and experience is capable of carrying out maintenance on and/or installation of and/or commissioning of and/or adjustment of the settings or functions of a powered gate.

3.1.4. Declaration of Conformity
A formal declaration by a manufacturer, or the manufacturer's representative, that the product to which it applies meets all relevant requirements of all European product safety directives applicable to that product.

3.1.5. Declaration of Incorporation
A legal statement from the manufacturer of a partly completed machine (PCM) to inform the manufacturer of the final machinery into which it will be incorporated that the PCM fulfils the requirements of all applicable European product safety directives and that it shall not be put into service until the complete machine is in full conformity with the Machinery Directive.

3.1.6. Designer
Individual or organisation responsible for the overall design of the powered gate. Designers are responsible for ensuring that the design will be safe, legally compliant and is suitable for the working environment and task as agreed with the owner.

3.1.7. Installer
Individual or organisation responsible for the safe installation or modification of a powered gate.

3.1.8. Maintainer
Individual or organisation responsible for maintenance or minor modification of a powered gate. Maintainers are responsible for ensuring that gates are left in a safe condition after any maintenance task.

3.1.9. Manufacturer
Individual or organisation responsible for the manufacture of gates and/or powered gate components and the issue of Declarations of Conformity or Incorporation for their products.

3.1.10. Owner
Individual or organisation in control of the gate.

3.1.11. Powered gate
Powered gate or traffic barrier intended for installation in areas in the reach of persons, and for which the main intended uses are giving safe access for pedestrians, goods and/or vehicles accompanied by or driven by persons in industrial, commercial or residential premises.

3.1.12. Partly completed machine
An assembly of parts that is machinery but which cannot fulfil its intended use until it is incorporated into finished machinery. Drive units and control boards are partly completed machines. A partly completed machine must be accompanied with a Declaration of Incorporation document and be CE marked under all relevant product safety directives.

3.1.13. Responsible Person
The manufacturer or manufacturer's authorised representative legally responsible for: undertaking a conformity assessment, ensuring a risk assessment is carried out to determine the essential health and safety requirements which apply to the powered gate, compiling and retaining a technical file, providing safe use and planned preventative maintenance instructions for the gate, preparing and issuing a Declaration of Conformity and CE marking the completed gate as prescribed.

3.1.14. Risk assessment
The process of identifying and quantifying hazards and then applying suitable control measures. Risk assessment is normally an iterative process where the initial risk value is reassessed after control measures are applied until the risk is reduced to an acceptable level.

3.1.15. Safety device
A device intended to perform a safety function but would allow a machine to continue to function (with a reduction in safety) if it were removed. A safety device must be provided with a Declaration of Conformity and be CE marked.

3.1.16. Safe gate
A gate in conformity with the requirements of Annex B of this code.

3.1.17. Safety notice
A notice issued to an owner informing them that a powered gate has been assessed as being unsafe in accordance with this code of practice. The safety notice will contain details of the safety failures, the course of action taken by the individual assessing the gate to make the gate safe (for example, removed power, placed to manual operation, informed owner) and the remedial work required to put the gate back into operation.

3.1.18. User
Anybody using or operating the gate.

3.1.19. Planned preventative maintenance
Routine servicing of a system, carried out on a scheduled basis to ensure ongoing safety and reliability.

3.1.20. Reactive maintenance
Repair, maintenance or modification carried out in response to the development of a fault (repair).

3.2.1 Abbreviations

For the purposes of this document the following abbreviations apply:

HSWA	Health and Safety at Work Act 1974;
MD	Machinery Directive 2006/42/EC;
EHSR	Essential Health and Safety Requirements in Annex 1 of MD;
WR	Workplace (Health, Safety and Welfare) Regulations 1992.

4: Design, manufacture & installation of new and substantially modified gates

4.1. Negligence

Any person who by their action or inaction causes injury to persons or property could be pursued in the civil courts for damages. This would include the owner (domestic or otherwise) of a powered gate or any person working on a powered gate.

4.2. Installer responsibilities

Machinery Directive 2006/42/EC (brought into UK law by the Supply of Machinery (Safety) Regulations 2008)

Powered gates when brought into service from new or after a substantial modification (see Note) shall comply with the Machinery Directive and particularly the safety requirements set out in the Essential Health and Safety Requirements in Annex I of the directive.

In the following situations, the responsibility for ensuring compliance lies with the installer:

- The installer manufactures the complete gate and drive unit;
- The installer manufactures the gate but uses drive units from another manufacturer;

- The installer buys the gate, controller and drive units from differing manufacturers and combines them;
- The installer carries out a substantial modification to an existing gate;
- The installer automates an existing manual gate.

The exception to these situations is where a complete gate or barrier system is placed on the market, such as a 'factory manufactured' gate with all ancillary items (drive units, safety devices and control units). In this situation, the person placing the product on the market will have the responsibility of complying with the Machinery Directive and will have to provide a Declaration of Conformity and CE mark the gate.

However, the installer still has a responsibility, under Section 3 of the Health and Safety at Work Act 1974, to ensure the gate has been installed correctly and safely in accordance with the manufacturer's installation and setting instructions.

Note: in general terms, a substantial modification is one where the modification is significant enough to for the modified machinery to be considered as new machinery.

For the purposes of this Code of Practice a substantial modification is considered to be:

- Non like for like replacement of the gate structure;
- A change in the means of movement;
  (for example from ram operation to underground operation)
- A change in the number of leaves or a reduction or increase in the opening width.

Health and Safety at Work Act 1974 section 2, 3 and 7
All work shall be executed in a manner such that it will be safe for users and anyone else who may be affected both during and on completion of the works.

Electricity at Work Act 1998 and Building Regulations -
Part P England & Wales, Section 5.6/6 in Scotland)
All work shall be executed in a manner that protects against electric shock and fire both during the works and on completion.

4.3 Training and competency

To ensure that training and competency requirements can be effectively managed, you shall maintain a training and competency record for each member of staff. You shall also have a process in place to ensure that sub-contracted staff are appropriately qualified. Training and competency requirements are detailed in Annex G.

4.4. Specifying the product

Introduction

The design process requires an information gathering procedure to be carried out to understand the owner's needs and expectations (for example, who will have access to the gate, expected type of traffic, hours of use, frequency of use, manned/unmanned, level of security) and review all requirements.

Diligence in this process shall ensure the correct system is specified, its operation will meet the stated aims and rework will be reduced to a minimum. The owner shall be advised of any inherent problems that may arise from meeting the requirements (for example, the use of fully boarded gates in exposed areas, and the impact on aesthetics when using safe edges to protect a hazard).

4.5. Design requirements

The designer and owner or owner's representative shall agree a design which meets the owner's requirements. The designer in this instance is the individual or organisation responsible for automating the powered gate and in many cases may be the installer.

During this process, the installer/designer shall review and carry out an initial risk assessment of the design and confirm with the owner or owner's representative that the initial requirements are still valid and/or the modifications agreed to ensure that a safe solution can be provided.

At this stage, owners shall also be made aware of the legal obligations they have with respect to the installation.

4.6. Survey and site plan

A full site survey of the proposed location of the gate shall be carried out and a site plan of the physical layout of area shall be produced.

The survey shall consider the following:

- The physical topography of the environment (trees, walls, rising ground);
- Conditions within the operating environment (wind loading, climactic variations);
- Users (young, disabled, infirm);
- Frequency and hours of use (duty cycle, illumination);
- How the system is intended to be operated (manual or automatic);
- Where the system is to be controlled from;
- The level of supervision when operating;
- Type of traffic (vehicles, pedestrians, livestock) and the expected duty cycle;
- Any foreseeable misuse of the system (children riding on gates);
- Underground conditions (existing structures, services, soil conditions and water table);
- Any existing supporting structure (walls, pillars etc);
- A holistic approach shall be taken to managing risk based upon the unique circumstances of the individual installation.

Consideration to access and egress requirements during responses to emergency incidents and any requirement for disability access shall be taken at this time and explained to the owner. At this stage, installers shall consider alternatives to the design proposal if safety concerns arise.

4.7. Risk assessment

A risk assessment shall be carried out as part of any design or installation activity. See Annex A.

4.8. Design proposal

The final design proposal for the gate shall be made after completing the site survey and risk assessment.

It may not be practicable to identify the specific parameters of the safety systems (for example, depth of safe edges) until the gate is commissioned but allowances shall be made in the design for their inclusion. System safety shall be the first consideration in the design process, not the last.

Annex B details the requirements for safety that shall be considered during the design of new gates to ensure the essential health and safety requirements as identified in the MD are met.

4.9. Manufacture

Companies who manufacture gates shall have a Factory Production Control (FPC) process in place to manage the quality and conformity of their product. This process need not be based on a standardised quality management system, however, systems complying with ISO 9001 will satisfy this requirement.

The following general areas shall be covered:

- Personnel;
- Equipment;
- Design;
- Raw materials and components;
- Production process control;
- Traceability and marking;
- Non-conforming product and corrective action;
- Handling, storage and packaging.

Annex C provides a more detailed breakdown of the requirements within these areas.

4.10. Electrical safety

You shall ensure that all electrical work on powered gates and associated infrastructure is carried out by a competent person. An appropriate electrical installation certificate shall be issued certifying compliance with BS 7671 as amended for work carried out to supply an electrical feed to a powered gate.

The remainder of the electrical system shall be constructed, inspected and tested to achieve an equal level of electrical safety and integrity. *(See EN 60204-1 and Annex B of this code)*.

4.11. Commissioning

Prior to a system being commissioned, the competent person shall carry out a full inspection and test of the gate system to ensure it is fully functional and meets all the design requirements.

Inspection and test requirements are included in Annex D.

Commissioning is the process of verifying that: the function of a powered gate meets the owner's requirements according to the design specification, the safety systems installed operate correctly and all marking and documentation has been completed.

The owner or owner's representative shall sign the commissioning document agreeing that the gate meets all the operational and safety functions as detailed in the design specification.

4.12. Handover

At handover you shall provide the owner with adequate information and training on the safe operation and maintenance of the gate. See Annex F.

4.13. Owner documentation

As a minimum, the following documentation shall be provided to the owner:

- User operating instructions and warnings
- Detailed planned preventative maintenance instructions that describe the inspections, checks, adjustments, replacements, lubrication, cleaning and tests required to keep the system in a safe condition, including the required maintenance intervals.
- Log book containing:
  - Name and contact details of the manufacturer/installer/maintainer;
  - Manufacturer's identification numbers associated with the gate;
  - Date of completion of the installation; Space to allow the recording of:
    - All maintenance and repairs carried out
    - Modifications
    - Name, date, signature and company of the person carrying out the maintenance activity
- Declaration of Conformity;
- Electrical Installation Certificate (17th Ed installations) where appropriate;
- Certificate of Compliance.

4.14. User training

You shall provide the following training at handover:

- An explanation of the operation of the gate and associated controls;
- An explanation of the safety features, how they operate and how they might cause the gate to malfunction;
- An explanation of any periodic user checks and maintenance that shall be carried out to ensure the continued safe and reliable operation of the gate;
- An explanation of how to make the gate secure if there is a requirement to immobilize the gate;
- An explanation of how to safely remove power;
- An explanation of how to manually release the gate mechanism and the location, use and security of any keys or tools required to allow safe manual control of the gate.

Training on the operation of the gate shall be reflected in the user handbook. This is to prevent any ambiguity between the actions taught and the actions described.

Users shall sign the handover documentation to confirm they are content with the training in the safe operation of the gate.

It shall be made clear to the person receiving the handover documentation that instructions intended for end users must be passed to the ultimate end users of the gate.

If a user refuses to sign for any aspect of the handover, this shall be annotated on the installer's copy of the handover documentation.

4.15. Technical File

Supply of Machinery (Safety) Regulations 2008

The Machinery Directive requires several key documents to be created for a technical file. The Responsible Person shall retain a file for at least ten years and it shall be available to the authorities on reasoned request. There is no legal duty to provide this document to the owner.

The technical file shall include the following:

- A general description of the gate, including an overall line drawing showing the layout, positions of safety devices and control devices;
- A risk assessment including the essential health and safety requirements that apply and how they have been satisfied;
- Calculations, specifications or justifications for the structural integrity of the foundations, supports, guides, hinges, gate leaf(s), rolling gear and travel stops etc;
- Electrical diagrams showing conduits, power cables and control circuit layouts;
- Test reports detailing the results of electrical, force and light curtain/photo scanner tests;
- Declarations of Incorporation from the suppliers of partly completed machines (drives and control panels) or evidence of conformity assessments for self-designed or modified control systems or drive units. These shall include conformity with other applicable directives (eg Low Voltage, Electro Magnetic Compatibility and Radio Equipment Directives);
- Declarations of Conformity from the suppliers of safety devices used;
- A copy of the operating instructions, residual risk explanations and safe use warnings issued to the owner;
- A copy of the planned preventative maintenance instructions and maintenance log issued to the owner;
- A copy of the declaration of conformity issued to the owner.

4.16. CE marking

Supply of Machinery (Safety) Regulations 2008

CE marking is the visible declaration by the manufacturer that the gate meets all the requirements of the Machinery Directive. The CE marking shall consist of:

- The letters CE (conforming to the specification in Annex III of MD);
- Name and address of the manufacturer;
- Unique serial number or model designation;
- Year of manufacture;
- 2006/42/EC.

Fixed visibly, legibly and indelibly to the gate system. See example in Annex E.

4.17.Declaration of Conformity

Supply of Machinery (Safety) Regulations 2008

This document shall be drawn up by the person responsible for Machinery Directive compliance.

The exact format of the Declaration of Conformity is not prescribed but shall contain the following:

- Name and address of the Responsible Person;
- Description and identification of the gate;
- A sentence declaring the gate fulfils all the provisions of the Machine Directive 2006/42/EC and any other relative Directives (for example, Electro Magnetic Compatibility Directive 2014/30/EU and Radio Equipment Directive 2014/35/EU);
- References to any standards or parts of standards used;
- Signature, date and place of declaration.

A copy of the Declaration of Conformity shall be passed to the owner. See example in Annex E.

