

Fairgrounds and amusement parks

Guidance on safe practice



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Although fairgrounds and amusement parks are relatively safe compared to activities such as driving a car or riding a bicycle, there have been a small number of serious incidents involving employees and members of the public. The Health and Safety Executive has worked with the members of the Fairgrounds and Amusement Parks Joint Advisory Committee to improve standards and to produce this revised guide.

This book incorporates improvements made over several years in this industry's practices. It deals with the safety of employers, employees and the general public using fairgrounds and amusement parks and gives advice on controlling risks, site layout and safe systems of work. It also provides information and guidance on fairground ride design, manufacture, installation, operation, maintenance and inspection.

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This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance as illustrating good practice.

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Foreword

This guidance sets out what the Fairgrounds and Amusement Parks Joint Advisory Committee (FJAC) considers are appropriate measures for those involved in the industry to reduce risks, work safely and comply with the law. The following trade associations, in alphabetical order, together with the Health and Safety Executive (HSE) are represented on the committee:

Amusement Catering Equipment Society (ACES)

Amusement Devices Inspection Procedures Scheme
(ADIPS Ltd)

Association of Independent Showmen (AIS)

Amusement and Leisure Equipment Suppliers (ALES)

British Amusement Catering Trade Association (BACTA)

British Association of Leisure Parks, Piers and Attractions (BALPPA)

National Association for Leisure Industry Certification (NAFLIC)

Showmen's Guild of Great Britain (SGGB)

Society of Independent Roundabout Proprietors (SIRP)

About this guidance

Introduction

- 1 The Fairgrounds and Amusement Parks Joint Advisory Committee (FJAC) has worked for over 25 years to continually improve standards and the exchange of information. Fairgrounds and amusement parks have been shown to be relatively safe compared to such activities as driving a car or riding a bicycle, but there have been a small number of serious accidents involving the general public and employees. Risks can never be eliminated from any aspect of life but need to be managed effectively. This new edition of *Fairgrounds and amusement parks: Guidance on safe practice* (HSG175), first published in 1997 was recommended in the Health and Safety Commission (HSC) Review of Fairground Safety (2001) and incorporates improvements over several years in this industry's practices.
- 2 This document concentrates on the safety of employers, employees and the general public using fairgrounds and amusement parks, and gives advice on measures to control risks. It provides advice on issues relating to attractions, including operation, maintenance, repairs, and modifications. It also includes advice on site layout and safe systems of work. There is a glossary at the end of the book which explains the terms used.
- 3 The Health and Safety at Work etc Act 1974 (HSW Act), and subsequent health and safety regulations, place duties on a wide range of people ('dutyholders') according to what they do (see Appendix 1). These include the following:
 - **Designers, suppliers, manufacturers, installers and importers** have duties to ensure that the attractions are safe when first supplied and installed, to carry out any necessary research and provide information about safe use, updated in the light of experience. **See Section C.**
 - **Organisers** (who can be companies) have overall control of the fairground or amusement park, and have duties concerning safe layout and emergency procedures. **See Sections A, B, D and E.**
 - **Controllers** (who can be companies) own or otherwise have control of an attraction, and have a duty to maintain it in a safe condition. **See Sections A, B, C, D and F.**
 - **Operators** are in immediate charge of an attraction and have a duty to operate it safely. **See Sections A, D and G.**
 - **Attendants** help to operate an attraction, and have a duty to take reasonable care for their own and others' safety, and to follow instructions. **See Sections A and G.**
 - **Inspection bodies** (IBs) (who may be companies) provide inspection and testing services. Where they are engaged by other dutyholders to perform specific tasks, it should be established that the particular type of inspection and testing service required is one that body is registered to perform. **See Sections A, C and D.**
- 4 An individual or company may fall into more than one category. For instance, a person may be the organiser of a fair and both controller and operator of one of the attractions.
- 5 All the member associations of the FJAC agree that the information in this book is appropriate to help dutyholders meet their legal requirements and expect their members to follow the systems described. Dutyholders are free to meet their legal obligations in other ways, but they need to be prepared to show that what they did was equally effective.

6 The system for safety of attractions set out in this guidance is shown in Section A, Table 1, although not all attractions require all of the actions listed. Section A, Table 2 summarises the actions recommended for different types of attractions.

7 This book does not cover occupational risks such as manual handling, exposure to substances hazardous to health, noise etc. Advice on these and other general health and safety requirements can be found in the 'References' and 'Further reading' sections.

8 Where the word 'must' has been used it is intended to mean a reference to a legal obligation. A summary of the main legal provisions is in Appendix 1.

Implementation of this guidance to devices designed before 1997

9 Reports of design review may not be available or needed for older attractions (those designed before 1997) whose design has been proved by maturity and can be demonstrated in a maturity design risk assessment. While in principle the hard evidence of an attraction's operational history may be an acceptable basis for proving a design, much depends on the history of modifications. Whether a design review is needed or not depends on the controller's assessment of risk, aided by advice from an inspection body. Guidance on the contents of a maturity design risk assessment is in Section D, paragraphs 76–77 and Appendix 2.

Section A

The system for safety of attractions

Table 1 The system for safety of attractions

Steps	Checks	Description
Design		By competent designers with knowledge of the relevant standards (see Section C).
	Design review*	Appraisal of a design (and any safety-critical modification) to check the adequacy of a design specification and the validity of the assumptions on which it is based (see Section D).
Manufacture		To the design specification.
	Assessment of conformity to design*	A check to confirm that a device is constructed to the reviewed design specification (see Section D).
	Initial test*	A test to check that the device operates safely in accordance with the reviewed design specification and the instructions in the operations manual. This test should be carried out by, or on behalf of, the manufacturer, supplier or importer and witnessed by an inspection body.*
Provision of an operations manual		Provision of adequate information required for the safe operation and maintenance of the device (see Appendix 3).
Device operation		Carried out by competent persons, suitably trained in normal operation and emergency procedures and in accordance with the operations manual and risk assessment.
Ongoing device integrity		By a series of checks, maintenance and inspection.
	Maintenance	The procedures carried out by competent persons necessary to ensure that a device is kept in an efficient state, efficient working order and in good repair.
	Daily check	Carried out by competent persons before the device is opened for use (see Section F).
	Periodic check	Carried out by competent persons in accordance with the manufacturer's specifications and any additional requirements required by modifications to the device, and/or the findings of the design review or risk assessment.
	In-service annual inspection*	The procedure necessary for a registered inspection body to decide whether an amusement device may continue to be operated for a specified period of time (see Section D).

* Carried out by an inspection body registered with ADIPS to undertake that category of work.

Table 2 Recommended actions for different types of attractions

ACTIONS									
Type of attraction	Ride?	Amusement device?	Stall?	Design review and assessment of conformity to design?	Initial test?	In-service annual inspection?	Daily check?	Other important safety issues and comments	
Arcade	No	Yes	No	Yes ^(a)	Yes ^(a)	Yes ^(a)	Yes	(a) Non-permanent structures only. For fire precautions see Appendix 6. Check electrical equipment at least annually.	
Boxing booth	No	Yes	No	Yes	Yes	Yes	Yes	May be 'tented structure' (see Appendix 6).	
Cableway	Yes	Yes	No	Yes	Yes	Yes	Yes	The Cableway Installations Regulations 2004 ¹ do not apply to cableway installations (on site or mobile) in fairgrounds or amusement parks that are designed for leisure purposes and not as a means of transport. They do contain advice which may be useful.	
Coin-operated amusement device	Yes	Yes	No	No ^(b)	Yes	Yes	See note in paragraph 191	(b) Devices outside the definition given in the Glossary require the full range of pre-use and in-service inspections. Local-authority-enforced when used outside fairgrounds and amusement parks.	
Coin-operated game	No	No	Yes	No	No	No ^(c)	Advised to check plugs and leads	(c) Periodic inspection of electrical equipment.	
Funhouse – with moving floors and slides etc	Yes	Yes	No	Yes	Yes	Yes	Yes	May be 'tented structure' (see Appendix 6).	
Guns/ crossbows	No	No	No	No	No	Strip down by specialist advised	Yes	Firearms legislation may apply.	
Hall of mirrors etc	No	Yes	No	As arcade above	As arcade above	As arcade above	As arcade above	As arcade above.	

Table 2 Recommended actions for different types of attractions

ACTIONS									
Type of attraction	Ride?	Amusement device?	Stall?	Design review and assessment of conformity to design?	Initial test?	In-service annual inspection?	Daily check?	Other important safety issues and comments	
Hoopla stall	No	No	Yes	No	No	No ^(d)	Yes	(d) Periodic inspection of electrical equipment.	
Hot dog or candy floss stall	No	No	Yes	No	No	No ^(e)	Yes	(e) Periodic inspection of electrical equipment. Food safety legislation applies. See Appendix 6 for advice on gas safety.	
Inflatable (bouncy)	Yes	Yes	No	Yes	Yes	Yes	Yes	Supervision.	
Other inflatable (not used for bouncing or sliding)	No	Yes	No	Advised for safety-critical components	See design review	See design review	Yes	Supervision.	
Pneumatic or air-supported structure	No	Yes	No	Yes	Yes	Yes	Yes	For fire precautions see Appendix 6.	
Ride, adult or juvenile	Yes	Yes	No	Yes	Yes	Yes	Yes	Passenger containment and supervision.	
Road train	Yes	Yes	No	Yes	Yes	Yes	Yes	Driving licence recommended, training and supervision.	
Safety-critical parts of theming (may be part of an attraction or general site theming)	No	No	No	Yes ^(f)	Yes ^(f)	Yes ^(f)	Yes ^(f)	(f) A high degree of care should be applied to the safety-critical parts of any theming which could cause serious personal injury if they failed.	

