

Automated Rising Bollards

Best practice guide for the manufacture, installation and maintenance of automated rising bollards



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dhf Best Practice Guide: Automated rising bollards

Best practice guide for the manufacture, installation and maintenance of automated rising bollards.

Scope

dhf has long provided guidance on the legislation and standards that affect the manufacture, installation and maintenance of industrial doors, domestic garage doors, powered gates, and traffic barriers in the form of Code of Practice (COP) documents and training. The **dhf** guidance for these products, and the British and European standards that cover them, do not include rising bollards. However, the machinery safety law that covers powered doors, gates, and traffic barriers applies equally to powered rising bollards.

This guidance has been produced to help fill this void.

1. Machinery safety law

Rising bollards are machinery and hence must comply with machinery safety law when placed on the market:

- The UK Supply of Machinery Safety Regulations (SMSR) in GB
- The EU Machinery Directive (MD) in Northern Ireland, the Republic of Ireland, and all other EU member states

Compliance requires meeting a common set of Essential Health and Safety Requirements (EHSR) found in both the UK Regulations and the EU Directive; the respective EHSRs are identical.

1.1 Responsibility for compliance

Responsibility for compliance with machinery safety law lies with the manufacturer although, when a product crosses a conformity marking territory border, the manufacturer must appoint an importer who must ensure that the product is in fact compliant:

- Manufactured in GB for the GB market - manufacturer responsible directly
- Manufactured in the EU for the EU or NI market - manufacturer responsible directly
- Manufactured in the EU for the GB market - GB importer necessary and responsible
- Manufactured in the GB for the EU or NI market - EU or NI importer necessary and responsible

- Manufactured outside GB, NI or EU for the GB market - GB importer responsible
- Manufactured outside GB, NI or EU for the EU or NI market - EU or NI importer responsible

1.2 Meeting the essential health and safety requirements

The EHSRs listed in the respective Annex 1s are extensive but non-specific in terms of safety performance. For a majority of products, the required level of safety for compliance is described by a series of product specific EU 'harmonised' and UK 'designated' standards. Where an MD harmonised or SMSR designated standard exists for a product type, achieving compliance is far simpler because MD harmonisation or SMSR designation allows:

- a. a legal presumption of conformity, and
- b. defines the minimum level of safety required for compliance

For industrial doors, garage doors, vehicle and goods gates and traffic barriers, EN 12453 provides this but, for a rising bollard, no such MD harmonised or SMSR designated standard exists; achieving compliance with the law is more complex and less clearly defined.

- The EHSRs are focussed primarily on the safety of people and hence their safety must take priority in the compliance assessment:
- Both intended use and foreseeable misuse must be catered for in the assessment - EHSR 1
- Where the general public (untrained persons) might be affected, particular care must be taken for their safety - EHSR 1
- All potential hazards must be identified and assessed - EHSR 1
- Safe design must be used to eliminate or reduce the hazards wherever possible - EHSR 1.1.2
- Safety systems and devices must then be applied to hazards that cannot be dealt with by safe design - EHSR 1.1.2
- Wherever residual hazards remain, these must also be addressed and dealt with by further mitigations such as user training,

signage, markings and warning devices - EHSR 1.7.2

The bollard manufacturer must:

- identify the hazards generated by the bollard in its intended environment, and
- estimate the risks according to the injury or damage to health possible and the probability of occurrence, and
- either eliminate or reduce them sufficiently to meet the EHSRs

For a rising bollard, the main hazards are:

- Structural integrity for being driven over when retracted - EHSR 1.3.2
- Electrical safety, particularly as the system will be underground and subject to flooding in wet weather - EHSR 1.5.1
- Control system reliability - EHSR 1.2
- Rising under the feet of a pedestrian - EHSR 1.3.7 & 1.3.8
- Drawing-in of fingers, etc during lowering - EHSR 1.3.7 & 1.3.8
- Rising under a vehicle (lifting) - EHSR 1.3.7 & 1.3.8
- Rising in the path of a vehicle (impact) - EHSR 1.3.7 & 1.3.8

Although there are no harmonised or designated standards that cover all of the ESHRs for a rising bollard, there are standards available that will prove very useful in achieving compliance:

- EN ISO 12100 Risk assessment and risk reduction
- EN 60204-1 Electrical equipment of machines
- EN ISO 13849-1 Safety-related parts of control systems
- EN 12453 EU harmonised and UK designated standard for gates and barriers

Although EN 12453 does not include rising bollards in its scope, because rising bollards operate in very similar environments, some of its clauses are appropriate, particularly:

- Clause 5.1.2 Safety function performed by control systems - explains which parts of EN ISO 13849-1 apply and at what performance levels and test categories: eg PL C and category 2
- Clause 5.2.1.5 Hold-to-run (excluding bullet points 2,3,4 & 5 relating to overtravel)