4.18. Commissioning of pre-manufactured CE marked gates

Where an installer has installed a pre-manufactured CE marked (by the manufacturer) powered gate, the installer has no responsibility for a Declaration of Conformity, technical File or CE marking. The installer shall however follow the gate manufacturer's installation and commissioning instructions, conduct an as installed risk assessment and retain the following documentation for the installed gate.

- A risk assessment of the gate as installed. See Annex A;
- Commissioning document. See Annex D;
- A copy of the manufacturer's installation and commissioning instructions (in English);
- The manufacturer's Declaration of Conformity (in English);
- A copy of the manufacturer's user instructions and maintenance instructions.

The installer shall pass on all user documentation to the user.

When the risk assessment process reveals shortcomings with the gate as supplied, the installer shall in the first place contact the manufacturer for a solution. If this does not bring a solution, the installer shall either contact the DHF if they are a member or the gate was supplied by a member, or, failing this, report the problem to the [1]national authority who has responsibility for market surveillance in relation to Machinery Directive.

[1]HSE in England Scotland and Wales, HSE NI in Northern Ireland and HSA in the Republic of Ireland.

5: Maintenance & minor modifications

5.1. Negligence

Any person who by their action or inaction who causes injury to persons or property could be pursued in the civil courts for damages. This would include the owner of a powered gate or any person working on a powered gate.

5.2. Maintainer responsibilities

Health and Safety at Work Act 1974

Anyone working on the gate shall ensure that any works they undertake will result in a safe outcome.

Electricity at Work Act 1998 and Building Regulations (Part P England and Wales section 5.6/6 in Scotland)
All work shall be executed in a manner that protects against electric shock and fire both during the works and on completion.

5.3. Training and competency

To ensure that training and competency requirements can be effectively managed you shall maintain a training and competency record for each member of staff. You shall also have a process in place to ensure that sub-contracted staff are appropriately qualified. Training and competency requirements are detailed in Annex G.

5.4. Owner responsibilities

Workplace (Health, Safety and Welfare) Regulations 1992 regulation 5 and 18

Under the WR, gates in the workplace, which are used by employees or the public, are required to be safe and subject to a system of maintenance.

Health and Safety at Work Act 1974 section 3

Under HSWA workplace owners and landlords shall ensure that gates are suitable for the purpose and conditions in which they shall be used and maintained in a safe condition.

5.5. Minor modifications

A minor modification to a powered gate is one where the changes do not fundamentally alter the structure of the gate, alter the means of movement of the gate or introduce new risks that undermine the original risk assessment.

For the purpose of this code, the following are considered to be minor modifications:

- Replacement of system components, with those which are or are not the same type or manufacturer as the original but retain the same basic functionality;
- Modifications that remove or reduce existing risks (for example, the relocation of hinges to remove a crush hazard or the application of safety devices);
- Modifications that mitigate a known risk using a different technology and do not introduce new risks (for example, replacing inherent force detection or pressure sensitive equipment with light curtain or photo scanner).

5.6 Risk assessment & survey (See Annexes A & B)

In the first instance, prior to any maintenance (planned preventative or reactive) or modification work, a full risk assessment (or a check of the validity of an existing risk assessment) to ascertain the condition of the gate shall be conducted. When this assessment indicates that the gate is not, or will not be safe following the proposed work, the gate shall be made safe if at all possible (see 5.7) and the work shall not proceed.

5.7 Planned preventative maintenance

Planned preventative maintenance content and frequency shall be in accordance with the gate system manufacturer's instructions. In the absence of the manufacturer's maintenance instructions, or in situations where the existing maintenance regime proves inadequate, the maintainer shall design a planned preventative maintenance schedule that reflects the nature of the system, system usage, environmental conditions, and all other factors which may affect the requirements for maintaining the gate in a safe condition.

The absolute minimum requirement is for annual planned preventative maintenance to be carried out in accordance with Annex H, but only if an annual maintenance visit proves to be adequate.

A six monthly functional check of photo beams that are not monitored to Cat.2 or 3 shall be completed. If adequate training is provided, these check(s) can be carried out by the owner.

If owners do not want to contract for a maintenance plan, they shall be reminded of their obligations under criminal and civil law.

5.8 Reactive maintenance

Any reactive maintenance action shall result in a safe outcome. Shall the risk assessment and survey indicate that the requested repair will not result in a safe outcome, the work shall not proceed (see 5.9).

5.9 Making safe

When a powered gate is found to be unsafe during any maintenance or minor modification activity, the installer shall seek the permission of the owner to make it safe wherever reasonably practicable as follows, dependant on the nature of the problem:

- Switch off the gate;
- Change the means of control to hold to run (where suitable);
- Return the gate to manual use;
- Secure the gate against collapse.

In addition, the maintainer shall:

- Inform the owner of the problems and their legal obligations;

- Inform the owner of the required action to make the gate safe;
- Provide a quotation for the repair and any required modifications;
- Issue a Safety Notice.

If the gate is left in hold to run, the individual making the gate safe shall seek assurances from the owner that only suitably trained operators will have access to the controls hence, in many cases, a key switch or similar will need to be employed.

It shall be appreciated that the final decision to take a gate out of service is one that shall ultimately be taken by the owner. If the owner decides to leave a dangerous gate in service, the installer shall point out the owner's legal responsibilities and issue a Safety Notice.

If the gate system is under a maintenance contract, and the owner refuses to have the gate made safe, then the installer may need to consider suspending the contract pending legal advice or the assistance of a third party (trade federation) or ultimately, and as a last resort, report the occurrence to the relevant authority.

5.10 Owner documentation

As a minimum, the following documentation will be provided to the owner:

- Revised operating instructions (if they have changed);
- Revised planned preventative maintenance instructions (if they have changed);
- Updated maintenance log (held by user or maintainer depending on the contract terms);
- Certificate of Compliance (where applicable);
- Safety warning notice (if required).

5.11 Maintenance file

To ensure compliance with the HSWA, comprehensive maintenance records shall be retained to provide assurance that these activities are being carried out with due care and attention.

The following records shall be retained for each gate that maintenance or minor modification activities have been executed on, as appropriate:

- Risk assessment;
- Planned preventative maintenance instructions;
- Maintenance log (this could be a copy or the original depending on the contract terms);
- Modification record;
- Safety isolation/disconnection record;
- Copies of safety warning notices issued.

Annex A Normative

Risk assessment process

The risk assessment process in this section applies equally to new and substantially modified gates, reactive maintenance, planned preventative maintenance and minor modifications. Reference is made to the Machinery Directive Essential Health and Safety Requirements in this guidance but they only apply and hence need to be recorded for new and substantially modified gates.

The actual requirements for safety are however the same for all powered gate work and are described in Annex B which reflects and clarifies the requirements of the various applicable standards.

The risk assessment process shall be split into seven distinct steps:

1. **Define the limits of the gate**
   (type, size, users, topography, environment, control, duty cycle, etc)
2. **Identify and list all possible hazards associated with the gate, including those arising from foreseeable misuse**
   (structural, electrical, control failure, misuse, moving parts, wear and tear, etc)
3. **Resolve as many hazards as is possible by application safe design principles**
   (structural integrity, safe design hinges, enclosure fencing, etc)
4. **Apply state of the art control measures to the remaining hazards that cannot be resolved by safe design**
   (safe edges, light curtains, local guards, electrical safety measures, etc)
5. **Identify the remaining minor residual hazards**
   (must be very minor)
6. **Issue user instructions and warnings**
   (or review existing)
7. **Issue planned preventative maintenance instructions**
   (or review existing)

Record all seven steps and retain them for inclusion on the relevant technical or maintenance file.

The next section sets out one possible way of executing and recording this process. If this system is not used, any alternative method must achieve the same level of safety and clearly document all seven steps.

Powered Gate / Traffic Barrier Risk Assessment

Site address: ……

…… Postcode: ……

Reference: ……

Assessment conducted by: …… Signature: ……

Date: ……

Number of pages: ……

This risk assessment makes reference to the Machinery Directive (2006/42/EC) Essential Health and Safety Requirements (EHSR); the directive does not apply to an existing powered gate unless it is being so substantially modified that the resulting gate must be considered a new powered gate.

The level of safety required is however the same in all cases.

Tick the appropriate box or insert details as appropriate.

☐ Machinery Directive applicable ☐ Machinery directive not applicable

☐ New ☐ Reactive repair ☐ Planned preventative maintenance ☐ Modification

☐ Swing ☐ Sliding ☐ Folding ☐ Traffic Barrier

Other: (insert) ……

Number of leaves: (insert) …… Leaf 1 width: (insert) …… Leaf 2 width: (insert) ……

Material: (insert) …… Height: (insert) …… Weight: (insert) ……

Percentage infill: (insert) …… Operations per day: (insert) ……

Weather conditions:
What weather conditions will the gate be exposed to?

☐ Outside location ☐ Sheltered ☐ Exposed

☐ Salt atmosphere ☐ Sand/dust ☐ Other: (insert) ……

Ground conditions:

☐ Paved ☐ Gravel/stone ☐ Level ☐ Sloping ☐ Kerb crossing

Users and others who may encounter the gate:

☐ No un-trained persons present ☐ Un-trained persons could be present

☐ High numbers of vulnerable persons present (e.g. Young children, physical disabilities, sight impairment, frail, elderly)

Nature of vulnerable persons: (insert)
……

Reason/location for vulnerable persons: (insert)
……

……
……

List of potential hazards

(some generic hazards common to all gates are shown)

No.	Location	Description	Safe design?
1	Foundations and supporting structures	Structural failure	
2	Gate leaf(s)	Structural failure	
3	Supports, guides, hinges and fixings	Structural failure	
4	Travel stops	Structural failure	
5	Electrical supply	Electric shock and fire	
6	Control system and wiring	Electric shock, fire and loss of control or safety function	
7	Safety devices	Loss of safety function	
8	Leading edge	Crush	
9	Cont.	Cont.	
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			

Use additional sheets as required.

(tick any items that are resolved by safe design measures, eg safe design hinge)
Note: safe design means that the hazard no longer exists, (eg structural strength, safe design hinge area) or that the hazard is no longer accessible (eg enclosed to prevent access by fixed guards).

Foreseeable misuse (EHSR 1.1.2)

☐ Catered for

Principles of safety integration (EHSR 1.1.2)
Wherever possible safe design has been used over application of safety devices to eliminate hazards:

☐ Safe design hinge area ☐ Fixed guards and fences ☐ Anti-climb precautions taken with fences and guards

☐ *Other: (insert) …… (*Retain specification/drawings)

Structural integrity (EHSR 1.3.1, 1.3.2, 1.3.6)
The following are adequate to support at least 2 x the forces applied by the automation and expected wind loadings without permanent distortion:

☐ Foundations ☐ Fixings ☐ Brackets ☐ Support structures

☐ Posts ☐ Supporting masonry ☐ Gate leaf structure

(Retain relevant reports drawings and / or calculations)

Derailment prevented (EHSR 1.3.2, 1.3.9)
The following are adequate to support the gate and the forces applied by the automation and expected wind loadings and protect it from singe component failure hazards:

☐ *Hinges ☐ Hinge backup device provided

☐ Guides ☐ Travel stops ☐ Rolling gear (Retain relevant drawings and calculations)

* Hinges and hinge fixings need to be rated at 3.5 x actual load without failure and share equal loading to achieve this, where this is not the case a backup device may be required.

Electrical safety (EHSR 1.5.1 & 1.6.3.)

☐ Supply inspected tested and certified to BS 7671

☐ 30mA RCD present on supply

☐ Wiring beyond the supply inspected and tested

☐ Wiring beyond the supply rated for current, voltage and environment

☐ All conductive metalwork connected to earth

☐ Enclosures are of correct IP rating for location and contents

☐ Enclosures containing dangerous voltages only openable with key or tool

☐ All pole isolator provided and lockable "off" when not visible from the gate system

(Retain relevant inspection & test results and certificates)

Control system reliability (EHSR 1.2) *Control system manufacturer Declaration of Incorporation present

☐ Control system manufacturer instructions followed

☐ Control system manufacturer cable specification followed ☐ Wiring and cabling tested

☐ Voltage bands segregated ☐ Cabling protected from damage ☐ Enclosures sealed

(Retain relevant declarations and test results)
* Where a manufacturer's Declaration of Incorporation is not provided, a complete Machinery Directive conformity assessment process must be undertaken and documented for the control system, to include other relevant directives (Low Voltage, Electro Magnetic Compatibility and Radio Equipment). The responsibility for this will fall to the installer/manufacturer.

Control devices (EHSR 1.2.2)

☐ Safely placed

☐ Activating the correct (safe) command

☐ Hold-to-run controls protected from unauthorized use

☐ Gate stops within safe over-travel limits under hold-to-run control (EHSR 1.3.8)

(Retain drawings and / or specification)

Safety device integrity (EHSR 1.4.3)

☐ *All safety device manufacturer Declaration of Conformity present

☐ Safety device manufacturer instructions followed

☐ Cabling protected from damage ☐ Enclosures sealed

☐ Category 2 device test protocol is compatible with control system test protocol

(Retain relevant declarations)

* See above - the same conditions apply as for the lack of a control system DOI.

Cutting and hooking hazards (EHSR 1.3.4)

☐ Eliminated / protected

Vehicle being impacted by a moving gate: (EHSR 1.3.7, 1.3.8)

☐ Outer photo beam ☐ Single height ☐ Dual height ☐ Height detail: (insert)

☐ Inner photo beam ☐ Single height ☐ Dual height ☐ Height detail: (insert)

☐ Ground loop(s) for safety ☐ Ground loop(s) for activation

☐ Signage ☐ Road markings

(Retain drawings and / or specification)

Vehicle and pedestrian control methods: (EHSR 1.7.1, 1.7.1.2, 1.7.3)

☐ Zone lighting in the hours of darkness ☐ Warning beacon(s)

☐ Warning sounder ☐ Signage

☐ Ground markings ☐ Gate or barrier mounted lights

☐ Gate or barrier mounted signage ☐ Reflective material

☐ Pedestrian separation railings provided ☐ Dedicated pedestrian access provided

☐ Traffic ☐ Traffic calming

☐ Access control ☐ Vehicle impact protection bollards

☐ Other: (insert) ……

(Retain drawings and / or specification)

Trip hazards (EHSR 1.5.15)

☐ Trip hazards reduced to a minimum

☐ Trip hazards made clearly visible

(Retain drawings and / or specification)

List of hazards that cannot be controlled by safe design and are hence controlled by state of the art control measures

(insert corresponding row number from the list of hazards)

Row No.	Applied Control Measure

Use additional sheets as required.