Table 2 Recommended actions for different types of attractions

ACTIONS									
Type of attraction	Ride?	Amusement device?	Stall?	Design review and assessment of conformity to design?	Initial test?	In-service annual inspection?	Daily check?	Other important safety issues and comments	
Self-drive, eg model cars, dodgems, karts	Yes	Yes	No	Yes	Yes	Yes	Yes	HSG200 <i>Go-karts: Guidance for safe operation and use</i> ² provides useful information.	
Shooting gallery (hazardous projectiles)	No	Yes	No	Yes	No	No ^(g)	Yes	Firearms legislation may apply. (g) Periodic inspection of electrical equipment.	
Shooting gallery (non-hazardous projectiles)	No	No	Yes	No	No	No ^(h)	Yes	(h) Periodic inspection of electrical equipment.	
Slide	Yes	Yes	No	Yes	Yes	Yes	Yes	Supervision.	
Walk-through house, eg haunted house	No	Yes	No	Yes	Yes	Yes	Yes	May be 'tented structure' (see Appendix 6).	
Wall of death/ Globe of death	No	Yes	No	Yes	Yes	Yes	Yes	Important to maintain structural integrity.	

Section B

Managing health and safety

Identify what needs to be done

10 Safety doesn't just happen. It requires everybody's commitment and willingness to work in an organised way to achieve good standards. The most important steps to managing health and safety are the policy, organisation, planning, monitoring, auditing and reviewing. These concepts are recognised in all sections of this book.

Planning

11 The planning process should identify the hazards, assess the risks and help determine what control measures are required. Sections C to G indicate how to effectively manage safety.

Risk assessment

12 Most accidents happen because simple precautions are not taken. Risk assessment involves looking at what can go wrong, the likelihood of it going wrong and identifying what you can do to prevent it – it is often about applying common sense in a logical way. See HSE's leaflet INDG163(rev2) *Five steps to risk assessment*.³

13 Consider both hazard and risk in a risk assessment:

- Hazard – anything that can cause someone harm.
- Risk – the chance that someone could be harmed and how serious the harm could be. The greater the chance and seriousness of injury, the higher the risk.

14 Risk assessment can be broken down into five steps:

Step 1 Identify the hazards

15 Use the following to work out how people could be harmed:

- your own or others' experience, information from trade associations, advice from HSE, fire authorities or published guidance from the manufacturers;
- technical information from designers and inspection bodies;
- your own enquiries and inspection;
- information from your workers, contractors and other people.

Step 2 Decide who might be harmed and how

16 For each hazard, you need to be clear about who might be harmed – this will help you decide the best way to manage the risk. Although public safety is of prime importance, workers and others, such as members of a ride owner's family, may also be injured.

Step 3 Evaluate the risks and decide on precautions

17 The risk assessment process may identify additional measures that need to be implemented to adequately control the risks. It is important that these measures are put in place. Evaluate the risks and decide whether the existing precautions are adequate or whether more should be done. Control measures need to be appropriate to the level of risk. The greater the risk, the greater the standard of control required. The public expects a high standard of safety, particularly when the risks are outside their control, eg risks from machinery. However, many will accept the risk of a minor bump (eg on the dodgems) as part of the fun.

Step 4 Record your findings and implement them

18 If you employ more than five people you must record the significant findings of your risk assessment and the measures you are taking to control risks. Although not law, the industry associations strongly recommend that you do this even if you have fewer than five staff. Recording these details will help show that you are running your business safely.

Step 5 Review your risk assessment and update it if necessary

19 Regularly review your assessment and revise it if necessary in the light of experience or any changes such as:

- accident/incident history, eg of any similar devices;
- renovation;
- modifications, including physical, procedural or software modifications.

Who should do a risk assessment?

20 Every employer and self-employed person must assess the risks to workers and others who will be affected by their work or business. Dutyholders in the fairground and amusement park industry will be involved in a range of risk assessments. For example:

- Designers need to:
 - identify how the public or workers might be injured, including risks arising from the need to inspect and maintain the ride, as well as from its use as an attraction and emergency situations;
 - determine possible effects of ‘foreseeable misuse’ (see paragraph 23 for a definition) by the public, controllers or operators.
- Manufacturers need to:
 - identify the risks to their employees and others during the manufacturing process.
- Installers need to:
 - identify the risks to their employees and others during the installation process, such as risks from working at height, manual handling, electricity etc.
- Organisers need to:
 - assess site risks, for example, access, transport, limitations of space, overhead power lines;
 - produce a site layout which will minimise the risks;
 - identify any planning, equipment, information and training needed to deal with emergencies.
- Controllers need to:
 - assess the risks from transporting, assembling, maintaining and using the attraction.

21 In some cases the duties will overlap, for example if someone both designs and manufactures an attraction. If this is the case, dutyholders need to:

- identify any control measures, precautions, information, instructions and training needed to make sure that all jobs are done safely;
- review their assessment, where relevant, in the case of changes in design, manufacturing process, modifications, operating conditions, operational experience etc.

What is ‘reasonably practicable’?

22 Many of the requirements of health and safety legislation require you to take ‘reasonably practicable’ steps and precautions to manage risks. The term ‘So far as is reasonably practicable’ means you have to take action to control health and safety risks except where the cost (in terms of time and effort as well as money) of doing so is grossly disproportionate to the reduction in the risk. You can work this out for yourself, or you can apply accepted good practice. The guidance in this book is supported by the trade associations as being good practice.

What is ‘foreseeable misuse’?

23 The concept of ‘reasonably foreseeable’ excludes the irrational (eg drying the cat in the microwave). The foreseeability of the danger includes considering the likelihood of the combination of circumstances that there would need to be for the potential of harm to be realised. You will need to consider foreseeable situations in which the passenger’s expected actions, as a result of not being able to fully perceive the danger or as a result of something unexpected happening, may expose them to an increased risk.

24 The term foreseeable misuse is not intended to include improbable or outrageous misuse. It could include:

- a ride being loaded out of balance;
- trying to start a ride before the passenger restraints have been closed;
- passengers trying to leave before a riding cycle is finished.

25 It is important to consider such misuses early on so that they can be taken into account at the design stage. Some foreseeable misuses may be preventable by design features such as interlocks. The designer may need to give advice for inclusion in the operations manual, for example in the case of out-of-balance loading the designer should:

- decide what out-of-balance loading is foreseeable;
- make sure that the ride design has considered the effects of such loading;
- give advice on safe loading of the ride.

Consultation with employees

26 Employers must consult all employees on health and safety issues 'in good time' on:

- new measures;
- appointing competent persons to advise on health and safety;
- health and safety information;
- health and safety training;
- new technologies.

27 Where trade unions are recognised, this must be done through the representatives they appoint. Other employees must also be consulted, either directly or via their elected representatives.

Section C

Designing and manufacturing an attraction

Designers

28 Amusement devices can range from relatively simple designs such as small juvenile rides, to large, adult rides of considerable complexity. It is important for the safety of the public who use them, and the operators who work on them that safety is considered adequately at the design stage.

29 As a designer of an amusement device you should ensure that it will be safe when it is being:

- assembled, dismantled, transported and installed;
- operated, cleaned, maintained, inspected and tested;
- used by the public.

30 You should specify the conditions in which the amusement device is expected to operate. This should include any limitations on use. You should also ensure the design is:

- supported and proved by any testing, examination and research needed to demonstrate that the device will be safe when used as intended;
- sufficiently detailed to ensure that it can be built, operated, maintained and inspected safely (including any special requirements for installation);
- validated as a whole, which is especially important when parts of the device are made by different manufacturers.

31 You should make sure that all the design work is properly carried out in accordance with relevant standards, is thoroughly documented and that all necessary quality assurance relating to the design is carried out.

32 You should make recommendations to the manufacturer/supplier, as appropriate, for items to be included in a commissioning schedule to ensure that the amusement device is properly commissioned before first being put into use.

33 You should also provide appropriate input to operating instructions, inspection and maintenance schedules etc, necessary for safe operation of the amusement device so that they can be included in the operations manual. This documentation should be in a language that is understandable by the people to whom the amusement device is being supplied.

Design risk assessment (DRA)

34 The fairground industry publication *Safety of amusement devices: Design*⁴ defines a design risk assessment as: ‘the process of assessing the hazards that an amusement device might pose, the likelihood of those hazards causing a risk and the control measures that are necessary to control those risks adequately’.

35 As a fundamental element of the design process, you should assess all the risks associated with the design, as well as those risks arising out of the activities specified in paragraph 29 and record this in the DRA. It should be used to help specify the safety functions of the amusement device.

When more than one designer is involved

36 The overall design of an amusement device may involve contributions from a number of people. For example, there may be separate designers for passenger cars, passenger restraints, track, control systems etc. It is important that the process of producing the overall design is co-ordinated and managed effectively to ensure that all safety-related aspects are considered and combined effectively.

37 For fairground equipment designed in Great Britain (GB) the responsibility for co-ordinating the design work lies with the person responsible for the overall design of the device.

38 Where the fairground equipment has been designed outside GB, the supplier or importer assumes the responsibility for ensuring the amusement device is safe to operate. In such cases they should take all reasonable steps to ensure that the advice in paragraphs 29–33 has been followed.

Pre-use inspections

39 Before an amusement device is used for the first time, the safety-related features of the design should be checked through a process of pre-use inspections, using an appropriately registered inspection body (see Section D paragraphs 83–122 for more information on pre-use inspections).

Designers and the design review process

40 One of the pre-use inspections is the process of design review. This should preferably be carried out before the device is manufactured. The designer should make all information required by the design review body available, as the device will not be able to operate without it.

41 Where you know that an inspection body has been appointed to carry out a design review, you are encouraged to consult them as early as possible in the design process. This is so that any possible design problems can be designed out at an early stage rather than at the end of the process, where even a seemingly minor requirement might be extremely difficult or time-consuming to implement.

Modifying an existing design

42 If an existing device is modified, the controller of the device should select a competent person to co-ordinate the modification process. This is to ensure that all the safety-related aspects of the modification are considered.

43 Designers who become aware of a feature of their design that might lead to danger should:

- take all reasonable steps to ensure that controllers using that version of the device are made aware of this;
- tell controllers about details of any modifications that are required and any time-scale that applies.