- Clause 5.2.1.7 Electro sensitive equipment - guidance on the integrity of non-contact presence detection devices for the protection of people, eg EN 12978 compliant devices
- Clause 5.3 Sources of energy and power controls - which parts of EN 60204-1 are appropriate and which clauses can be disregarded
- Clause 5.3.3 Hydraulic drive units - guidance on pressure and entrapment of air: EN ISO 4413
- Clause 5.3.5 Re-start after unintended interruption (eg power cut) - guidance on safe re-start
- Clause 5.3.6 Supply disconnection - guidance on electrical isolators for maintenance
- Annex B.1 - Gaps to avoid shearing and drawing in: eg 8mm maximum

1.3 Protection of pedestrians

Control measures for the protection of people on foot during rising could be:

- hold to run, or
- non-contact beams, or
- laser scanner or light grid protection

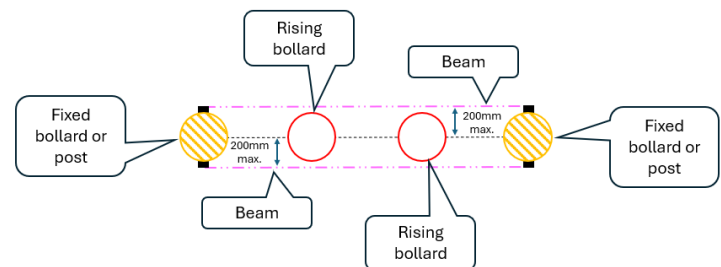


Figure 1 - pedestrian protection example

Beam heights should be between ground and 700mm and be active during rising; the reaction to blocking should be to descend or prevent rising. The beam line should be as close as possible to the outer surfaces of the rising bollards and not more than 200mm from the centre line.

Control measures for the protection of draw-in hazards during lowering could be:

- a safety distance of 8mm or less, or
- hold-to-run, or
- laser scanner or light grid protection active during closing

Residual risk control measures for further protection of pedestrians in higher risk environments could include:

- danger, rising bollards signage
- danger, rising bollards ground markings
- pedestrian railings to guide pedestrians away from the bollard zone
- pedestrians this way signage
- audio visual warning devices

1.4 Vehicle protection

Control measures to prevent the bollard rising under a vehicle could be one or a combination of:

- non-contact beams, or
- vehicle detectors

Control measures to prevent vehicles driving into bollards could be one or a combination of:

- traffic lights
- keep clear ground markings
- stop here ground marking
- stop here signage
- traffic lights ahead signage
- beware, rising bollards signage
- traffic calming
- hazard markings on the bollard
- warning lights on the bollard
- audio visual warning devices
- flood lighting

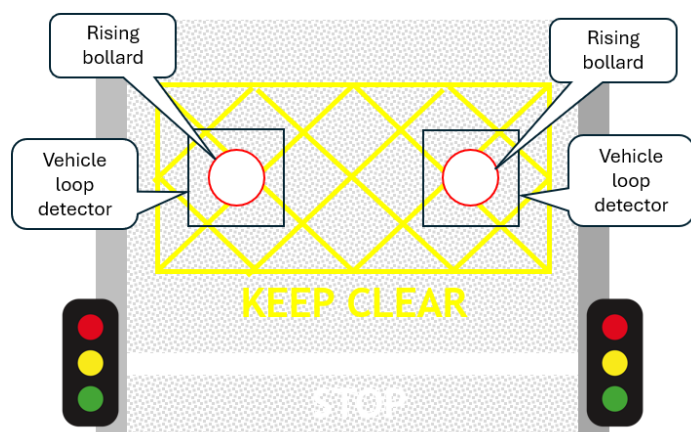


Figure 2 - vehicle protection example

One problem can be that, if a vehicle approaches whilst the bollard is down, and the bollard does not start to rise until it is below the driver's line of sight, an impact is inevitable. Visual warnings, time delays,

and other control systems need to take this into account.

1.5 Declaration of Conformity

The manufacturer (or their importer) must issue a Declaration of Conformity (DOC) that declares conformity with the UK Regulations if the bollard is UKCA marked or the EU Directive if it is CE marked. The DOC must identify the product, the manufacturer's name and address, the year of manufacture, and declare conformity with all other applicable UK Regulations or EU Directives, for example:

- EMC Directive/Regulations
- Radio Equipment Directive/Regulations

1.6 Installation instructions

Where the bollard is intended to be installed by a 3rd party, such as an installation company, the manufacturer (or the importer) must provide detailed installation instructions that explain the requirements for transporting and handling the bollard without damage, the specification for the foundations and drainage, the electrical supply requirements and all settings, adjustments, programming, and wiring detail necessary. Where necessary, the installation instructions should also explain the need for any site-specific residual risk assessment that will be necessary to achieve a safe and compliant installation.