Note: "hazards that cannot be resolved by safe design" are hazards that still exist but have been controlled or reduced to safe levels by application of safety devices, e.g. fuses, RCD, earthing and bonding, safe edges, light curtains, inherent force limitation, photo beams, lights and sounders, etc.

Residual hazards listed (EHSR 1.1.2)

1. ☐ (insert) .....

2. ☐ (insert) .....

3. ☐ (insert) .....

4. ☐ (insert) .....

5. ☐ (insert) .....

6. ☐ (insert) .....

☐ Residual hazards explained in the user warnings (EHSR 1.7.4)
(Retain documentation)

Maintenance (EHSR 1.6)

☐ Planned maintenance instructions (schedule) provided

☐ Planned maintenance is possible in safety

☐ Planned maintenance instruction content and frequency adequate

☐ Planned maintenance completed

☐ Maintenance log present/available
(Retain documentation)

☐ Maintenance log updated

☐ User instructions and warnings provided (EHSR 1.7.1, 1.7.4)

Applicable Machinery Directive Essential Health and Safety Requirements complied with.
Note: This section only applies where the Machinery Directive is applicable.

☐ 1. Foreseeable misuse
☐ 1.1.2. Principles of safety integration
☐ 1.1.3. Materials & products
☐ 1.1.5. Design of gates to facilitate handling
☐ 1.2.1. Safety & reliability of control systems
☐ 1.2.2. Control devices
☐ 1.2.3. Starting
☐ 1.2.4. Stopping
☐ 1.2.5. Mode selection
☐ 1.2.6. Failure of power supply
☐ 1.3.1. Stability of foundations
☐ 1.3.2. Risks of break up during operation
☐ 1.3.4. Risks due to surfaces, edges or angles
☐ 1.3.5. Risks related to combined machinery
☐ 1.3.6. Risks related to variations in operating conditions
☐ 1.3.7. Risks related to moving parts
☐ 1.3.8. Choice of protection against risks from moving parts
☐ 1.3.9. Risks of uncontrolled movements
☐ 1.4.1. General requirements of guards
☐ 1.4.2. Special requirements for guards
☐ 1.4.3. Special requirements for protective devices
☐ 1.5.1. Electricity supply
☐ 1.5.4. Errors of installation
☐ 1.5.14. Risk of being trapped
☐ 1.5.15. Risk of slipping, tripping or falling
☐ 1.6.1. Machinery maintenance
☐ 1.6.2. Access to operation position & servicing points
☐ 1.6.3. Isolation of energy sources
☐ 1.7.1. Information
☐ 1.7.1.2. Warning devices
☐ 1.7.2. Warnings of residual hazards
☐ 1.7.3. Markings
☐ 1.7.4. Instruction

Annex B normative

Requirements for safety

New gate installations will be designed to eliminate hazards wherever reasonably practicable rather than use sensitive devices to control hazards created by the design. All physical hazards shall be controlled or eliminated up to a height of 2500mm above ground level or any other fixed access level.

B.1. Hazard types

Crush = reducing gaps ≤500mm in horizontal movement or any vertical downward movement (barrier);

Impact = reducing gaps >500mm in horizontal movement;

Shear = the guillotine effect where elements pass;

Draw in = where body parts may be dragged in but without the guillotine effect;

Entrapment = where escape is prevented but without pressure contact;

Hooking = where snagging of clothing could cause a hazard;

Cutting = where sharp edges could cause injury;

Structural failure = where structural faults cause falling down or derailment;

Electrical hazards = electric shock, fire or loss of control or safety.

B.2. Control measures

B.2.1. Hold to run:

- Sustained action of the control device is required to move the gate;
- Trained users only to use the controls;
- The controls shall be in the immediate vicinity of the gate, in clear view of all hazardous movement and place the operative in a place of safety;
- The controls shall prevent unauthorised access where untrained persons might be present (key switch or similar);
- The controls shall be the only active control device;
- The gate shall travel no more than 100mm on release of the controls;
- The gate shall travel no more than 50mm on release of the controls in the last 500mm of movement;
- The gate shall travel at no more than 0.5m/sec;
- For *converging leaves this means 0.25m/sec. each
  (*bi parting swing gates or pairs of swing/folding gates without a leaf delay).

Radio control devices may not be used unless the device will only function when in direct line of sight to the gate.

B.2.2. Safety distances:
Maximum distance between fixed vertical elements is 100mm;
Where 100mm is exceeded on an existing gate, the
consequences of a greater separation between verticals shall be risk assessed in regard to hazards arising from children's heads being stuck or trapped between the verticals. Other safety
distances are depicted in figures B2 to B9.

B.2.3. Safe edge:

- Safe edges or bars in resistive, optical or mechanical or pneumatic format;
- Safe edge and any control device compliant with EN 12978;
- Provides force limitation in accordance with clause 7;
- Circuit meets the requirements of clause B.3.

B.2.4. Light curtain means:

- Light curtains, photo scanners or similar technology;
- Excludes all possible contact with the hazard;
- Device is compliant with EN 12978;

- Single beam photo electric beams are not included unless they exclude all possible contact with the hazard; for
example, attached to the lower surface of a barrier boom;
- Circuit meets the requirements of clause B.3.

B.2.5. Inherent force limitation:

- Obstacle detection provided by sensitive drive units;
- Provides force limitation in accordance with clause 7;
- Shall not be used to control draw-in hazards.

B.2.6. Guard:

- Permanently fixed and only removable with a tool or key;
- Durable and resistant to foreseeable abuse;
- Designed to resist climbing with vertical elements on the outside;
- High enough to exclude access to all risks;
- Conform with tables B1 and B2 for reach over and reach through protection.

Maximum unprotected interface with moving elements = 8mm

Fence height m	Height of gate		
	2	2.2	2.4
	Horizontal Safety Clearance		
2	600	600	600
2.2	400	400	400
2.4	0	300	300
2.5	0	0	100

Table B1 reach over

Mesh size mm	Horizontal Safety Clearance		
Smallest dimension	Slot	Square	Round
4-6	20	10	10
6-8	40	30	20
8-10	80	60	60
10-12	100	80	80
12-20	[1]900	120	120
[1]Where the length of the slot is less than 40mm the safety clearance can be reduced to 120mm			
20-30	900	550	120
30-100	900	900	900

Table B2 reach through

B.2.7. Entrapment:

Entrapment hazards can be controlled by providing a manual release; use of the manual release shall not introduce any further hazards and must remain safe when power is restored. Moving the gate in manual must be achievable with ease and, where more than one person is required to move the gate, the user instructions must explain this.

Note: EN 12604 advises that a safe force for one person to move a gate in manual is 390N.

B.2.8. Structural integrity:
It shall be demonstrated that the gate and its supporting
structures are constructed to resist permanent deformity in
normal use or under foreseeable misuse. Elastic deformations that do occur shall not be detrimental to function or safety.
The gate, its supporting structures and suspension elements shall be designed such that falling down, collapsing or derailment is prevented in normal and foreseeable misuse.

Note: EN 12604 describes safety factors of 2 x expected loads without permanent deformity and 3.5 x expected loads without structural failure. Where these figures are achieved, it could be considered that no further back up device is needed, however if these figures are not achieved for hinges, hinge mountings and guides, then back up devices must be employed to prevent falling down, collapsing or derailment.

Table B3 suggests some post sizes and planting depths that have proven reliable in the past. Fully filled or palisade gates affected by wind or posts set in poor ground conditions may well need considerably larger posts and more depth. Post holes shall be dug at least 3 x post dimension if dug square or 3.5 times post dimension if dug round and be back filled with concrete.

Gate	Width in m	⇦1.5	1.6 - 1.7	1.8 - 2	2.1 - 3	3.1 - 4	4.1 – 5
Height in m	Post Depth	Minimum Steel Post Dimension mm					
⇦1.5	0.6	80 x 80 x 5	100 x 100 x 6	120 x 120 x 6	150 x 150 x 6	200 x 200 x 6	250 x 250 x 8
1.5 – 2	0.8	100 x 100 x 6	100 x 100 x 6	120 x 120 x 6	150 x 150 x 6	200 x 200 x 6	250 x 250 x 8
2.1 – 3	1	100 x 100 x 6	120 x 120 x 6	150 x 150 x 6	200 x 200 x 6	250 x 250 x 8	250 x 250 x 8

Table B3

B.3. Safety device circuits shall:

Conform to either one of the following:

- EN 954-1 Cat. 2 or 3;
- EN 13849-1 Cat. 2 PL C or D;
- EN 13849-1 Cat. 3 PL C or D.

And be either protected from short circuit by a control panel derived test of the circuit at least once every manoeuvre or by means of one of the following:

- Min. 1mm^2 conductors;
- Use of short as possible cable routing;
- Use of crimped, feruled or tinned conductor ends to prevent stray strands;
- Wherever reasonably practicable, the control device shall be placed within the control panel, or be connected via armoured cable or cable in conduit.

Activation of the device shall not lead to any further hazard. Furthermore, in the event of a fault in the system it shall prevent the gate from starting.

B.4. Sliding gate specific hazards (see fig. B1)

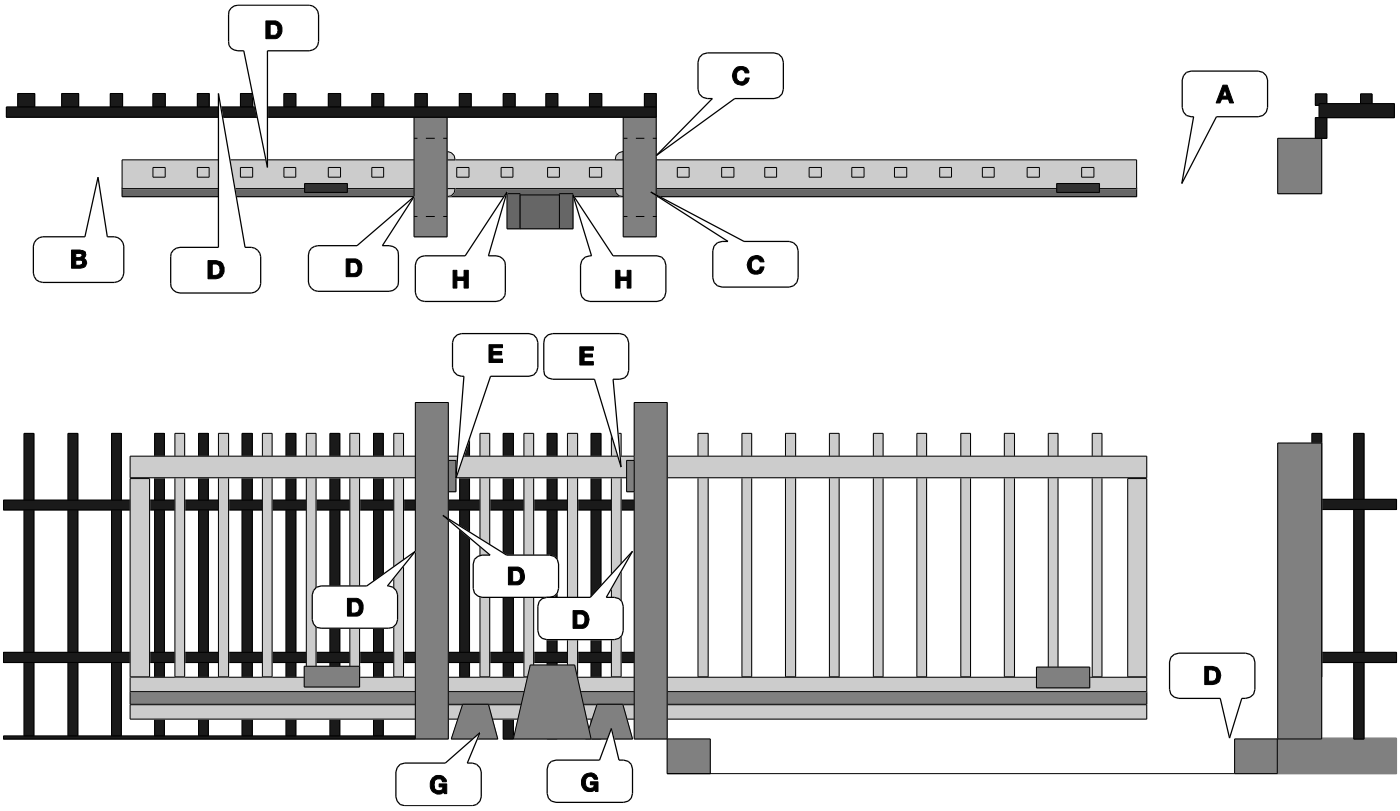


Fig. B1 Sliding gate common hazard locations

A. Main leading edge crush and impact hazards shall be controlled by either:

- Inherent or safe edge derived force limitation in combination with *photo beams across both sides of the opening;
- Hold to run or light/radar curtaining.

*Photo beam shall be placed <700mm above the road and <200mm horizontally from the gate faces

B. Main trailing edge crush and impact hazards shall be controlled by at least one of:

(Note: An opening crush hazard exists whenever the leaf comes to within 500mm of a fixed object, impact hazards are present throughout movement.)

- Guard;
- Safety distances, for *crush* element only - see fig B4;
- Hold to run;
- Inherent or safe edge derived force limitation;
- Light curtain.

C. Entrance portal support frame shear or draw in hazards shall be controlled by at least one of:

- Hold to run;
- Safe edges - see fig. B2 and note 1;
- Light curtain.