44 The controller should ensure that the safety-critical aspects of a modification to an existing design are subject to the three pre-use inspections. See paragraphs 182–183 for details of what constitutes a safety-critical modification and paragraphs 83–122 for details of pre-use inspections.

45 Any person within the supply process who becomes aware of a design deficiency that might lead to danger should take all reasonable steps to ensure that others known to be in the supply chain and any controllers using that version of the device are provided with necessary information to avoid failure of the device.

Manufacturers

46 During the manufacturing process you as a manufacturer should ensure:

- that every device fully meets the design specification in terms of materials, material properties, dimensions, quality and manufacturing standards etc; and
- that parts which are not readily identifiable for correct assembly are clearly marked in a manner which will avoid errors in assembly; and
- that those constructing the device (eg welders, electrical technicians etc), including any subcontractors, are suitably qualified and competent to do so.

47 Where you use subcontractors for part of the manufacturing process, you should specify the following:

- the name of the individual or organisation which has the overall co-ordinating role for manufacture (either yourself or someone appointed on your behalf); and
- the extent and limits of all contractor's duties and responsibilities; and
- the expected criteria for quality assurance and quality control.

Quality assurance

48 You should make sure that:

- the device is manufactured to the design specification and that all components and materials used are of the correct quality; and
- all aspects of manufacture are controlled by measures designed to produce a consistent and high standard of quality, eg by reference to established quality assurance procedures;
- people manufacturing the device are competent; and
- it is manufactured to the appropriate standards.

Control systems

49 Where the device has safety functions that make use of one or more electrical, electronic, or programmable electronic safety-related control systems, make sure that the system, including any software that may have a safety function, is designed, developed and quality assured using the principles set out in relevant standards.

Non-destructive testing (NDT)

50 You should also check that any NDT required during the manufacturing process has been done. It is good practice to keep the records of such tests for the lifetime of the device. You should add any relevant pre-use NDT reports to the operations manual; this is because if flaws are subsequently found by NDT, it will not be known whether these flaws have arisen during operation. See Appendix 5 for further details.

Commissioning schedules and initial test

51 You should ensure that a written commissioning schedule is in place that can be used by those people who are expected to install and put amusement devices into use.

52 It should confirm that the device has been manufactured and installed so that all operational and safety systems are functioning correctly. It should also list the tests that will need to be carried out during initial test. See Section D paragraphs 110–122 for more information on the initial test.

53 The commissioning process in itself is not a substitute for an adequate initial test to be witnessed by the inspection body. To ensure the installation process is managed effectively, the commissioning process and initial test should be seen as separate exercises and clearly identified as such.

Installing an amusement device as a fixed structure

54 This section refers to the assembly of a device that is designed as a fixed structure, and not as a mobile structure which is designed to be frequently erected and dismantled. For a new fixed structure, installation can be part of the manufacturing or supply process (depending on the design of the device and the terms of the contract). Installation may also involve more than one manufacturer and may be wholly or only partly under the controller's control.

55 The parties involved will need to co-operate and co-ordinate to ensure they are clear as to who is responsible for what and at which stage. This should be confirmed in writing before any work begins, and any modifications to the plan confirmed in writing to all interested parties.

56 If a device is installed as a fixed structure, but later dismantled and reinstalled, this should be considered as a modification. However, as long as no changes to the design have been made, a design review may not be necessary for the structure, but will normally be required for the design of the foundations unless the ground conditions are identical. The extent of the design review is a decision to be reached by a design review inspection body.

57 An initial test will still be required to confirm that the device has been reinstalled correctly and that items such as theming have been added correctly. If any theming is involved, then this should be included in all the pre-use inspections if it can affect the safety of the amusement device.

Converting a mobile amusement device to a static fixed device

58 There are times when a device that was originally designed for mobile use will be used as a fixed structure. The controller should ensure that any additional factors, such as extra theming or ground conditions, do not introduce risks (eg by compromising the safety envelope of the amusement device).

59 If the process of dismantling the amusement device and its subsequent assembly as a fixed device did not involve intrusive processes or any changes that may affect the safety of the device, then the necessity for pre-use inspection may be limited to an initial test. The scope of the initial test will depend on any risks associated with items added to the device that would not normally be associated with mobile devices.

60 If safety-critical modifications have been made, the device will need to have the full range of pre-use inspections carried out before it is brought back into use.

Importing an amusement device

61 You are an importer if you bring a device into the country either temporarily or permanently. If you buy a foreign device through an agent who is permanently resident in Britain, the agent is normally the importer.

62 You are responsible for ensuring that the pre-use inspections (design review, assessment of conformity to design and initial test) are carried out and that the designer and manufacturer have followed the information in this book. You can do this by checking that the operations manual contains the necessary reports on the pre-use inspections.

63 The device should not be used unless these pre-use inspections have been carried out, and the inspection body verifying the inspection reports has confirmed in writing it is satisfied that the device is safe to be used.

64 It is recommended that in purchase contracts for new devices you should request that designers, manufacturers and importers follow the appropriate guidance in this book and in the publication *Safety of amusement devices: Design*.⁴

65 You should take care to check that the documentation you receive follows the requirements of ADIPS pre-use inspections. Differences in methodology, practice, procedures and certification requirements between countries can lead to different interpretations of what is required, for example:

- use of design criteria inappropriate for Britain, eg wind loading;
- incomplete review, eg with no, or inadequate, attention to control systems or passenger-containment systems;
- false assumptions, eg that a component or a safety-control system will never fail or that it will fail safe.

Supplying an amusement device

66 You become a supplier if you sell (or hire out) any device, new or second-hand. Make sure you do everything necessary to check that the designer, manufacturer and importer, as appropriate, have complied with their legal requirements and have followed the advice in this guidance.

67 You can do this by checking that the operations manual contains the necessary reports on the pre-use inspections: design review, assessment of conformity to design and initial test. If these have not been done, you will need to take steps to have these completed before the device is first used.

68 You must provide the controller with all the information necessary for safe use, before the device is first used. You should include the reports of pre-use inspections, and any modifications stemming from them.

69 If you intend to hire a device it should have a current Declaration of Operational Compliance (DOC) (for inflatable devices a DOC issued under the ADIPS system or a safety certificate issued under the PIPA scheme). This information should be included in the operations manual. It should be in English (and the language of the controller, if different) and be adequate for effective safe use, maintenance and inspection of the device.

Section D

Inspecting an amusement device

Inspection and testing

70 This section provides guidance on the procedures that are in place to ensure that amusement devices are checked for safety before they are first used, and on the periodic annual in-service inspection required to assess their ability to operate safely throughout their working life. See Section F for guidance on maintaining and carrying out the daily checks which are required to operate a device safely.

71 There are currently three agreed schemes in this industry for the inspection and testing of amusement devices:

- The Amusement Devices Inspection Procedures Scheme (ADIPS) involves a series of pre-use and in-service inspections, and applies to all fairground rides, amusement devices and inflatable amusement devices. The amusement industry trade associations recognise this as the scheme for the pre-use inspection, in-service annual inspection and certification of all amusement devices. It is administered by ADIPS Ltd.
- Within ADIPS, the pre-use and in-service inspections of all coin-operated amusement devices that do not fall under the main ADIPS scheme. This is administered by the British Amusement Catering Trade Association (BACTA) on behalf of ADIPS.
- The PIPA scheme is administered by the Performance Textiles Association (PERTEXA). This scheme is also recognised as being appropriate for the pre-use and in-service inspection and certification of inflatable amusement devices.*

* PIPA is supported by the inflatable industry associations (IPMA, AIMODS, BIHA, NAIH) and was developed in consultation with HSE. Design, conformity and initial test are certified by a uniquely numbered PIPA tag that is permanently attached to the unit, as well as a yearly renewable inspection certificate. Further information can be found on the PIPA website: www.pipa.org.uk.

Amusement Devices Inspection Procedures Scheme (ADIPS)

72 ADIPS covers:

- types of inspection required for amusement devices;
- registration and administrative control of inspection bodies;
- documentation required by amusement device operators;
- inspections required for coin-operated passenger-carrying amusement devices and liaison with BACTA.

Types of inspection covered in ADIPS

73 There are four types of inspection within ADIPS that fall into two categories: pre-use inspections and the in-service annual inspection.

Pre-use inspections

74 These should be carried out before an amusement device is used for the first time in GB, or after any safety-critical modifications to an existing amusement device. These are:

- Design review (paragraphs 85–103).
- Assessment of conformity to design (paragraphs 104–109).
- Initial test (paragraphs 110–122).

In-service annual inspection

75 This should be carried out at least once every 12 months (see paragraphs 124–134). Note that an inspection body may require a further examination at a specified shorter period.

Maturity risk assessment (MRA)

76 When ADIPS was introduced in 1997, it was recognised that there would be devices in use that had not been subject to pre-use inspections and did not have complete design documentation, but that were, however, well-designed and maintained. An arrangement was therefore reached to allow such devices to continue to operate. The controllers of these devices were given until 2004 to prepare an MRA that could be used to demonstrate safety through maturity of a device. This only applied to devices that had operated in GB before 1997.

77 It is accepted that there will be a number of older amusement devices operating that now have an MRA instead of the ADIPS pre-use inspections. To help assess the adequacy of these MRAs, guidance on the background to the MRA process, and information on what should be included in one is outlined in Appendix 2. This information may be used by both inspection bodies and HSE inspectors to determine the adequacy of the MRA.

Register of inspection bodies (IBs)

78 The amusement industry trade associations have agreed that only inspection bodies registered with ADIPS should carry out inspection and certification of amusement devices. An inspection body may be registered for any or all of the types of inspection. They should only work within the scope of their registration. For example, bodies only registered to carry out in-service annual inspection should not carry out design reviews etc.

79 ADIPS contains a service quality schedule (SQS) for each type of inspection, identifying the qualifications, experience and procedures necessary for an inspection body to be registered with the scheme. The SQSs are currently based on the requirements of ISO 17020.⁵ The registration procedure requires all inspection bodies to compile and maintain a quality file containing details of their qualifications, experience and other competencies, as required by the SQSs.