1.7 Operation and maintenance instructions

The manufacturer (or the importer) must provide detailed operation and maintenance instructions to be passed on to the end user. They should explain the residual hazards, how to use the bollard safely, and what steps are necessary for routine maintenance, including the qualifications, skills and experience necessary for each task.

1.8 Technical file

The manufacturer (or their importer) must retain a detailed technical file. The file must document the entire conformity process and must be retained for at least 10 years.

1.9 Conformity marking

The manufacturer (or their importer) must ensure that the bollard is appropriately conformity marked for the market it will be placed on. Currently, in GB, the conformity marking under machinery law can be

either CE or UKCA whilst, in the EU and NI, it must be CE.

This concludes compliance with machinery safety law for placing on the market, for the manufacturer.

2. Installation and maintenance

Installation companies have obligations under national health and safety law:

- UK Health & Safety at Work Act 1974
- NI Health & Safety at Work Order 1978
- ROI Safety, Health & Welfare at Work Act 2005

They must ensure the safety of their employees and others who may be affected during the installation and resulting from it; the completed system must be safe for its intended use and environment.

Installation companies should ensure they are sourcing a correctly marked and documented conforming product, install it in accordance with the manufacturer's instructions, complete a compliance and residual risk assessment, pass on the manufacturer's Declaration of Conformity and operation & maintenance instructions to the client.

3. Owner/manager legal obligations

The client/owner/manager will also have legal obligations under the health and safety law listed above and, where the premises is also a workplace:

- UK Workplace (Health, Safety & Welfare) Regulations 1992
- NI Workplace (Health, Safety & Welfare) Regulations 1993
- ROI Safety, Health & Welfare (General Applications) Regulations 2007

The system must be safe and subject to suitable maintenance. The owner/manager should retain the manufacturer's Declaration of Conformity, user instructions and maintenance instructions and follow their contents.

4. Safety, security, and revenue protection

It must be understood that, under UK health and safety law, safety of people most commonly outweighs security and revenue protection. When **dhf** consulted with HSE on this subject, it commented that, if your security or revenue protection need

requires the use of a dangerous machine to operate in a public environment, you probably have not come up with the right solution.

5. High security and hostile vehicle mitigation bollards

In high security environments, the consideration should be focussed on when it would be safe to open an entrance, rather than how quickly you can close it. When **dhf** asked UK HSE about the relationship between safety law and security, it drew our attention to this case in Northern Ireland.



The Perimeter Security Suppliers Association provide advice on manufacture, supply, and installation of hostile vehicle mitigation systems such as ISO 22343-1 rated rising bollards.

PSSA



ISO 22343-1:2023



Other guidance

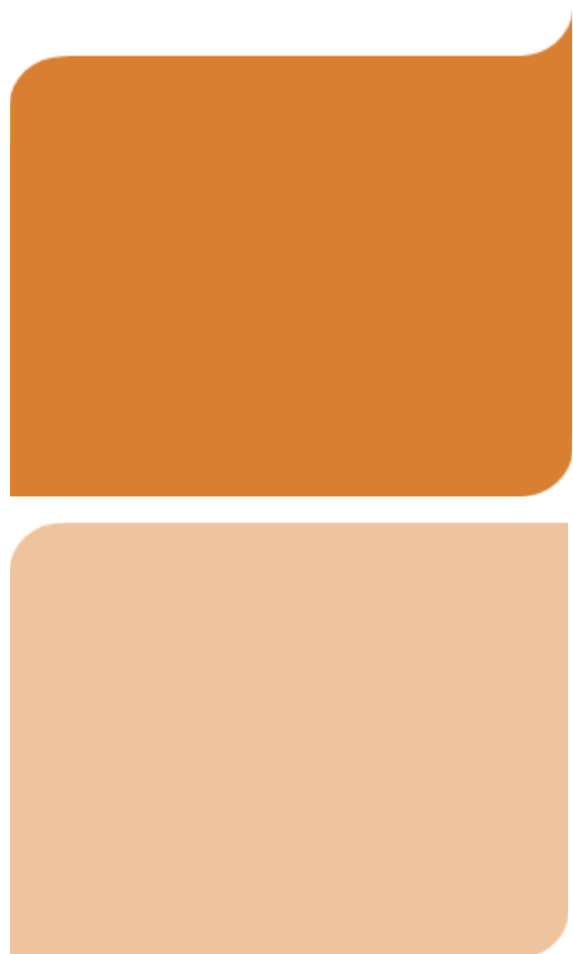
Department for transport/CPNI Traffic Advisory Leaflet 02/13: Bollards and Pedestrian Movement



Department for transport/ Traffic Advisory Leaflet 4/97: Rising Bollards







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