D. All other support frame, leaf or perimeter shear and draw in hazards shall be controlled by at least one of:

- Guard;
- Hold to run;
- Safe edges;
- Light curtain.

To check for a safe distance between safe edge and the moving leaf, a test piece of rigid material 120mm x 120mm x 500mm shall be placed as deep as is possible into the leaf infill and shall activate the safe edge. The test is conducted in manual mode only, whilst observing the system output. See fig. B2.

E. Upper guide/roller draw in hazards shall be controlled by at least one of:

- Guard
- Hold to run;
- Light curtain.

F. Lower *cantilever* gate rolling gear hazards shall be controlled by at least one of:

- Internal rollers via lower edge slot = no further risk;
- External or exposed rollers as a guard.

G. Lower *tracked* gate rolling gear hazards shall be controlled by at least one of:

- Guard to within 8mm of ground - see fig. B3.

H. Drive unit draw in hazards shall be controlled by:

- Guard
- Hold to run;
- Light curtain.

Note: *The preferred method of protecting risks B, D, E and H is to guard off the entire run back area of the gate and provide a maintenance hatch for drive unit access.*

List A to H is not exhaustive, other examples may exist dependent on design detail; nonetheless, all hazards shall be revealed by assessment and be controlled.

Fig. B2 Sliding gate support structure safe edge positioning

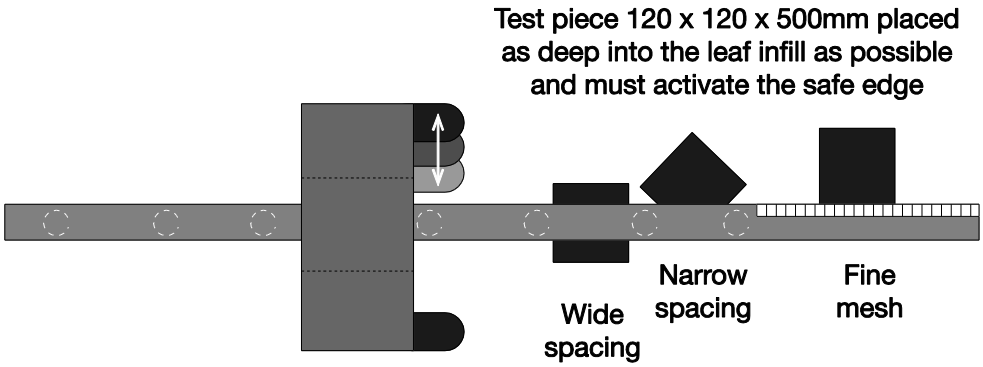


Fig. B3 tracked sliding gate guard clearance

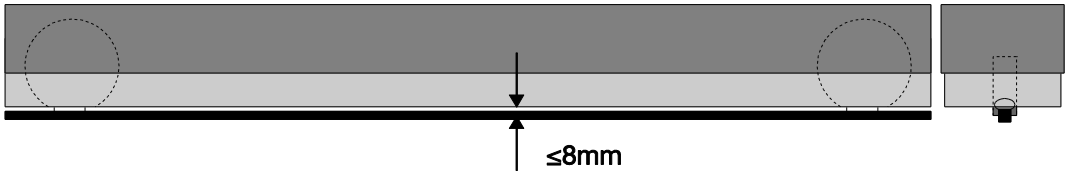


Fig. B4 Safe distance to eliminate a crush hazard, the impact hazard remains and still needs to be addressed.

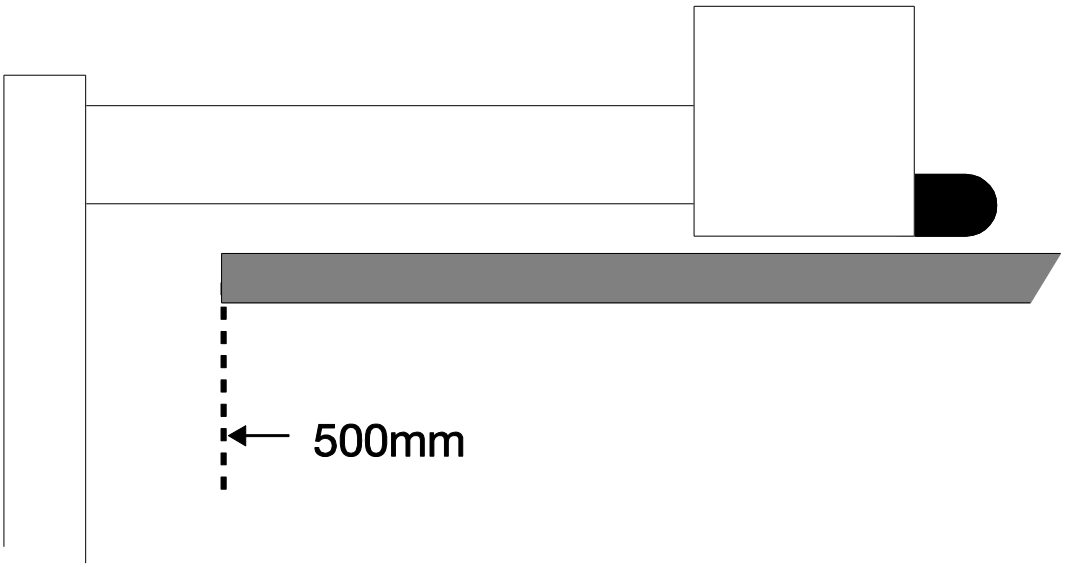


Fig. B5 Open and closing phase impact and crush zones

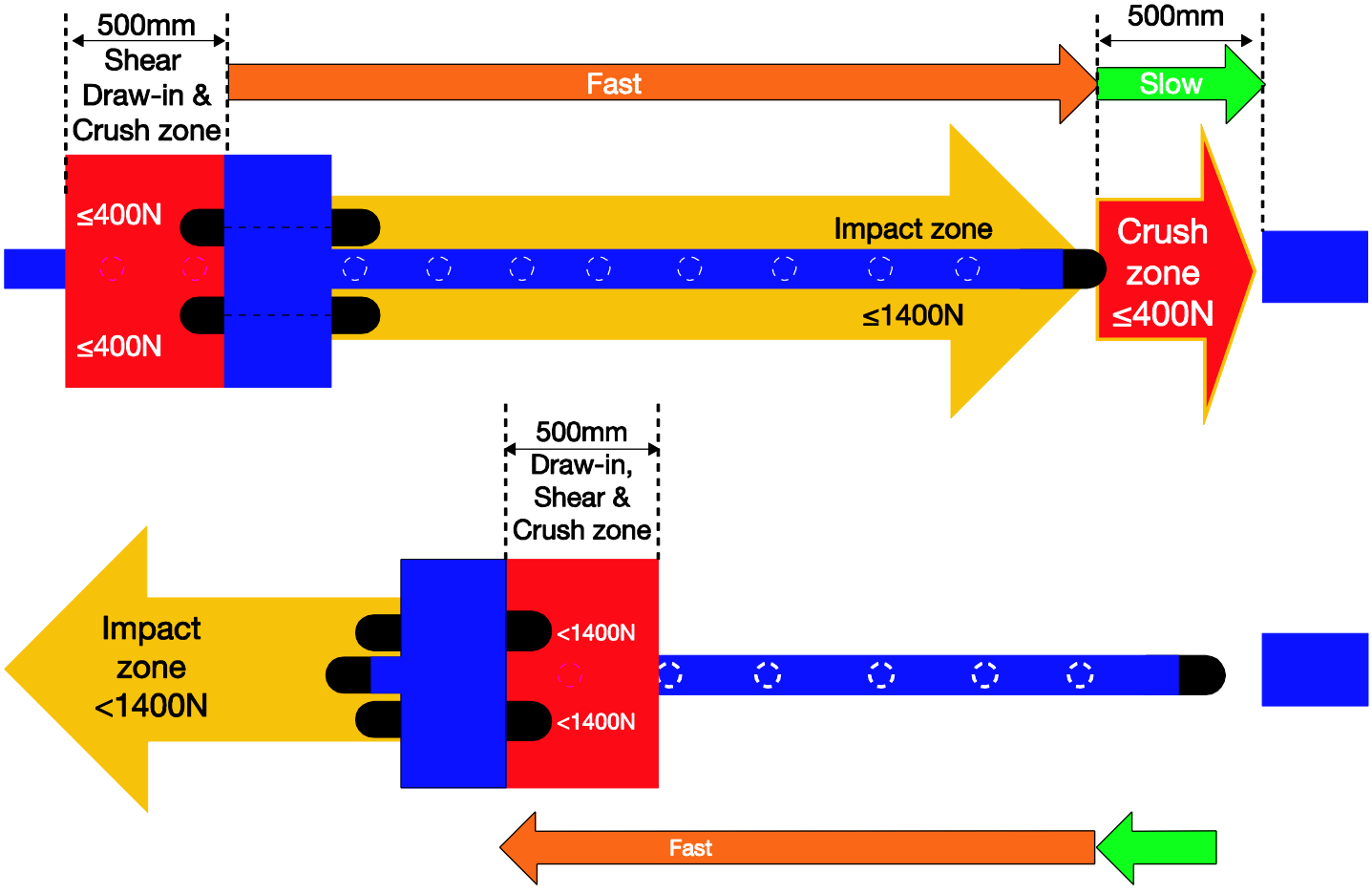
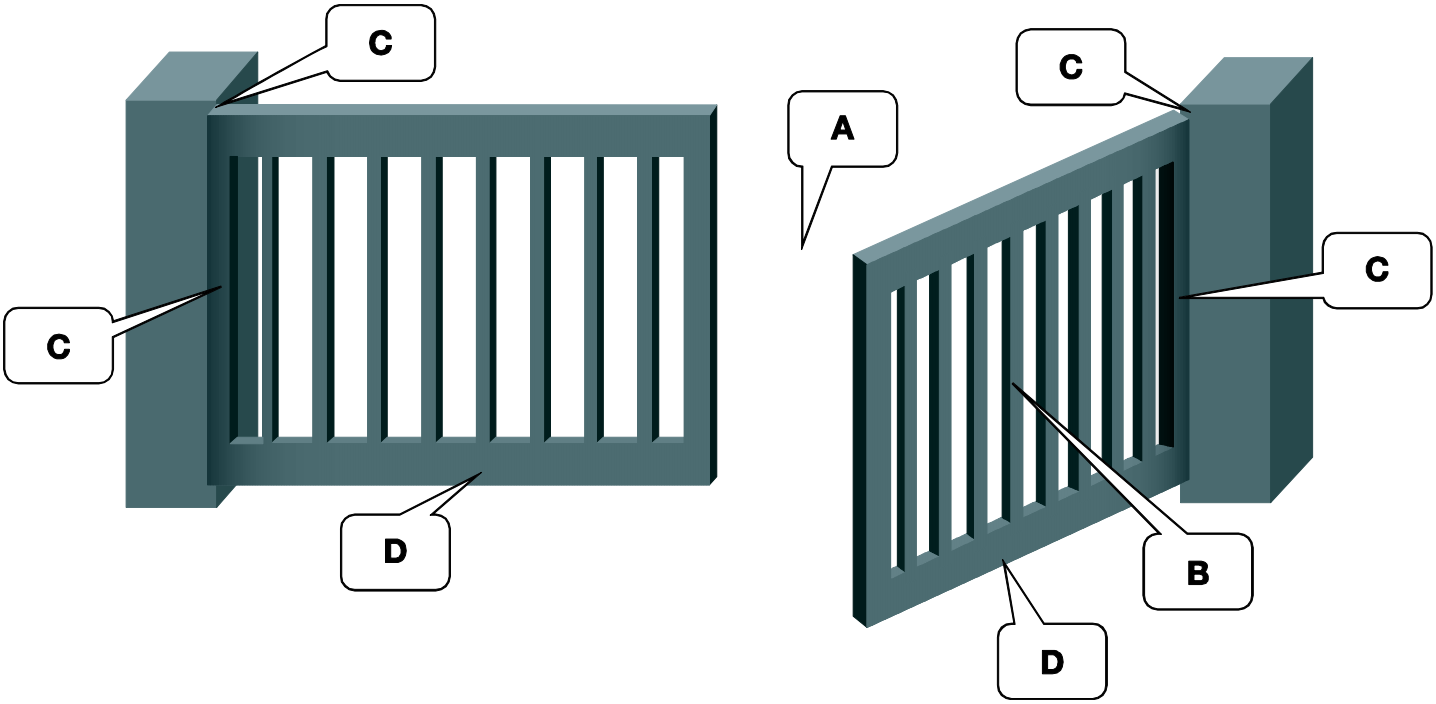


Fig. B6 Common swing gate hazard locations



B.5. Swing gate specific hazards - (see fig. B6)

A. Closing crush and impact hazards shall be controlled by at least one of:

- Hold to run;
- Inherent or safe edge force limitation in combination with *photo beams across the closed face;
- Light curtain.

*Photo beam to be placed <700mm above the road and <200mm horizontally from the gate face

A second beam across the opening at the open extremity of the gate leaves is highly recommended

B. Opening crush hazards shall be controlled by at least one of:

***Note:** Opening crush hazards exist wherever a leaf opens to within 500mm of a fixed object, impact hazards are present throughout movement and across the full gate width.*

- Hold to run;
- Safety distances, for the *crush* element only - see fig. B11;
- Inherent or safe edge force limitation;
- Light curtain.

C. Hinge area crush, draw in or shear hazards (see fig. B9) shall be controlled by at least one of:

- Safe design hinges - see fig. B10;
- Flexible guards;
- Hold to run;
- Safe edge;
- Light curtain.

Maximum gap of 100mm allowed in all circumstances.

D. Lower edge crush and impact hazards shall be controlled by at least one of:

- Hold to run;
- Inherent or safe edge force limitation (both sides, both directions);
- Light curtain.