Administration of ADIPS

80 ADIPS Ltd and BACTA administer the scheme:

- ADIPs deals with the inspection bodies who carry out the four types of inspections needed on amusement devices. They have prepared a series of forms (available from ADIPs Ltd) that should be used by inspection bodies. Only inspection bodies that are competent for the type of work that they carry out may be registered with ADIPS.
- BACTA administer the scheme only in respect of qualifying coin-operated, passenger-carrying amusement devices. In this scheme only the initial test and in-service annual inspection are required.

Independence of inspection bodies

81 Inspection bodies carrying out pre-use inspections should be able to demonstrate independence from the design, manufacture, supply and importation process of the device they are inspecting, both for new devices and for safety-critical design modifications to existing devices. This is to avoid any potential conflict of interest where the independence of their work might be compromised. In the BACTA scheme the inspection body need not be independent of the operating or manufacturing company.

82 Where specialist expertise is required during in-service inspection, it may be necessary to use a person who is not independent of the supply process. For example, it may be appropriate in some instances to use the manufacturer of a specialist component to give advice on its fitness for further use. The competence of any specialist used is the responsibility of the person who appointed or contracted them. Any use of such specialists should be with the agreement of the appointed inspection body.

The pre-use inspection process

83 The controller of an amusement device is responsible for ensuring that the three pre-use inspections are carried out before it is brought into operational service, either for the first time following its manufacture or importation, or after any safety-critical modification. The controller may appoint an inspection body to take overall responsibility for arranging the work, confirming the completion of the pre-use process and issuing the Declaration of Operational Compliance (DOC). This inspection body is known as the Appointed Inspection Body (AIB). The AIB may collate the work of others to complete the process and issue the DOC, or they may carry out some or all of the work themselves, depending on the circumstances and complexity of the task. Where only one body is involved it will automatically become the AIB.

84 It is important that the AIB confirms before issuing the DOC that any requirements for further procedures and testing outlined in the design review have been satisfactorily completed.

Design review

85 Design review is the first of the pre-use inspection procedures. Its purpose is for an independent and competent inspection body to assess a design prepared for a device, and conclude whether the designer has adequately addressed all issues that may affect the safety of the device that will be relevant throughout its intended operational life. Only inspection bodies registered with ADIPS to carry out design reviews should carry them out.

When is a design review needed?

86 A design review should be carried out for any amusement device supplied or imported into GB before it is used for the first time. It is also needed for any device that has had a safety-critical modification. Where a design review is assessing a modification to a device, it can be limited to the modification and any other safety-critical parts of the device affected by it.

Application of a design review

87 It is essential that a design review clearly identifies the precise model number or design version of the device. If the designer or importer has not specified a design version number, the inspection body should identify the amusement device to which the review applies. This identification should appear on all documentation.

88 The design of a type of amusement device may vary over time as the designers and manufacturers change and update the original specification. In some cases modifications to the design may be minor, in other cases substantial. Changes may or may not be safety critical. It cannot therefore be assumed that, simply because a device bears a physical resemblance to an earlier model, it is the same in every regard. If a design is modified in any way that affects safety, a further design review will be needed.

89 If a design review is carried out and intended to apply to a series of identical devices, then this should be clearly stated on the front sheet. In this case the other pre-use inspections will still be required for each individual device. Where a new model of an existing ride design is put forward for design review, the inspection body may be unable to confirm that the existing design review is valid for the new model without further work being done. For example the design drawings referenced in the original design review will need to be available to the inspection body so they can check that the design of the new device is identical to the one previously reviewed.

90 If anyone intends to buy, import or supply a new device and an existing design review (for example, a design review carried out for an earlier model of a device) is provided as evidence that the design of the new device is safe, written confirmation should be obtained from the original design review inspection body, that their design review is valid for the new device and applies in all respects to the new device that is now being brought into use.

91 The other pre-use inspections, assessment of conformity and initial test that are designed to ensure the device is as reviewed will still be required for the new device.

Managing design review

92 When a design review is commissioned, an inspection body should be selected by the person commissioning the work to take overall responsibility for co-ordinating the design review process. This inspection body may subcontract to, and/or collate the reports issued by, other registered inspection bodies where such bodies have been appointed by other parties (eg designer, manufacturer or controller) to carry out discrete parts of the overall review.

93 The co-ordinating inspection body is responsible for ensuring the competence of anyone subcontracted by them who is not registered with ADIPS. They are not responsible for the quality of reports carried out by other registered inspection bodies who bear that responsibility themselves.

Contents of a design review

94 The design review should include (but not be limited to) the adequacy of the following:

- the design calculations;
- the design documents, which should be consistent with appropriate standards, specifications, guidelines and industry practice;
- details of any non-evidence-based assumptions, particularly those on which any calculations are based (eg fatigue life);
- the design and operation of any control system (electrical, electronic or other, programmable or otherwise);
- an assessment of the structural/mechanical safety of the amusement device;
- the suitability of the containment system (and the adequacy of any passenger restraints included as part of this system);
- the operating instructions, which should be clear, complete and sufficiently detailed;
- the inspection and maintenance schedules, including the NDT schedule and that they are sufficiently detailed.

95 The co-ordinating inspection body should confirm the extent of the review. Some modifications may require only limited review, but a change to the seating capacity, for example, might require the whole device to be reassessed.

96 The inspection body issuing the DOC should ensure that the following has been done:

- confirm that the steps in paragraph 94 have been completed;
- confirm that the design of all relevant component parts (eg mechanical, structural, hydraulic, control system, electrical, electronic, ergonomic, containment etc) of the device have been reviewed by competent inspection bodies and their findings presented.

When is a design review complete?

97 A design review should reach one of four conclusions:

- the device will be safe if built and operated and maintained to the design that has been reviewed; or
- deficiencies in the design have been identified, however, the device is considered to be safe to operate **where specified written operating, inspection and/or maintenance arrangements are in place** to address those deficiencies (eg limitations in operating conditions such as reduced numbers of cars, reduced speed, specified inspections of critical parts etc); or
- deficiencies in the design have been identified, however, the device is considered to be safe to operate for a limited number of cycles. In this case the design review **must be limited, either by date or by number of completed ride cycles**, and after it expires:
 - either a further review must be carried out to determine whether the device is safe to operate and what conditions of operation, maintenance and/or inspection are required; or
 - written confirmation has been received from the design review body that all outstanding issues have been satisfactorily resolved;
- the design of the device is deficient to the extent that the device cannot be safely brought into service. In such cases the design review should state the reasons why. This should be communicated to the person who commissioned the review as soon as possible.

Deficiencies in the design

98 Where the design review identifies deficiencies or where there is inadequate information available to allow a design review to be carried out satisfactorily, this should be brought to the attention of the person who commissioned the design review, who should take appropriate action to rectify the deficiency.

99 Where any re-design has been carried out, it should be subjected to design review, to the extent determined by the inspection body.

100 A design review may produce findings that have implications for the safety of other devices. The controller and the design review body are advised to contact their trade association and/or the ADIPS bureau in such cases.

Completing the report of design review

101 As a minimum the report of design review should contain the following:

- information on the scope of the design review, eg whether it deals with a part (structural, electrical etc) or all of the design;
- a means of identifying the specific device including any model numbers;
- a list of the drawings, with drawing dates and revision numbers, calculations and information reviewed;
- the categories in paragraph 94 which apply to the design being reviewed;
- any measures that are required for safe operation;
- any extra information identified by the review that is required for the future inspection, operation and maintenance of the device;
- any time/cycle limitations;
- items that require further consideration at either the ACD or initial test stages.

102 The report of design review is not a substitute for the information that should be provided by the manufacturer, designer, importer or supplier which is required for the safe operation, inspection and maintenance of the device. This information should be in the operations manual (see Appendix 3 for further details).

103 Once the design has been reviewed, some safety-related matters may still need to be proved by testing or other procedures. Where this is the case, the inspection body should state this in the design review. They should include details of any further information and test results that are needed by them to allow the review to be completed. The design review will not be complete until any further work specified has been completed.

Assessment of conformity to design (ACD)

104 Assessment of conformity to design (ACD) is the second of the pre-use inspections. Its purpose is for an independent and competent inspection body to check that the safety-critical aspects of a manufactured device conform to the reviewed design.

105 The ACD for a device coming into use for the first time in GB should cover the entire device, including structural, mechanical, electrical, electronic, hydraulic and pneumatic assemblies. An assessment of a safety-critical modification, however, may only need to cover the parts affected.

106 As with the process of design review, it may be that more than one inspection body will be involved in checking the assessment of conformity to design of a device, especially if the device is large or complex. The person who commissions an ACD should therefore appoint an inspection body to take overall responsibility for co-ordinating the process. This inspection body may subcontract to, and/or collate the reports issued by, other registered inspection bodies where such bodies have been appointed by other parties (eg designer, manufacturer or controller).

107 The ACD should confirm that the design review corresponds specifically to the device being assessed. The process should involve using the drawings and information referenced in the design review. Examples of areas that may need to be considered are:

- critical structural dimensions;
- mass of components which could affect safety;
- conformity of materials to the design specification;
- conformity of electrical, hydraulic and pneumatic assemblies to the reviewed design.

108 The methods used may be physical and visual assessment and/or by considering quality assurance (QA) documentation from the manufacturing process. Sampling may be appropriate in some cases.

Issuing the certificate of assessment of conformity

109 At the completion of the ACD process, the inspection body should issue a report of assessment of conformity to design. This should be submitted to the AIB and should contain the basic information recommended in paragraph 107 and clearly specify:

- what has been assessed; and
- any parts of the device which do not conform to the specification. It is recommended that this information should be passed to the person who commissioned the report and the manufacturer, where different.