When the gap under the gate is constant and >120mm the hazard is impact (<1400N see fig. B7)

When the gap under the gate is variable or less than <120mm the hazard is crush (<400N see fig. B8)

E. Lock and travel stop interface crush hazards

Lock and travel stop interface crush hazards are not considered as significant provided they are of as minimal surface area as possible, are as high as possible (locks only) and are positioned at the outer extremity of the

Fig. B7 When the gap under the gate is constant and greater than 120 mm

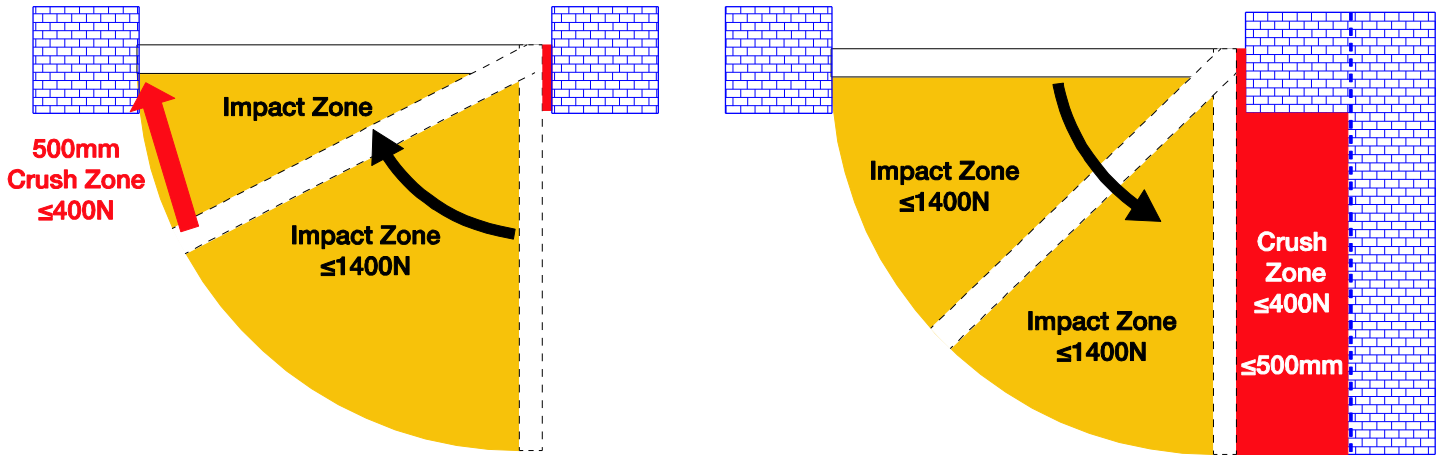


Fig. B8 When the gap under the gate is variable or less than 120 mm

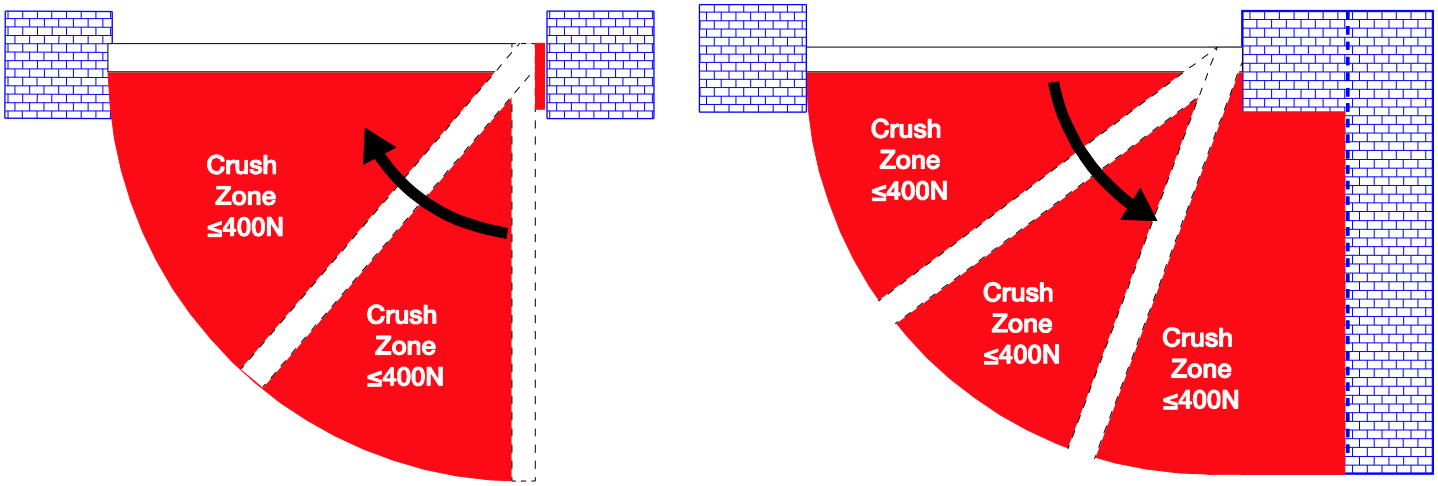


Fig. B9 Typical hinge crush locations

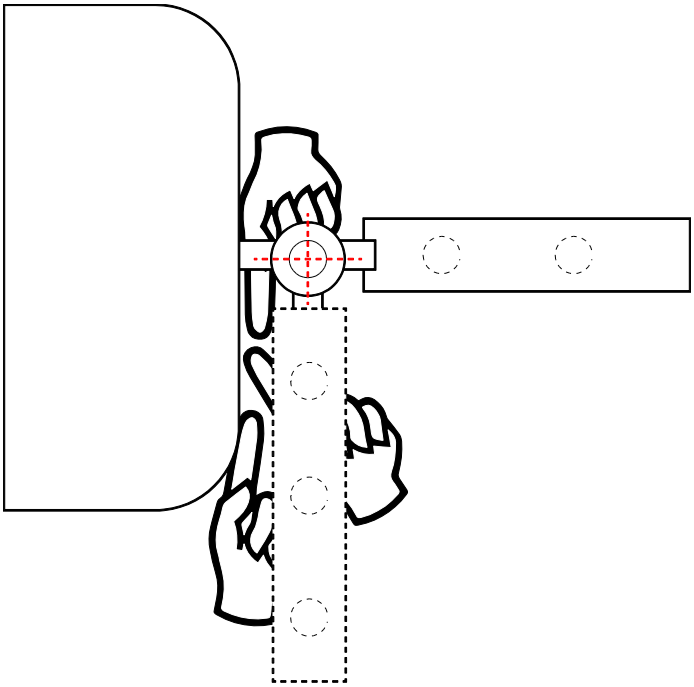


Fig. B10 Safe design hinge

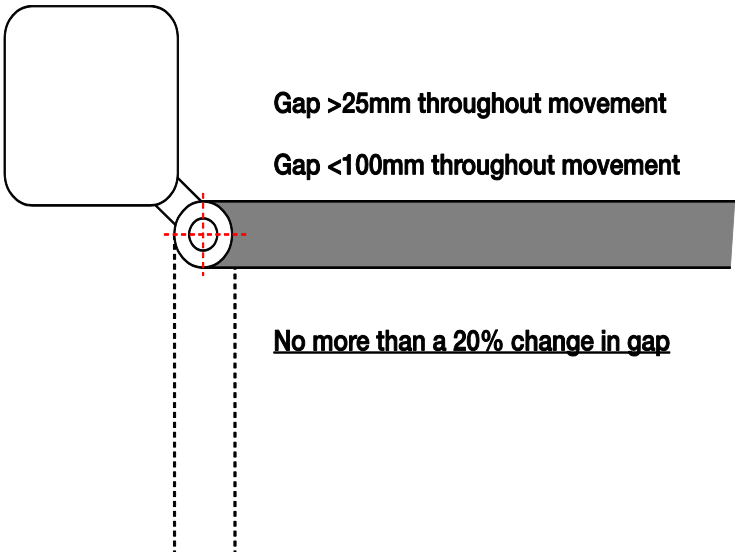
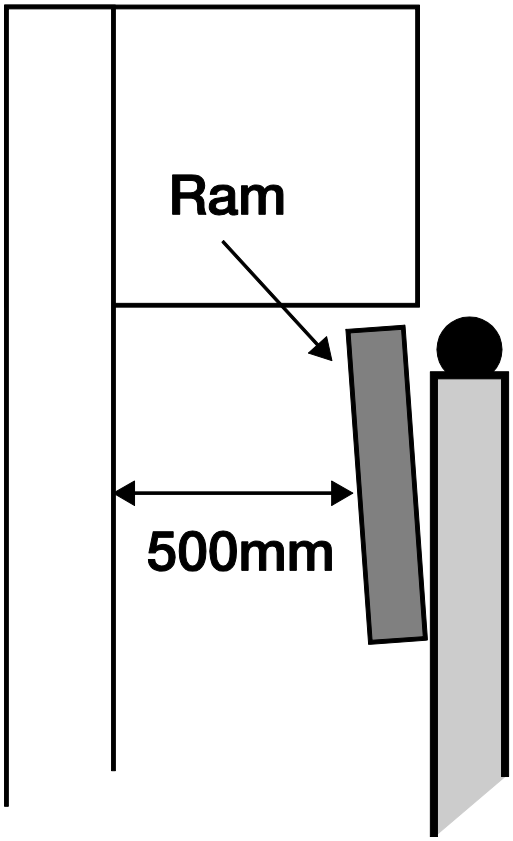


Fig . B11 Safe distance required to eliminate the crush hazard, the impact hazard still remains across the entire leaf width and still needs to be controlled.



This list of hazards is not exhaustive, other examples may exist dependent on design detail; nonetheless, all hazards shall be revealed by assessment and controlled.

B.6. Folding gate specific hazards

All risks as per swing gates with the addition of:

A. Leaf to leaf hinge gap hazards shall be controlled by at least one of:

- Safe design hinge – see fig. B10;
- Flexible guards;
- Hold to run;
- Safe edge;
- Light curtain.

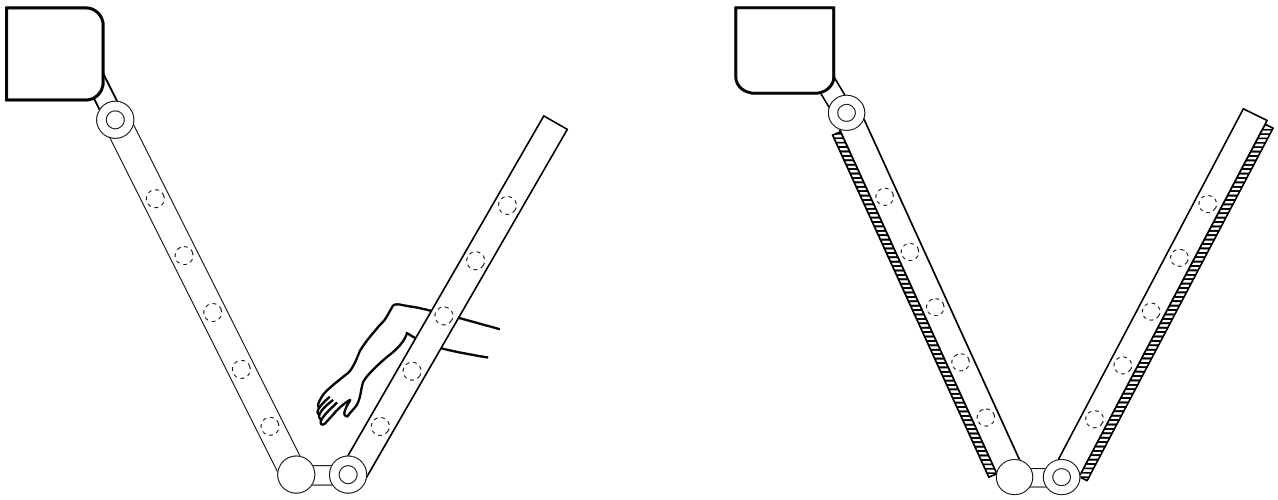
B. Leaf to leaf crush hazards shall be controlled by at least one of:

- Hold to run;
- Safe edge force limitation;
- Light curtain.

C. Reach through arm crush hazard shall be controlled by at least one of:

- Fine mesh to both outer leaf faces, (see fig. B12).

Fig. B12 Folding gate reach through crush hazard and control measure



B.7. Traffic barrier specific hazards (see fig. B13)

A. Crushing hazard as the boom descends shall be controlled by at least one of:

- Hold to run;
- Inherent or safe edge force limitation in combination with photo beams;
  - *Two pairs, one each side of the boom <200mm horizontally;
  - *One pair on the boom centre line;
- Light curtain.

*Photo beam(s) to be placed <700mm above the road.

B. Crush hazard as any counter balance moves towards fixed objects shall be controlled by at least one of:

- Guard;
- Hold to run;
- Light curtain.

C. Shear, crush or draw in hazard as the boom moves shall be controlled by at least one of:

- Guard;
- Absence of sharps and reducing gaps;
- Hold to run;
- Light curtain.

Fig.B13 Barrier hazard locations

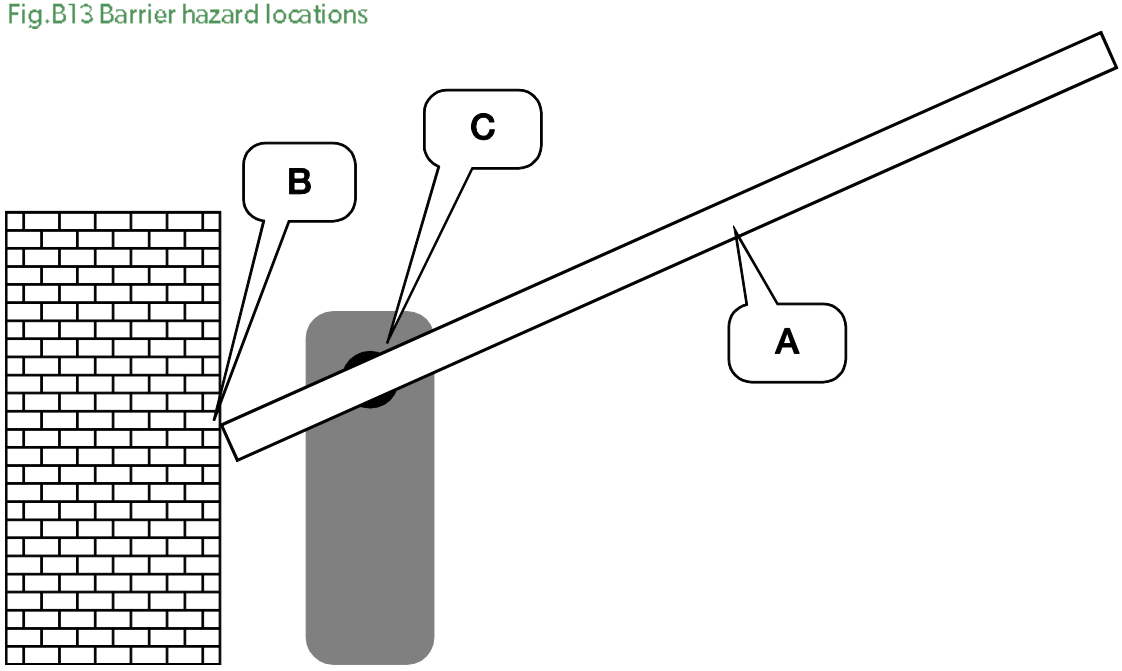
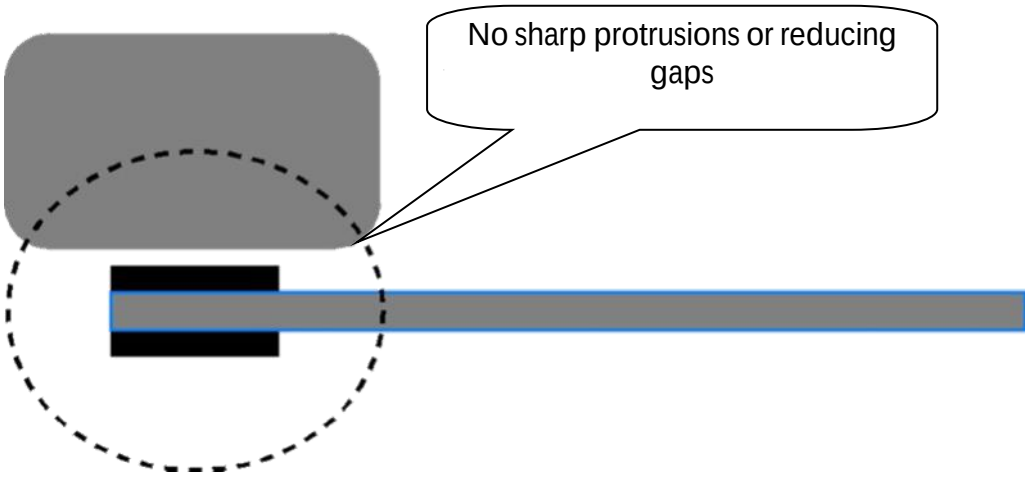


Fig. B14



Barrier skirts can present their own hazards, hence either they shall collapse freely and easily (see B.11), or they shall be prevented from causing injury; for example, by means of a light curtain.

B.8. Force limitation

B.8.1. Maximum dynamic force (Fd) is limited to:

- 400N for all crush hazards;
- 1400N for all horizontal impact hazards.

B.8.2. Maximum static force (Fs) in all cases:

- 150N.

B.8.3. Maximum time for forces to be above 150N (Td) in all cases:

- 0.75 seconds.

B.8.4. Maximum time forces to be above 25N (Tt) in all cases:

- 5 seconds.

B.8.5. Maximum time forces to be ≤25N in all cases:

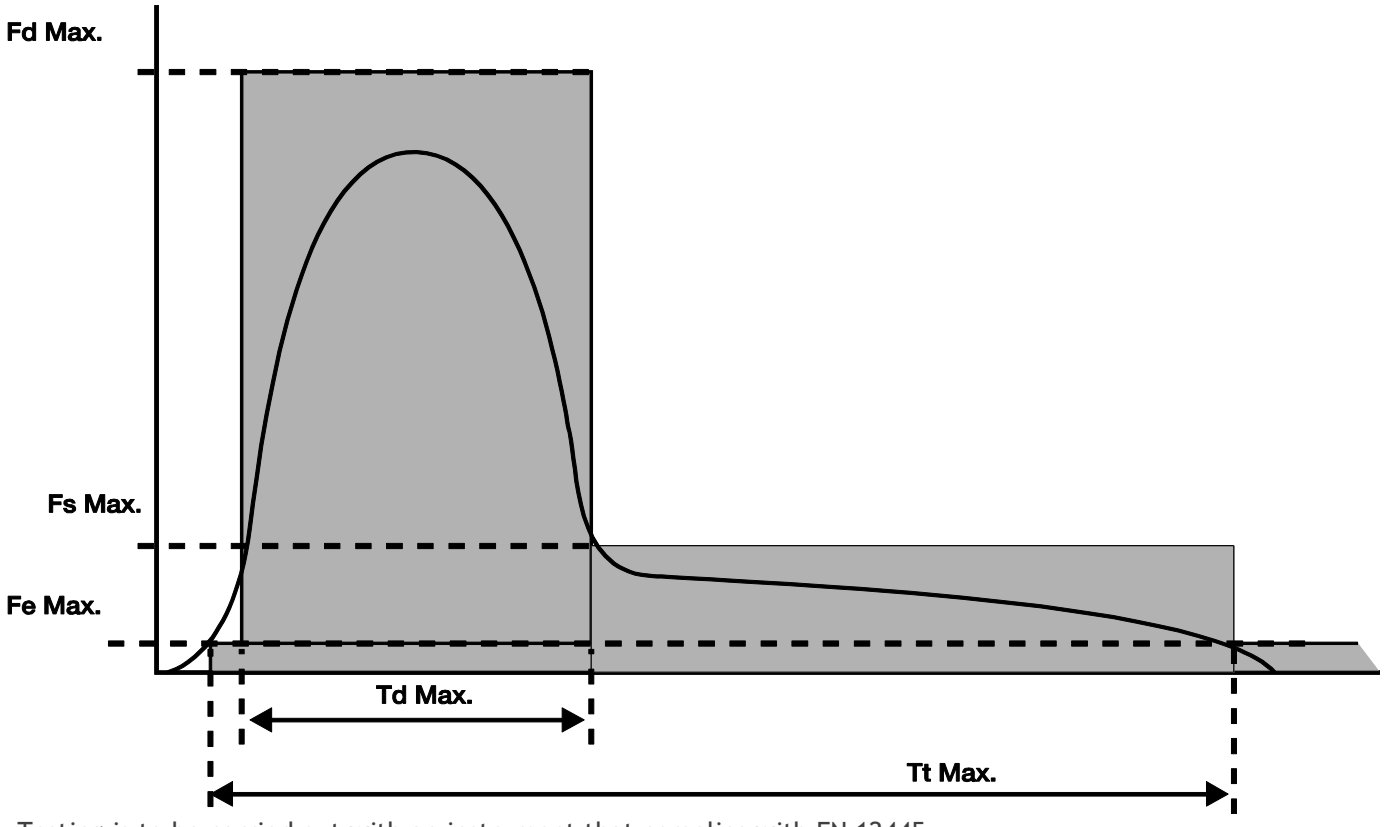
- Infinite.

90% threshold values:

- Fd 360N for crush hazards;
- Fd 1260N for horizontal impact hazards;
- Td = 0.68.

Above which, an average of three tests shall be used.

Fig. B15 Force limitation curve



Testing is to be carried out with an instrument that complies with EN 12445.

Any test that indicates forces in excess of 90% of Fd or Td maximum shall be repeated three times and the average of all three tests taken as the result.

B.9. Force measurement points for sliding gates

B.9.1. Crush measurements are taken at the leading edge at 500mm separation distance - Fd. max. 400N.

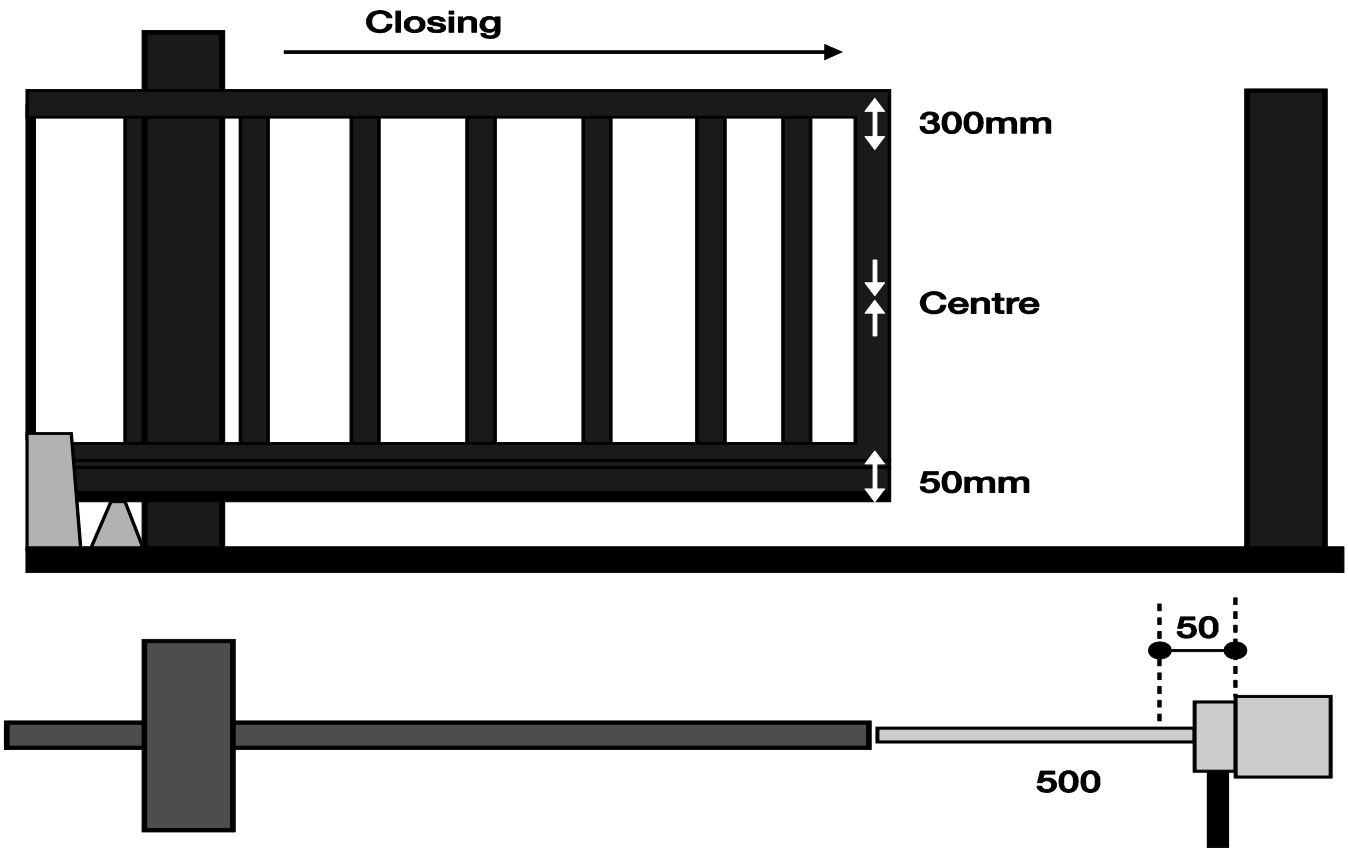
This measurement is taken at 3 heights:

I. 50mm from the bottom of the gate;
II. Centre of the gate height;
III. 300mm from the top of the gate for gates ≤2500mm high Or 2500mm from the base of the leaf for gates >2500mm high.

The point of highest reading is then re-measured at:

IV. 50mm separation distance - Fd. max. 400N

Fig. B16 Leading edge crush test positions



B.9.2. Where the trailing edge comes to within 500mm of a fixed object tests I - IV are repeated at the open crush hazard.

B.9.3. Full speed measurements shall be taken at the leading edge where slowdown is used to achieve safe force at crush locations. The test shall be made at a separation distance that results in full speed - Fd. max. 1400N.

V. Centre height of the gate, min 1500mm.

B.9.4. The measurement point in B9.3 shall also be used to determine the performance of safe edges used on the support frame of the gate.

If the same size of safe edge is used on the support frames as on the leading edge, then—Fd. Max. at full speed shall = <400N for the support frame safe edges to be safe.

If differing size safe edges are used on the leading edge and support frame, then a sample section of the size used on the grames shall be tested at the leading edge at full speed to ascertain adequate performance: Fd. Max. at the tested sample = 400N.

Fig B17 Sliding gate impact and support structure crush test position

B.10. Force measurement points for swing and folding gates

B.10.1. Leading edge crush measurements are taken at 500mm separation distance - Fd. max. 400N.

I. 300mm from the bottom of the gate;
II. Centre of the gate height;
III. 300mm from the top of the gate for gates ≤2500mm high Or 2500mm from the base of the leaf for gates >2500mm high.

The point of highest reading is then re measured at:

IV. 50mm separation distance - Fd. max. 400N - fig. B18, 19 & 20.

The gate shall be tested in the mode it will be used. If a leaf delay is used, it shall be tested with that same delay; if no delay is used, the leaves shall be tested as they converge.