Initial test

110 The initial test is the third of the pre-use inspections. The purpose of this inspection is to have an independent and competent inspection body check that the safety-critical aspects of a device function as intended. An initial test is needed at the following times:

- before first use of any device in GB;
- before re-use after any safety-critical modification;
- before first use of any device installed at a fixed site (see Section C, paragraphs 54–57).

111 The controller of the device is responsible for ensuring that the initial test is carried out. It is normally carried out by or on behalf of the designer, manufacturer, importer, or supplier in accordance with a prepared schedule, and verified by the inspection body. The inspection body should ensure that all relevant tests have been carried out satisfactorily before issuing a report of initial test.

112 Commissioning tests may not substitute for a properly conducted initial test. However, information from such tests may be submitted to the inspection body witnessing the test as evidence of the device's performance under particular conditions. The inspection body will decide whether the evidence is suitable to include as part of the tests required to issue a satisfactory report of initial test.

113 The initial test programme should take into account any recommendations for checks and tests included in the reports of design review.

114 All documentation supplied for the purposes of the initial test should be in English. It would not be possible to conduct an adequate initial test if the documentation were in a foreign language.

115 The initial test is likely to be made up of a number of different tests that measure and record performance, rather than just checks on the function of the controls. For example, when a stop control is tested, it may be important to know how long the device takes to stop and that functionally it does stop within prescribed limits. This will allow the controller to detect any later deterioration in performance.

116 The device should be tested against its foreseeable operating conditions. For example, if a device is manufactured with an operational capability of being run by the operator at a rotational speed of 25 rpm, it should be tested at that speed to give a true test of its possible performance.

117 Using documentation relating to tests done by others is acceptable if reasonable steps have been taken to verify that the tests were relevant, the procedures used were appropriate and the results reliable. These reports need to be added to the report of initial test. Where previous tests are accepted, functional testing of the device under both normal and foreseeable emergency conditions still needs to be witnessed by the inspection body.

Managing initial test

118 The initial test should include, where relevant, but not be limited to:

- an assessment of the stability of the device including when foreseeably unbalanced;
- checking the safety-critical elements of safety envelopes;
- checks to make sure that switches, valves, variable controllers (eg pressure regulators), overload protection (eg pressure-relief valves) etc are properly set and, where appropriate, locked off, and settings recorded;
- observations and measurements of the performance of the device under normal loading and foreseeable unbalanced loading in all the configurations permitted in the operations manual;
- measurements of speeds, accelerations and forces **up to the maximum design capability** of the amusement device to check the validity of the design calculations;
- tests of the function and performance of safety-critical systems in normal operation and under foreseeable fault and emergency conditions;
- confirming the availability of an operations manual in the language of the controller.

119 Test loads should be of an appropriate size and shape, for example a sandbag strapped to a seat might be adequate to test structural members supporting a passenger unit, but might not be suitable to test the effectiveness of a passenger restraint.

120 When the initial test is complete, the inspection body should discuss the results with the designer, controller and co-ordinating design review inspection body and document any unsatisfactory results, damage or failure. The inspection body should document what repeat testing may be needed after any remedial action that has been found to be necessary has been completed.

121 A report of initial test needs to be issued to the person who has commissioned the report for subsequent inclusion in the operations manual. A report of initial test should not be issued unless the inspection body has witnessed and verified that at the time and place of test the device has performed safely.

Issuing a report of initial test

122 The inspection body needs to prepare a report for inclusion in the operations manual. A satisfactory report should be based on the schedule provided by the designer/manufacture and verified in the design review. The following should be included where relevant:

- the loads used and results obtained (as the reference for future tests);
- details of the relevant testing done by the manufacturer and the results obtained;
- copies of inspection reports and tests done by others;
- details of the weather conditions at the time of the test, if relevant;
- any limitations as to use identified during the initial test;
- any aspects of performance identified during the initial test that the controller should monitor and details of how that work should be done;
- that a initial test has been witnessed and the device performs according to requirements of the initial test schedule.

Completion of the pre-use inspections and issue of the Declaration of Operational Compliance (DOC)

123 A DOC can be issued by the AIB when the inspection bodies carrying out each of the pre-use inspections have confirmed in writing that these inspections have been satisfactorily completed. The DOC should be issued with an expiry date subject to any conditions imposed as a result of the findings of the pre-use inspections, but in any case should be no longer than 12 months.

In-service annual inspection

124 In-service annual inspection is the fourth of the package of safety inspections for devices operating in GB. Its purpose is for an independent and competent inspection body or bodies to check on the fitness of an amusement device for continued further use during its operational life. It is a check on the safety-critical components of an amusement device to ensure that they have not deteriorated to an extent liable to cause danger.

125 A successful in-service annual inspection will verify that the device is fit to be used for a specified period. It does not remove the duty on the controller of a device to ensure that the device is adequately maintained, nor does it duplicate the pre-use inspection procedure.

Managing in-service annual inspection

126 The controller of an amusement device should choose an inspection body to act as the AIB. It is the role of the AIB to issue the DOC when the inspection has been satisfactorily completed. Where only one inspection body is involved it will automatically become the AIB.

127 There may be a number of different inspection bodies carrying out inspections and tests of individual subsystems (eg mechanical, hydraulic, electrical etc) covering the safety-critical components of the amusement device.

128 If actions need to be taken before the device can be used again, or within a specified time, the inspection body should inform the controller in writing of the necessary requirements.

129 The AIB should ensure that all the relevant inspections required to ensure the continuing safety integrity of the amusement device have been completed and a report issued. A report number, completion date and expiry date should be provided for each report. Once these are confirmed and collated the AIB may then issue a DOC to the device controller.

130 Where an inspection body has completed its inspections, but the final report has not been issued, the AIB may issue a DOC as long as the inspection body concerned has confirmed in writing that the inspections have been completed and the device has been found to be satisfactory. The final report should be sent to the AIB within 28 days of the work being completed.

131 A registered inspection body should not work outside its area of competence, ie the categories of work they have registered with ADIPS Ltd to carry out.

132 An inspection body is not responsible for work carried out by other registered inspection bodies. The individual inspection bodies have a duty to ensure their work is both competent and diligent.

How long is a DOC valid for?

133 The DOC lists the individual inspections that have been done, and the date they were completed. These inspections are normally valid for 12 months from completion, unless a shorter time has been specified. Each of the reports will have an expiry date. The expiry dates of the reports may be different if the individual reports were carried out by different inspection bodies at different times.

134 The DOC expires on the date that the first individual examination reports listed on the DOC expire. The period of time between in-service annual inspections should not exceed 12 months, but may be a shorter period of time if specified in any of the reports or by the AIB.

Role of the appointed inspection body

135 The AIB should:

- confirm that the pre-use inspections (design review, assessment of conformity to design and initial test, or risk assessments if the design is mature (see Appendix 2)), have been carried out and are documented in the operations manual;
- confirm that the relevant in-service inspections are documented in the operations manual;
- make all reasonable enquiries with the controller whether any modifications that may affect the safe operation of the device have been made since the previous DOC was issued and that the design review, assessment of conformity to design and initial test, as required, have been documented in the operations manual;
- confirm that the report of functional test is in the operations manual. The purpose of the functional test is to check that the device operates safely within stated operating conditions.

Preparing for an in-service annual inspection

136 The controller and the relevant inspection bodies should agree the items to be dismantled. It is recommended that this is done in advance to allow parts to be prepared for inspection before the inspection body arrives. Preparation may include degreasing, removal of rust, removal of paint, or other protective finishes. This will normally include the dismantling of complex assemblies to allow access to safety-critical areas.

137 Difficulty of access is not a valid reason for failing to inspect safety-critical components.

138 The schedule specifying the required non-destructive testing (NDT) will also provide information on any disassembly required. See Appendix 5 for further details.

139 Before starting work, the inspection bodies involved in the inspection should:

- check with the controller and in the operations manual to see whether any safety-critical components have been replaced, modified or repaired since the issue of the previous DOC. If so, there may be a need for further inspection or actions as a result of this work;
- check with the controller for any relevant accident or incident history of the device. This will inform them of necessary further inspection or action that may be required;
- check the operations manual to review the service history, identify the safety-critical components and any recommended inspection methods listed.

Recommended procedure for in-service annual inspection

140 The inspection should include, where appropriate:

- visual inspections;
- NDT;
- electrical tests;
- functional tests.

141 An in-service annual inspection should consider all the safety-critical parts of the device. This will normally include the following, where appropriate:

- the condition of mechanical and structural parts of the device. Examples of this are the load-bearing components including the supporting structure, passenger-carrying units, couplings etc;
- any equipment used for assembling or dismantling where it is part of the device;
- the condition and settings of the hydraulic or pneumatic system;
- interlocks, especially those that have a safety function;
- the integrity of the passenger-containment system;
- the integrity of the passenger restraint to make sure that it is in good condition, properly adjustable and functioning correctly. This should include a sample strip down of passenger restraints unless there is a reason for not doing so documented in the operations manual. Any sampling carried out should follow the guidance in paragraphs 144–145;
- the parts of the device which do not normally bear passenger loads, including lighting fittings, guard rails, canopies etc and other decorative features as well as their supporting members (particularly important where such parts could fall or be projected into the path of moving passenger carriages);
- the integrity of the electrical installation, including generators;
- equipment providing motive power;
- control systems, particularly those systems that have a safety function;
- guards and barriers;
- attachments which could affect safe operation, eg theming, lighting supports and access platforms;
- safety equipment which is not designed to function during the normal operation of the device, for example:
 - fall-back arrestors, emergency brakes or other systems providing redundancy and back-up systems;
 - chains and ropes used to retain parts of the device in place in the event of structural failure;
 - integral evacuation equipment.

142 Inspection bodies should make any recommendations for any other inspection or testing that they feel is necessary to allow them to complete their part of the inspection.

143 An inspection body should confirm that devices have been upgraded to avoid danger, where information is reasonably available to them and lies within the remit of the inspection they are carrying out. Sources of information would include safety bulletins from manufacturers, the trade associations, ADIPS, HSE and information received by the controller.

Sampling

144 If a device has a number of identical components which can be individually identified, the appointed inspection body may select a proportion of them and examine that sample in detail. If any defects are found in the sampled components, the remainder will need to be examined.

145 The components sampled should be varied from one inspection to the next, and their identities documented to ensure that over a number of in-service annual inspections all similar components have been inspected.

Functional test

146 An in-service annual inspection should include a functional test. This should not be attempted until any work on safety-critical components, identified as necessary as a result of the inspection, has been completed and the device reassembled. It may require a separate visit.

147 The device should be observed operating (with representative loads if necessary) and the effective operation of safety-related controls checked. The load may be provided by passengers if safe to do so.

148 The observations made should be compared with the operating specifications set out in the operations manual. This includes those for speed controls, stopping devices and any interlocks, for example between passenger restraints and the starting device.

Written report

149 After completing their inspection, each inspection body involved should prepare a written report, including a reference number and dates of completion and expiry. The report needs to list any faults or any areas which require further inspection or testing. It should be clearly stated:

- if the device should not be used – the reason(s) why and a list of defects;
- if the AIB is recommending that the device should only be used under specific limitations (eg under reduced speed or with certain passenger units not used);
- the maximum period of time that the device may be operated before re-inspection of the full device (or named components);
- if after remedial maintenance, repair or testing has been completed, further inspection is required.

150 Once the AIB has collated all the individual inspection reports and by doing so has confirmed that all the relevant inspections have been satisfactorily completed, they may issue a DOC to the controller. A DOC should not be issued until the AIB is satisfied that all necessary remedial actions outlined in the inspection reports have been completed.

151 The controller should keep reports of in-service annual inspection for at least 10 years (indefinitely if possible) to provide a history of the device.

Section E

Guidance for organisers

Role of the organiser

152 Effective organisation of fairs and amusement parks is essential to manage safety properly and control risks. The aim of the organiser is to ensure the safe operation of the fair or amusement park by taking overall responsibility for the management of the risks. The organiser will need to:

- identify any control measures needed to avoid or reduce risks to the public and employees;
- have a policy in place for organising, planning, monitoring, controlling and reviewing activities that affect the safety of people on the site.

153 The organiser may be an individual, a group of people or a company. In practice the identity of the organiser will depend on the following:

- for fixed sites, such as amusement parks, the person or company in control of the overall site will usually be responsible;
- for temporary sites the situation may be more complex:
 - where an individual acts as a licensee, that individual is the organiser;
 - where there is no licensee, then an organiser should be chosen and be given the necessary authority by the controllers present;
 - where the fair is part of a larger event, the promoter will usually be the organiser. The controllers present must co-operate with the organiser.

154 While individual controllers have overall responsibility for the safe operation of their attractions, the organiser needs to make sure that the actions of these controllers do not affect the overall safety of the site. The organiser should take reasonable steps to ensure that individual controllers have complied with their duties under this guidance. It is imperative that the organiser has the authority to take any necessary action to ensure the safety of the public if it is apparent that a controller is failing to do so.

Organising

155 As organiser you will need to:

- appoint responsible people to be on duty while the public is on site and make sure they have been trained in the action to take if there is a fire or other emergency;
- make sure that people with specific responsibilities in emergencies are readily identifiable by conspicuous clothing or marking;
- have a named deputy who has the responsibility and authority to act in your place;
- let each controller, operator and attendant know your identity and the names of any deputies, together with all necessary information about the emergency plan, including site address and any relevant telephone numbers;
- identify and mark escape routes and any assembly points and make these known to staff and to the emergency services and others involved with the fair as necessary.

156 Make sure that everyone involved has, at some point, received relevant training in emergency procedures. This does not necessarily mean that you have to do the training, but you should check that it has been done. The training should include:

- how to spot and prevent potential emergencies;
- what to do on discovering an emergency;
- how to raise the alarm;
- how to use emergency equipment;
- how to help others escape to a safe place.

Planning

157 Consult the appropriate authorities and emergency services before the fair takes place (or periodically for fixed sites) to make sure they are aware of what is being planned, and have the opportunity to comment on any proposals being made.

158 Ensure that risk assessments have been carried out that identify what needs to be done with regard to:

- transport and access, eg for both routine transport movement and emergency vehicles;
- emergency situations, including evacuation, which could arise from:
 - fire or explosion;
 - major failure of an attraction;
 - severe weather conditions;
 - overcrowding or crowd disturbances;
 - any other reasonably foreseeable emergencies, which will depend on the nature, size and location of the site.

Emergency plan

159 Make sure you have appropriate emergency procedures in place for the duration of the fair. You should have prepared a written emergency plan before the fair starts, or, in the case of a fixed site, before it opens to members of the public. The detail and complexity of any plan will depend on factors such as the size of the fair or fixed site, its location, duration and the likely number of visitors. The risk assessments for the fair should provide a focus for areas that need to be considered.

160 The emergency plan should be made available to controllers, the emergency services and the local authority. It should include:

- a list of people with allocated responsibilities and their contact details;
- stewarding arrangements (stewards should not be involved in the operation of amusement devices);
- conditions agreed with the emergency services, such as:
 - liaison arrangements;
 - rendezvous points, entrances, and emergency routes;
 - the location of services (eg water, electricity etc);
- evacuation procedures;
- contact details for the relevant emergency services;
- a layout plan of the site. This should include, where appropriate:
 - device locations;
 - entrances, including access for emergency services;
 - pedestrian and traffic routes;
 - position of control centres;
 - location of services (eg water hydrants, electrical substations etc);
 - assembly positions.

161 Plan the layout of attractions so that:

- risks arising from the site such as uneven or soft ground, wind uplifts or from another structure or overhead power-lines, are minimised;
- there are no points where channelling the public could lead to dangerous overcrowding in an emergency. Extra space may be needed around popular attractions;
- there is sufficient space to allow access for emergency vehicles (including access to fire hydrants), at the same time as the public is evacuated. Don't forget that access routes will need to be able to cope with people with disabilities or families with children and pushchairs;
- there are identified access routes that can take the weight of all vehicles. Remember that emergency vehicles and recovery equipment, eg cranes, may need to access the site;
- the ground or structures used are suitable to take the weight of all anticipated people, plant and vehicles;
- there are safe distances between attractions and perimeter walls, fences etc (this includes any barriers and waiting areas), taking into account:
 - the motion and passenger clearance envelopes of amusement devices;
 - the need for emergency access and egress (pedestrians and vehicles);
 - segregation of the public from dangerous moving parts or areas of danger.

162 For coin-operated passenger-carrying amusement devices, distances between them may vary, as long as any necessary safety envelope is not compromised.

163 Ask advice from the local electricity company to find out if power lines cross over or under sites where attractions will be placed. Make sure controllers are aware of the risks and relevant precautions. Further advice is available in Guidance Note GS6 *Avoidance of danger from overhead electric powerlines*.⁶

164 If the fair is likely to disturb the ground or if significant loads are to be placed upon it, you as the organiser should obtain relevant information on underground services from the owner of the land and the local utility suppliers. Pass this on to the controllers and plan the fair to minimise the need for them to place poles or pegs near such services, or to place load-bearing structures where the ground is not suitable, eg above voids. Use cable-locating techniques before any excavating is done. Further information is given in HSG47 *Avoiding danger from underground services*.⁷

165 Some sites, for example those used for street fairs, may have restricted or difficult access. In such cases you may need to plan the times of arrival and departure of the attractions to minimise the risks to members of the public passing through the area during build-up and pull-down. If necessary, seek permission to restrict access by the public during these times.

166 Check before the fair starts that all controllers have current insurance and that for each device there is a current Declaration of Operational Compliance (DOC) from a registered inspection body with a relevant set of reports in its operations manual to show that it is fit for use.

167 Employers have duties under the Health and Safety (First Aid) Regulations 1981 to make first-aid arrangements for their own employees.^{8,9} **It is strongly recommended that you make arrangements to provide first aid for members of the public.** Providing trained first-aiders for the public should be seen as an important part of your emergency planning.

168 If you are planning a firework display on your site you are strongly recommended to use a professional company and consider the guidance in HSG123 *Working together on firework displays*.¹⁰

Managing the site

169 To manage the site effectively you need to:

- be available on site, or be represented by a deputy, whenever the site is open to the public;
- establish a means of communicating with controllers, the public and the emergency services;
- identify and mark any area prohibited to the public;
- make sure that fire and other safety checks are carried out each day before the public is admitted, for example, that:
 - a system for raising the alarm is in place;
 - fire escape routes are unobstructed and all fire exit signs are clearly visible;
 - there are no obvious hazards (eg deteriorating ground conditions);
 - fire instruction notices are displayed;
 - fire-fighting equipment is available.

Monitoring the site

170 Make sure that safe conditions are maintained in and around the attractions throughout the day by:

- monitoring individual attractions;
- checking for overcrowding and re-routing the public if necessary;
- keeping all routes, including emergency routes, clear and well signposted;
- monitoring the condition of the site, particularly housekeeping and the state of the ground, and that waste paper and other flammable materials are not allowed to accumulate where they may be a source of danger;
- checking that the layout stays as planned.

Review your procedures

171 For a temporary site, review the effectiveness of your procedures at the end of the fair. For a fixed site, review procedures at regular intervals. Use the findings in future planning. Include a review of effectiveness of the organisation with your own staff, family members and colleagues.

Section F Guidance for controllers

Safe operation

172 The safety objective for controllers is to ensure that the initial integrity of a device is maintained, and that it is operated safely in respect of the risks to employees and the public. This can be achieved through the lifetime of a device from pre-purchase enquiries to eventual sale by:

- following the Amusement Devices Inspection Procedures Scheme (ADIPS) for pre-use and in-service inspections (see Section D);
- ensuring the required documentation accompanies buying and selling (see paragraphs 174–180 and Section C);
- safely modifying and repairing (see paragraphs 181–186 and Section C);
- effective maintenance (see paragraphs 190–199);
- safe systems of operation (see paragraphs 201–245);
- training operators and attendants (see paragraphs 246–256);
- maintaining the operations manual (see paragraphs 176, 179, 185–186, 192 and Appendix 3);
- following emergency procedures (see paragraphs 257–264);
- periodically reviewing the effectiveness of the above.