Fig. B18 Swing gate crush test position 1

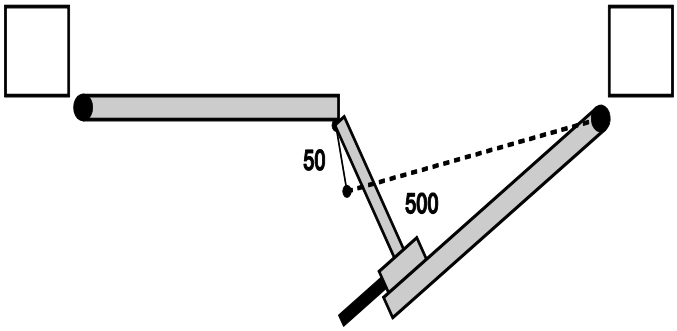


Fig. B19 Swing gate crush test position 2

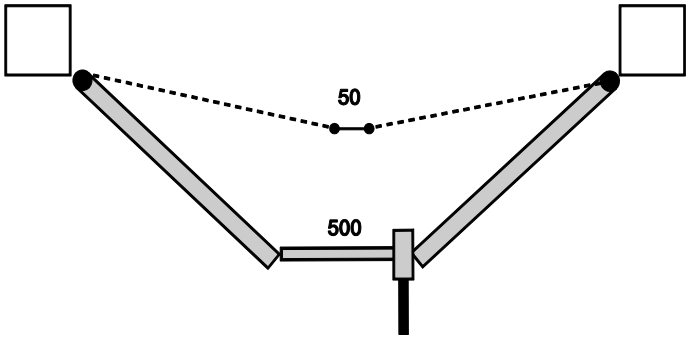
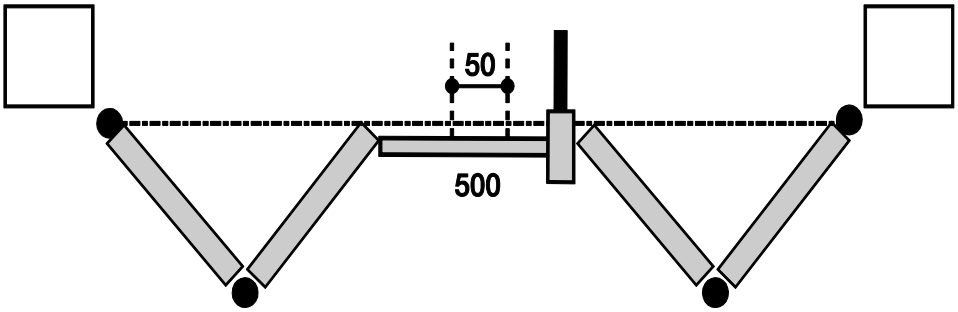


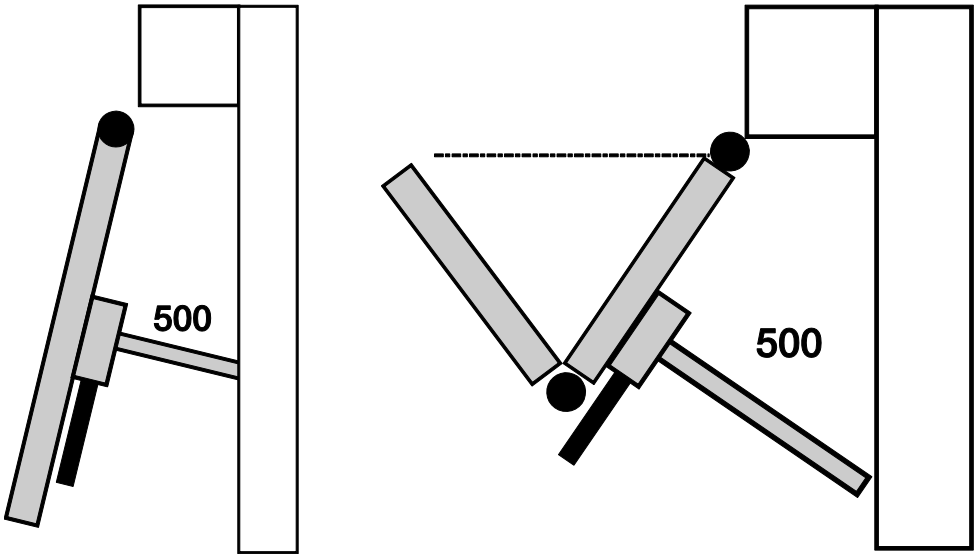
Fig. B20 Folding gate crush test position



B.10.2. Swing & folding gate open crush hazards are measured at the most outstanding feature up to 2m above ground or in the absence of protrusions on either surface: 1m out from the hinge, 1m up from the ground:

- 500mm separation distance - Fd max. 400N see fig. B21.

Fig. B21 Swing and folding gate open crush test positions



B.10.3. Full speed measurements shall be taken at the leading edge where slowdown is used to achieve safe force at crush locations. The test shall be made at a separation distance that results in full speed - Fd. max. 1400N:

- Centre of gate height - Fd max. 1400N - fig. B22/23.

Fig B22 Swing gate impact test position

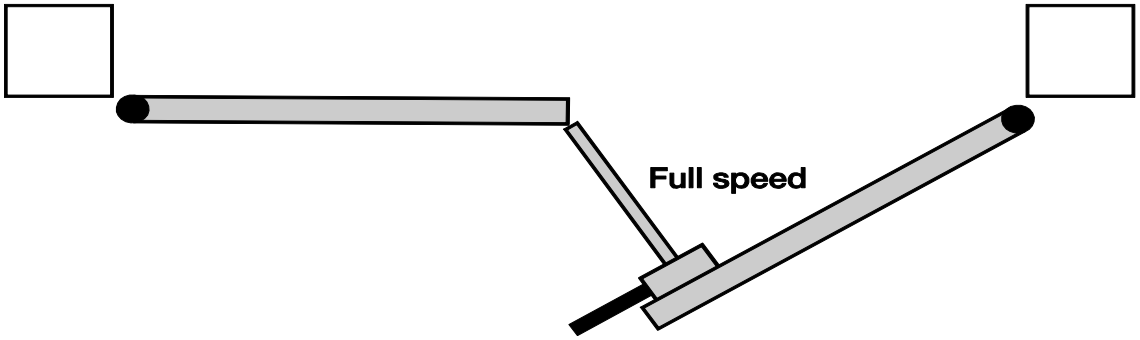
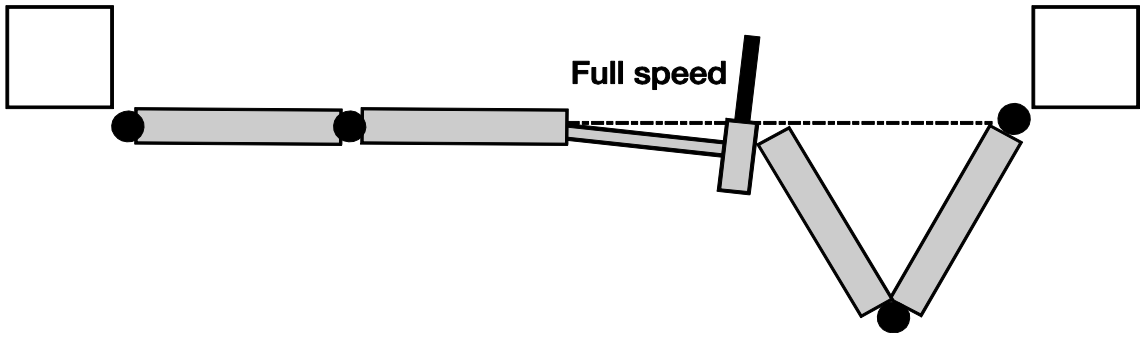


Fig. B23 Folding gate impact test position



B.10.4. The measurement point in B.10.3. shall also be used to determine safe force at the lower edge of the gate. Where slowdown is used to achieve safe force at crush locations, Fd. Max. at full speed shall be at or below the figures given in B.5 D.

When the gap under the gate is constant and >120mm the hazard is impact (<1400N see fig. B7).

When the gap under the gate is variable or less than <120mm the hazard is crush (<400N see fig. B8).

This assumes that the same means of providing safe force is used at the leading edge and the lower edge (e.g. inherent limitation of force or safe edge). Where this is not the case, an improvised test against a rigid static object shall be used to verify safe force at the lower edge at full speed.

Note: *Testing at the leading edge of a swing or folding gate can give a realistic indication of force along the lower edge because force is a product of speed weight and operator torque. From the outer extremity of the gate towards the hinge, torque is increasing but speed is dramatically reducing.*

This equalising effect loses all credibility in the last 10% of leaf width, hence the requirement to use safe edges at hinge area crush hazards. Hinge area safe edges can be verified by using off-cuts of plastic pipe and looking for distortion of the pipe against the safe edge. This method of verification is only viable at the hinge area where leaf speed is incredibly low.

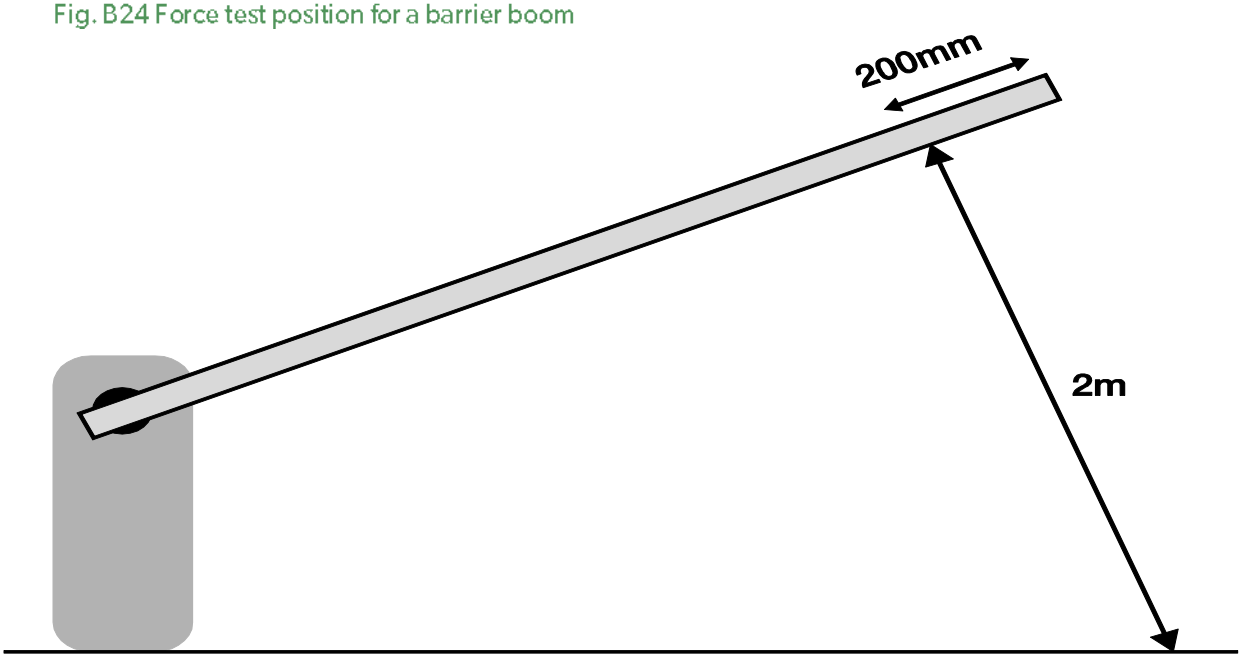
B.11. Force measurement points for barriers

Crushing force measurements are taken 200mm in from the tip of the boom at a maximum height of 2m (2m extension pole) – Fd. Max. = 400N.

Where an articulated boom offers no vertical resistance at initial contact (e.g. some chain connected designs) Td. may be ignored provided that Fd. is within limits.

Where a boom with collapsible skirt is used, the skirt may be secured in the collapsed position for the tests provided that it will collapse without exerting more than 50N.

Fig. B24 Force test position for a barrier boom



B.12. Testing of light/radar curtains

Hazards protected by light or radar curtaining will be tested by means of a cylindrical test piece measuring 300mm x 50mm painted half matt black and half gloss white.

Fig. B25 Light curtain test piece

The test piece is presented to the moving gate at all hazardous locations and it shall not be possible for it to come into contact with hazardous movement. The test piece is designed to simulate a part of the human anatomy and shall be presented in a manner that simulates a person running, or falling into the path of the dangerous movement.

If dangerous movement is to be prevented, the gate shall stop quickly enough to prevent dangerous contact and hence the device being tested shall set up an effective exclusion zone of adequate dimension “d” to give the system time to react. To this end, this code of practice provides the following advice:

- For a leaf travelling at ≤0.5m/second a 200mm exclusion zone is required;
- For a leaf travelling at >0.5m/second a 900mm exclusion zone is required.

The overall requirement is that dangerous contact with the test piece is prevented.

The reaction of the system to an activation of the device will be crucial because, in many locations, the resulting reversal could present a further uncontrolled hazard elsewhere on the gate. For this reason, either pause or stop will be the required reaction to activation for many hazard locations.

Fig. B26 Sliding gate test locations

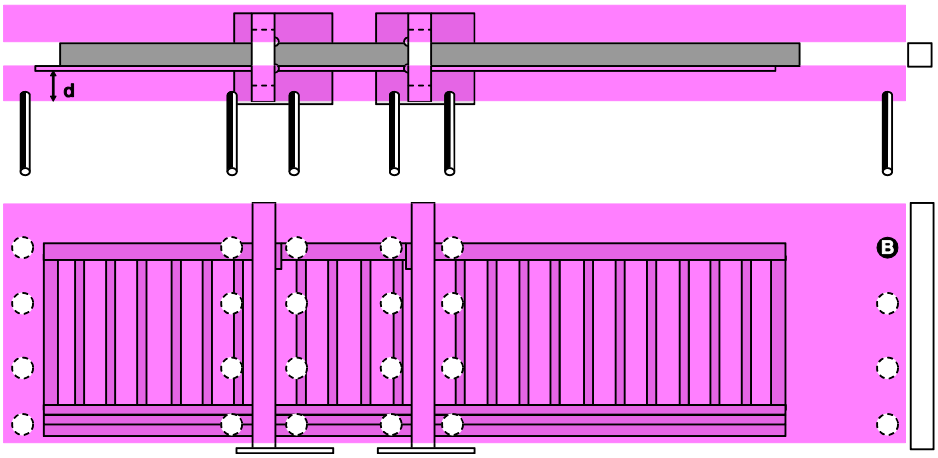
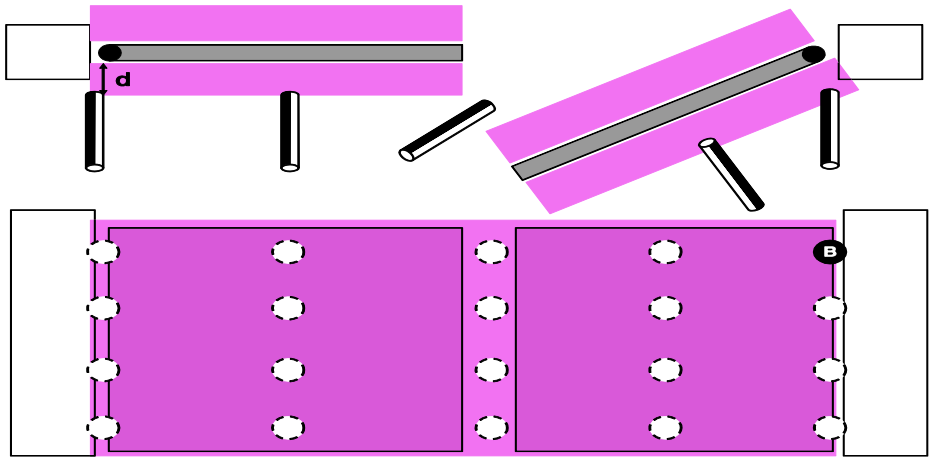


Fig. B27 Swing gate test locations



B.13. Electrical hazards

B.13.1. Supply wiring

The supply to the installation will be provided, tested and certified to comply with BS 7671 and amendments. Where an existing supply is utilised, evidence shall be provided to demonstrate that it has been tested to ensure compliance with BS 7671.

B.13.2. System wiring

The system beyond the supply terminals shall be built and tested using the same basic principles as BS 7671. It shall be proven by either measurement or calculation that the total earth fault loop impedance of the entire installation is within the specification of the circuit protective device for a maximum disconnection time of 0.4sec. The supply shall be protected by a 30mA RCD.

B.13.3. Isolation

An electrical all pole isolator shall be provided, either in view of anyone working on the gate or, where it is remote from the gate, shall be lockable in the off position. Access to the isolator shall not also present access to live terminals.

B.13.4. Conductive parts earthing

Where class 1 earthed equipment (230/400v earthed) is present, all extraneous conductive parts will be connected to the machine earth terminal or proved to have a resistance of less than 0.5 ohm to the earth terminal. *Please note that many 24v drive units are in fact 230v class 1 devices.*

B.13.5. Differing voltage bands

Where cables containing differing voltages share a conduit both cables shall have a voltage withstand of the highest voltage present or that the higher voltage cable is surrounded by an earthed metallic screen, for example, steel wired armoured (SWA) cable or similar.

B.13.6. Communication or data cables

Where communication or data cables share a conduit with power cables point B.14.5 will apply with the addition that the data cable shall also be screened and earthed.

B.13.7. Cable ratings

Cable rating shall be specified to withstand the voltage present, the maximum current and voltage present. Volts drop shall be no more than 5% or within the equipment supplier's specification.

B.13.8. Flexible cables

Cables used to connect equipment that moves relative to fixed elements in normal use (eg rams) shall be of multi stranded conductors to IEC 60228 class 5 or 6 (multiple fine strand copper conductor, not SWA, etc).

B.13.9. Enclosures

- Enclosures subject to external conditions shall be at least IP54;
- Enclosures and drive units used below ground shall be at least IP67;
- Enclosures containing dangerous voltages shall be marked with an appropriate dangerous voltage label and be openable only by means of key or tool.

B.13.10. Cable protection

All vulnerable cabling shall be provided with mechanical protection by means of conduits, trunking or armouring. Vulnerable cabling is anything containing 230v or greater, or anything that forms part of a control system, for example, photo beam cables, safe edge cables, motor cables, encoder cables or access control device cables. All cables, trunking, conduits and enclosures shall have adequate UV protection where they are subject to sunlight.

B.13.11. Control system integrity

The control panel/motor combination Declaration of Incorporation shall list:

- Machinery Directive EHSR 1.2 (Safety and Reliability of Control Systems); or,
- Full conformity with EN 60335-1 and EN 60335-2-103.

Or, the manufacturer/installer has type tested for conformity with Machinery Directive EHSR 1.2 (Safety and Reliability of Control Systems) and all other relevant EHSR and applicable product safety directives. These will include the Electromagnetic Compatibility and Radio Equipment Directive. Test reports shall be supplied to prove compliance.

Annex C Informative

Factory Production Control (FPC)

This section highlights some of the areas for consideration when designing a Factory Production Control system as an alternative to a full ISO 9001 system. An FPC system is needed wherever manufacture of gates or traffic barriers occurs.

GENERAL
Are written procedures/work instructions issued to the shop floor?
If so, are they "controlled" so that updates can be consistently applied?
Identify the documents relevant to the product(s) being CE marked.
Do you directly control the machinery used to manufacture the product?
If not, and you use a sub-contractor, what controls are in place?
PERSONNEL
Who is the management representative in overall charge of FPC and with responsibility for ensuring that its requirements are applied?
Are the personnel involved in production qualified and trained to operate and maintain the equipment and carry out production line duties?
EQUIPMENT
Is maintenance of the process machinery carried out to written procedures at regular intervals?
Are the results recorded?
Is the inspection equipment correctly maintained and calibrated to ensure constant accuracy of tests performed during FPC?
How is the frequency of calibration controlled?
Are records kept?
DESIGN
Where relevant, are the responsibilities for the stages of the design process defined?
Do procedures contain details of any design checks to be carried out?
RAW MATERIALS AND COMPONENTS
What are the procedures/routines covering the purchase of raw materials and components?
Do purchase orders detail specific requirements such as grade of steel or type of glass?
Are specifications agreed with certain suppliers?
Are any certificates of analysis or conformity requested from suppliers?
Are batches of raw materials or components traceable through the production process and in finished products?
If so, how is this traceability maintained?
PRODUCTION PROCESS CONTROL
How is the flow of production controlled? Are job sheets or works orders raised for each batch/day/week of production?
How is progress recorded?
What records are generated?
Are all production processes and procedures recorded at regular intervals?
Who records the processes?

Continued ...

Who records the processes?
Is the recording automatic?
How is the documentation organised?
Is product testing carried out on site?
If not, then where?
Check test records for recent production. Do the results match the requirements of the technical specification?
TRACEABILITY AND MARKING
How are product batches traceable through the production process and in finished products?
What records are maintained of where the finished products are shipped?
How is production batch number traceability maintained after dispatch to assist in traceability in the event of a complaint being received?
How long are records kept?
NON CONFORMING PRODUCTS
Is there a documented inspection system that allows detection of defects before delivery?
What proportion of products is inspected?
How are any non-conforming products identified and stored?
What records are kept?
CORRECTIVE ACTION
Does the system include action to prevent future nonconformities?
Who is responsible for: (a) Investigating the cause of nonconformities (b) Correcting nonconformities
Is there an adequate documented system concerning complaints received about products and is the system integrated into the FPC?
How are customer complaints addressed?
HANDLING, STORAGE & PACKAGING
Are procedures in place for storing and handling raw materials, components and products to prevent damage and deterioration?

Annex D Normative

Commissioning Checklist

The commissioning process shall be completed before the gate is put into service and handed over to the client. It shall cover at least the items listed below and, in any case, ensure that a gate will not be put into service until it is safe.

Inspections on completion

- ☐ Structures are secure
- ☐ All nuts bolts and fixings are secure
- ☐ Travel stops are secure and durable
- ☐ Guides, rollers and hinges are secure
- ☐ All guards are securely fixed
- ☐ All safety distances are achieved
- ☐ Earth connections are secure
- ☐ Cables are secure, adequately separated and protected
- ☐ Cable entries are sealed
- ☐ Enclosures are sealed
- ☐ Wiring terminations are correctly made and secure
- ☐ Warning signs and labels are in place

Functional tests on completion

- ☐ Audible or visual warning devices are working
- ☐ Limit switches are working and stop the gate in the correct places
- ☐ Photo cells working in correct phases of travel
- ☐ Safety loop sensitivity correct for vehicle types expected
- ☐ Safety devices activate in correct phases and do not create further hazards
- ☐ Inherent obstacle detection activates in correct phases
- ☐ All activation devices function as intended and do not create hazards
- ☐ System remains safe when power is restored after power cut

Performance tests on completion

- ☐ Electrical tests completed and recorded
- ☐ Force tests completed and recorded
- ☐ Light curtain tests completed and recorded
- ☐ Force related settings recorded
- ☐ All reducing gaps are protected

Risk assessment

- ☐ Risk assessment is valid and all hazards are adequately controlled

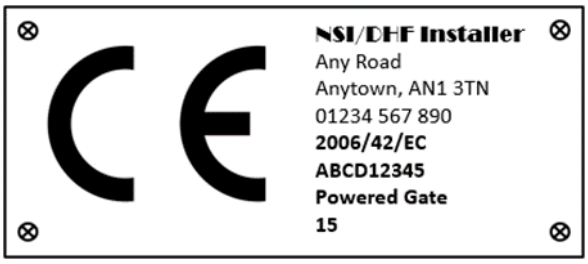
CE mark

- ☐ Applied visibly, clearly, securely and indelibly where applicable

Annex E Informative

Document Templates

CE mark



Declaration of conformity

Company name and address

Declaration of Conformity

Description & unique identification number: *(insert)*

The company above declares under its own authority that the door above is fully compliant with:

- 2006/42/EC

The company additionally declares that the door is in compliance with the following directives:

- 2014/30/EU – Electro-Magnetic Compatibility Directive (EMC)
- 2014/53/EU – Radio Equipment Directive (RED)

Place and date of declaration: *(insert)*

Name & signature of the responsible person: *(insert)*

Certificate of Compliance

DHF TS 011:2016 CERTIFICATE OF COMPLIANCE	
Issuing Company	(Insert)
Owner	(Insert)
Installation address	(Insert)
Issue reason	(New / New Maintenance Contract / Repair / Modification)
Type	(Sliding / Swing / Folding / Traffic Barrier)
Mode	(Automatic / Hold to Run)
Serial	(Insert)
Date	(Insert)

Annex F Normative

Handover Checklist

1. The following items have been explained to the client

- ☐ How to operate the gate
- ☐ How to isolate the power to your system
- ☐ How to manually release your system
- ☐ How the safety features of your system function
- ☐ How to avoid any residual hazards associated with your system
- ☐ How to use the activation devices
- ☐ How to change the batteries on remotes, etc
- ☐ How and when to perform the required safety checks

2. The following items have been provided to the client

- ☐ User instructions
- ☐ Declaration of Conformity
- ☐ User warnings and residual hazard identification
- ☐ Maintenance instructions
- ☐ Maintenance log book

Installer name (insert) ..... Date (insert) .....

Signature (insert) .....

Client Name (insert) ..... Date (insert) .....

Signature (insert) .....

Annex G Normative

Training and Competency

The following training requirements are the minimum acceptable for the roles identified:

Unsupervised installer or site supervisor:

- Basic health and safety - CSCS or similar;
- Manual handling – certificate;
- dhf AGG Diploma – certificate;
- Locating underground services (where the installer breaks ground) – certificate;
- Manufacturer's product training (or company in house product training) – certificates.

Supervised installer:

- Basic health and safety - CSCS or similar;
- Manual handling – certificate.

Provision of electrical supply:

- BS 7671 C&G;
- NVQ2 or equivalent.

On site welding:

- NVQ or employer's self-certification of competence;
- Self-certification for self-employed.

Off-site welding fabricators:

- NVQ or employer's self-certification of competence;
- Self-certification for self-employed.

On site surveyor:

- Basic health and safety - CSCS or similar;
- dhf AGG Diploma;
- Underground service awareness - in house proof;
- Product awareness - in house proof;

Specifiers:

- dhf AGG Diploma;
- Product awareness - in house proof.

Annex H Normative

Planned Preventative Maintenance Checklist

The contents of the planned preventative maintenance schedule for each gate shall be bespoke in nature and reflect the nature of the system, system usage, environmental conditions, and all other factors which may affect the requirements for maintaining a particular gate in a safe condition. Planned preventative maintenance shall however include at least the following steps:

☐ Re-assessment of the existing risk assessment in terms of ongoing suitability or any changes to local environment, nearby structures, controls or changes of use or nature of users; this element shall run concurrently with the items listed below and throughout the visit.

Isolate power, disconnect any battery backup, lock off/secure the isolator and verify by testing that all energy supply voltage is off:

☐ Visual inspection of presence and security of all earth connections;

☐ Visual inspection of cabling, conduits and trunking for damage;

☐ Visual inspection and physical check of all wiring terminations;

☐ Visual inspection of condition and sealing of junction boxes;

☐ Check gate structure for damage, integrity of decorative/anti-corrosive finish, cracks, weld failure and security of all fixings;

☐ Check level and plumb of structures, hinges and leaves throughout movement;

☐ Check presence and security of travel stops;

☐ Lubricate all moving parts as appropriate;

☐ Check manual release and free movement of leaf throughout travel in manual mode;

☐ Visual inspection of condition of all safety devices (safe edges and photo beams, etc);

☐ Visual check of drive unit(s) for damage and oil leaks;

☐ Check drive unit oil levels as per manufacturer's requirements;

Secure the area/make provision to keep people away from the gate, then re energise the system:

☐ Functional check of RCD (press the test button).

Make provision to control the gate with a temporary or permanent start stop/device (radio transmitter/start/stop button or similar). Check that you can start and stop the gate at will and then complete the following:

☐ Functional check of travel limit settings;

☐ Visual and audible check of warning lamps or sounders;

☐ Function check of photo beams;

☐ Functional check of all safe edges;

☐ Check function and smooth running of drive units;

☐ Test force limitation with a force tester;

☐ Test light curtains with a test piece.

If safe to do so, return the gate to normal service, if not make the gate safe and attach a warning sign.

Record all test results.

Complete the maintenance log.

Inform the client of any findings.


WARNING
AUTOMATIC GATES
Please wait at
stop line

Contact us for more information

Email: info@**dhf**online.org.uk

Telephone: (0) 1827 52337

Address: **dhf** 42 Heath Street, Tamworth, Staffordshire. B79 7JH