Responsibilities of controllers

173 You are responsible for the safe operation of all your devices. You may delegate tasks, but overall responsibility remains with you at all times. You must also:

- co-operate with others, for example the organiser, other controllers etc to ensure safety;
- report any failures or injuries when required. By reporting an incident you are not admitting liability, but if you do not report it, that is a criminal offence (see paragraphs 261–263);
- assess the risks on site to identify the control measures required to ensure your devices operate safely.

Buying or selling a device

174 Devices come within the definition of ‘work equipment’ in the Provision and Use of Work Equipment Regulations 1998 (PUWER), with the exception of coin-operated devices designed for unattended use. Duties under PUWER apply to all employers and to self-employed people – see HSE leaflet *Using work equipment safely* for further guidance.¹¹

175 If you directly import fairground equipment you assume the legal duties of the designer, manufacturer and supplier. You may be in breach of the relevant legislation for any failures or injury that result from the design or manufacture of a device unless you have taken reasonable steps to check that it complies with legal requirements and this guidance. You can do this by following this guidance and using an inspection body registered with ADIPS to carry out pre-use inspections (design review, assessment of conformity to design and initial test) to confirm that you have satisfactorily addressed these duties (see Section D).

176 You should not use an amusement device unless you have suitable documentation in English, either the relevant pre-use inspection reports or a

suitable maturity risk assessment (this will depend on the age of the ride and the date it was manufactured or imported – see Section D). A device should have an operations manual consistent with Appendix 3 of this guidance. This should also be in English. Without this documentation you cannot be certain that everything necessary to make the device safe has been done. In the case of coin-operated amusement devices an initial test report and instruction manual is sufficient.

177 If you acquire a second-hand device, the current Declaration of Operational Compliance (DOC) should be re-issued by an inspection body in the name of the new controller. If the device was designed to be permanently installed and has been moved to a new site, this should be considered a safety-critical modification and subject to the relevant pre-use inspections.

178 If you sell, hire or lend out any device second-hand you become a supplier. You must comply with section 6 of the HSW Act for fairground equipment (see Appendix 1).

179 If you sell a device second-hand you should provide the buyer with the operations manual (see paragraphs 66–69 and Appendix 3). There will be some older devices for which the operations manual is incomplete. In these cases as much of the device history as possible should have been gathered to form the manual. For coin-operated amusement devices it is sufficient to have an instruction manual.

180 If you hire or lend out a device you should ensure that it is in a safe condition, has adequate operating instructions, a current DOC and have suitable systems in place for inspecting and maintaining it when it is returned and before it is re-hired or re-lent out. In the case of inflatable devices a PIPA certificate will also be acceptable.

Modification and repair

181 Before modifying any device, make sure that the proposed modification will be safe.

182 A safety-critical modification includes any change to:

- loading (eg changing seating arrangements, fitting heavier passenger units);
- speed or operating cycle;
- range (eg height of lift);
- safety envelope;
- safety-critical components, devices or systems;
- structural and mechanical components;
- drive mechanisms;
- control mechanisms (eg brakes, shock absorbers, speed limiters, speed or position sensors);
- software;
- passenger containment (including fencing and barriers);
- passenger height restrictions.

183 It will also include:

- use of a device outside its specification or normal environment for which it was designed;
- reinstallation of a fixed device in a different location.

184 If in doubt, it should be assumed that every modification is safety-critical and the advice of a competent person should be sought.

185 Before using any device following a safety-critical modification, you need to obtain and enter in the operations manual the following documents relating to the modifications:

- report of design review (see paragraphs 101–103);
- report of assessment of conformity to design (see paragraph 109);
- report of initial test (see paragraph 122).

186 After a repair do not use a device until:

- every repaired part has been checked against the specification and/or procedure. If there are differences you should treat the repair as a modification;
- details of the repair and any relevant tests and inspections are recorded in the operations manual. For coin-operated amusement devices, the details may be recorded in any suitable way.

Inspection and test

187 Ensure that all necessary pre-use inspections (or design maturity risk assessment for older rides – see Appendix 2) have been carried out on a device before it is brought into service for the first time. Also ensure that each device is subject to in-service annual inspection and that it has a current DOC. Only use an inspection body that is registered with ADIPS to carry out pre-use and in-service inspections. See Section D for information on inspection bodies and types of inspections.

188 In some cases the manufacturer, supplier or the inspection body may recommend more frequent inspections. Other types of examination may also be necessary (eg statutory examinations such as for pressure systems, lifting equipment etc) or if safety-critical parts of the device have been modified or repaired.

189 Never operate a device beyond the expiry date on the DOC.

Maintenance

190 The process of pre-use and in-service inspection is important as part of the system to ensure a device is safe. However, these inspections are not enough to ensure that a device is adequately maintained in a safe condition. You are responsible for making sure that additional periodic checks and inspections are done to make sure a device remains in a safe condition during the period it is being operated.

Daily check

191 **Note:** Paragraphs 192–194 may not be relevant to coin-operated amusement devices, but those responsible for such equipment are strongly recommended to check daily for damage and to make sure that the device is working properly.

192 Make sure that each device has a daily check before the public uses it. For an amusement device the daily check needs to be in writing, filed in the operations manual and:

- take account of any instructions from designers, manufacturers, importers, suppliers and inspection bodies;
- list all parts and other matters which need daily checking to ensure safety and describe how they should be checked;

- include, where appropriate, details of the extent of acceptable variations, eg out-of-level, air pressures, torque settings, wear;
- check that safety controls, brakes and other safety devices, including communication systems, operate effectively (these should be done daily unless it can be shown that a longer periodic inspection is appropriate);
- include checks to make sure that barriers, guards, walkways etc are in place and in good condition, and that all locking devices and securing pins are in place and in good condition;
- ensure that cabinets, boxes, enclosures etc containing hazardous equipment and/or substances are suitably secured;
- for a ride, require at least one complete operating cycle.

193 Make sure the person doing the daily check is sufficiently trained and experienced to do it properly. It is good practice to keep records of any relevant training provided. Keep records of daily checks and of any remedial action taken, if possible for at least three years in such a way that the records can be examined if needed.

194 Do not open a device to the public unless the safety measures the daily check has shown to be necessary have been taken.

Periodic maintenance

195 You must properly maintain and service work equipment, which includes amusement devices. Make sure that maintenance work is done:

- by people trained or experienced in the procedures appropriate for that equipment;
- taking account of the manufacturer's instructions and maintenance schedules. Where they are not specified seek the advice of a competent person.

196 It is good practice to have a supply of common components (eg springs, catches etc) and to have a programme of planned preventive maintenance aimed at replacing components before they reach the end of their useful lives. An important part of maintenance is condition monitoring, ie the recording of the condition of components and performance of systems at regular intervals so that gradual changes can be detected, for example, on a ride:

- Is the travel on a control lever increasing?
- Is the ride taking longer to stop?
- Are the readings on pressure gauges changing?

197 Welding or other hot work may be needed as part of maintenance. It is possible that by doing welding, you may be making a safety-critical modification. If so, it will require a design review, an assessment of conformity to design and/or an initial test.

198 Do not repair cracks in any device without consulting the manufacturer or a registered inspection body. The manufacturer needs to know if there is a problem, so that causes can be investigated and remedied. The manufacturer may then want to make recommendations about the repairs and/or safe operating conditions. If any welding is done, make sure that the correct materials and techniques have been used so that the integrity of the device is not affected.

199 Before operating a device following maintenance, make sure that any protective devices, eg guards, fences, doors, interlocks etc, which may have been removed, are replaced, secured and are operational.

Safe systems of operation

200 Paragraphs 201–245 give practical guidance on how safe systems of working can be adopted by controllers.

Siting of amusement devices

201 You must co-operate with the organiser to assess any site risks (see Section E).

202 Make sure that each device is erected on ground or a structure which:

- can safely bear the load;
- is stable and suitable for the device to be built up and used safely.

203 Take account of any manufacturer's instructions relating to operating conditions such as wind speed and make sure that adequate anchoring points have been used.

Transporting, assembling and dismantling devices

204 When transporting, assembling or dismantling:

- move devices in a way that minimises the risk of damage to safety-critical components. Make sure that all loads are properly secured during transit;
- be very careful when moving vehicles on site. Carry out vehicle movements in accordance with any instructions from the organiser;
- avoid moving vehicles if there are members of the public or young children in the area;
- avoid reversing where possible, and where it is unavoidable take reasonable precautions;
- assemble and dismantle each device in accordance with the manufacturer's instructions using trained personnel or people under supervision.

205 During assembly and dismantling, use any temporary guys, stays, supports and fixings needed to prevent danger from the collapse of any part of the device. Provide enough lighting for it to be done safely and take all reasonable steps to exclude the public and others who are not involved in carrying out the work.

206 Lifting equipment falls under the requirement of the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)¹² and should be thoroughly examined, tested and inspected (see Appendix 1) either:

- in accordance with legal requirements; or
- if it is a part of the device required to allow it to operate as an amusement device, to the same standard as required for the remainder of the device.

Assembling component parts

207 Have procedures to make sure that safety-related components are:

- individually identifiable if they look the same but are not interchangeable;
- stored to minimise the risk of deterioration and contamination;
- examined for signs of wear, deformation and damage when being assembled;
- cleaned and lubricated as necessary before being incorporated into the structure;
- carefully assembled so they are not damaged, for example, they should be correctly aligned and not bent, distorted or unduly forced;
- assembled using appropriate fastening and securing components which are properly used and correctly adjusted. In particular:
 - 'R' clips should be the right size, in good condition and correctly fitted;
 - split pins should be spread effectively;

- self-locking nuts should not be used more times than recommended by the manufacturer;
- recommended torque settings should be applied;
- not thrown, or dropped where this is likely to injure people or damage equipment.

208 If you find components that are damaged or have excessive wear, replace them with parts consistent with the design specification before you use the device again.

209 If you find repeated or unusual damage to safety-critical components, seek specialist advice as it could indicate a fault developing on the device.

210 If your risk assessment identifies a significant risk arising from the failure of a single component you may need to check these components more carefully and frequently than others. Where the risk is found to be high you may wish to make a modification which will require design review.

Operational stability and safety

211 Travelling amusement devices can be assembled and dismantled several times over the course of a season and even fixed devices may be moved on occasion. The assembly process should take into account the need to make sure they are stable and secure before they are put into service.

- Check that all the structural members needed for stability and safety are correctly used and that appropriate packing is provided.
- Level and pack each device according to the manufacturer's instructions, where available, making sure that loads are adequately distributed and firmly supported. Where practicable, place the packing directly beneath the load points. If you cannot do this, use a supporting structure suitable for transmitting the loads safely through the packing to the ground.
- Use only suitable packing materials and place them to prevent slipping or sinking. Keep the number of packing pieces to the minimum consistent with safe operation. Never rely on hydraulic jacks to support a device. Check packing regularly.
- Check the ground regularly after a device has been built up to confirm that its load-bearing capacity has not deteriorated.
- For a device with rail tracks, lay them so that the passenger-carrying units run safely and smoothly over them. Where required, clearly mark pedestrian crossing places and make sure the surfaces are level enough to prevent trips and falls.

Preventing access to dangerous moving parts and areas

212 A major risk is that of people coming into contact with dangerous moving parts of rides. Your risk assessment (see Section B) should identify appropriate control measures such as:

- barriers;
- interlocks or locking-off points and procedures;
- platforms;
- steps;
- marking danger zones;
- notices;
- staff training;
- supervision.

213 In many cases you will need to use more than one control measure. Where your control measures include supervision, operators and attendants will need appropriate training. You have responsibility to ensure the safety of your staff as well as the public. Many employees are 'run down' by rides, particularly when collecting fares or doing maintenance.

Barriers

214 Providing a suitable barrier is often the most effective way of preventing access to danger areas or dangerous parts. If the barrier protects an edge from which somebody could be injured if they fell, the barrier should have a top rail (at least 1100 mm high), a toe board and a mid-rail to ensure that the maximum gap between it and the top rail/toe board is 470 mm. These barriers should be designed to prevent people from becoming trapped in or falling through them.

215 Keep access points between barriers to the minimum size and number needed for safe loading and unloading as identified by your risk assessment. Do not have more than four access points nor make them so wide as to defeat the point of having barriers or make effective supervision of the gap impracticable. Some rides supplied with 'open fronts' may need additional barriers.

216 While the ride is in motion, prevent people from passing through gaps in barriers unintentionally by:

- placing an attendant at a safe position at each access point or effectively barring the access gaps;
- providing the access points with offset barriers/and or steps.

217 All barriers need to keep people outside the safety envelope of the device. If parts swing out over public areas, these areas may need to be enclosed where any part of the device or a passenger will be less than 2.5 m above the ground.

218 In some circumstances, it may not be possible or necessary to use a barrier. In these cases the platform of the ride may provide a sufficient barrier where it can be justified by risk assessment, based on factors such as the height of the platform, the projection of moving parts of the ride outside the limit of the platform, entrapment risks and the speed of the ride.

219 Coin-operated amusement devices may not require barriers unless the motion presents a significant risk.

Access to danger areas

220 On some devices with raised platforms, there may be a danger area underneath the platform. Take care to prevent access to such areas, particularly if building up a device on sloping ground.

221 Highlight danger areas by notices, painted lines etc. Provide sufficient supervision to make sure that people do not stray into danger areas. Although supervision is important, it should not be a substitute for physical measures.

222 Where appropriate, provide a safe area for waiting members of the public and make any arrangements necessary to control them. These may include providing additional supervision and/or features such as queuing rails and gates.

223 On dark rides, provide emergency exit routes which are well-lit and signed when required. Control risks to prevent tripping or falling, particularly where the routes cross or run alongside rail tracks.

224 Before using any device, securely fasten any covers or barriers over openings to prevent access to dangerous parts of machinery. For further information see BS EN 294:1992 *Safety of machinery. Safety distances to prevent danger zones being reached by the upper limbs*.¹³

Electrical safety

225 Amusement devices should be maintained in an electrically safe condition. The annual in-service inspection is not a substitute for effective maintenance and periodic checks for safety. Any work carried out on electrical parts of amusement devices should be carried out by suitably competent persons.

Falls from height

226 Amusement devices require assembly and dismantling, inspection and maintenance which may all involve people working at height. Where possible you should plan the work to eliminate the need to work at height, eg by assembling as much of the device as possible at ground level. Where work at height is necessary it should be carefully planned and suitable safe systems of work introduced.

227 Employees should be properly trained in the work to be done, and in the use of adequate personal protective equipment (eg fall-prevention, fall-arrest and work-positioning equipment). It is very important where work at height is expected that you have an emergency rescue procedure in place to recover someone who may have fallen and is suspended (eg from a lanyard or inertia reel and harness system). There is a serious risk from suspension trauma if the person is not rescued within a short space of time (which can be as little as 10–15 minutes). See Appendix 4 for details of how to carry out a work at height risk assessment.

Safe systems for operating devices

228 The information in Section G on safe operation of devices by operators and attendants is also relevant to controllers but is not repeated here.

229 Keep records of what you and others have done to ensure safety. You may be asked for documents by organisers, lessors, HSE or trade associations seeking evidence that your device is being operated safely. Depending on the type of device, these may include:

- significant findings of risk assessments;
- maintenance, modification and inspection records;
- instructions for operators and attendants;
- training records.

230 Have a system for securing devices and immobilising rides not open to the public and take reasonable steps to prevent public access at these times.

231 Ensure when each device is open to the public (except those designed for unattended use) that:

- it is in the immediate charge of an operator;
- the operator is in control of the device throughout the cycle;
- no operator is in charge of more than one operating device at any time;
- no device is used outside the operating conditions specified in the operations manual or any other condition specified by an inspection body;
- no unauthorised person interferes with it except to use an emergency stop, if appropriate, readily identifiable to the public.

232 Safe operation also includes making sure that non-users are not put at risk. Some of the things you may need to do to protect them include:

- not allowing the public to wait in places of danger;
- providing enough attendants to control access points and, where appropriate, queuing areas. The number of attendants will depend on the size of the crowd;
- making sure that waiting or loading areas are not overcrowded or overloaded;
- not allowing a ride to be started until it has been confirmed that it is safe to do so;
- providing notices or using a public address system to give information to the public and help attendants enforce your rules;
- making sure that all staff are readily identifiable.

233 Where operators do not have a clear view of all loading or unloading points, devise a clear system of signals for checking with attendants that it is safe to start. Make sure every person using the system is instructed how to use it and display a copy of the signal code in appropriate positions.

234 When there is a foreseeable risk of collision between cars on a tracked ride, a suitable system should be in place to control the risk of injury, eg a series of brakes designed to prevent collision.

235 Assess how weather conditions can affect the safety of your device, for example:

- What conditions will require additional inspection of packing and anchors?
- At what wind speed should you close the device, removing lighting or backdrops or provide additional anchorage?
- What parts become slippery or less effective when wet?

Passenger containment

236 The main risks to passengers on a ride are:

- contact with parts of the ride outside the passenger unit;
- ejection due to the motion of the ride;
- falls from the ride;
- injury arising from the forces imposed by the motion of the ride, including during emergency stops;
- foreseeable passenger misuse.

237 You should have a knowledge of how the designer intended the passenger containment to be used, particularly the use of passenger restraints. Always follow instructions given by the designer on passenger containment, eg physical restrictions. Any alteration to any part of the passenger-containment system will require a design review to be carried out by an inspection body registered with ADIPS.

238 Do not add parts to the device (eg theming) that could adversely affect the clearance between each passenger-carrying unit and other parts of the ride. Any alterations that may affect safety clearance distances will require a pre-use inspection procedure by an inspection body registered with ADIPS.

239 Check that all components of the passenger-containment system including seats, bars, belts, harnesses, handholds, footrests, locks, catches, hinges and other attachment points are properly maintained and correctly adjusted so they will be secure and minimise injury from the motion of the ride. Do not use any part of a ride where the passenger-containment system is defective.

240 Take reasonably practicable measures to identify and exclude any individuals who cannot ride safely if, for example:

- they are too small to be safely contained;
- they are too large to be safely contained;
- they have a disability or other condition, eg back or neck injury, heart condition, or they are pregnant;
- they are behaving inappropriately.

241 Like all service providers, you must consider what you need to do to comply with the Disability Discrimination Act 1995.¹⁴ This law gives disabled people rights to access your rides and you may have to make 'reasonable adjustments' to help. For more details see Appendix 1, paragraphs 55–58.

242 Size limits of passengers should be specified in the operations manual and followed by controllers. If passengers within the size limits cannot reach the main components of the containment system or otherwise ride safely they may not be suitable to ride on the device. Where this situation arises frequently, you should seek further advice on passenger containment from a person competent in the design of passenger-containment systems. Treat any proposed change of size limits as a safety-critical modification.

243 Help operators and attendants enforce any passenger exclusions by having prominent notices or pictograms which clearly set out any restrictions specified by the designer, or design review body. Where appropriate use the public address system to reinforce the need for passengers to follow safe riding procedures.

244 Make sure:

- the operator and attendants give clear and appropriate instructions to passengers on their conduct and that they check all adjustable restraints before each ride;
- if passengers can be stranded away from their normal unloading point they can be moved to a place of safety without risk or undue delay, preferably in the unit in which they are travelling. There should be procedures suitable for everyone using the device that are understood by the operator and attendants. On dark rides staff should be able to tell passengers how to get to emergency exits.

245 Train, instruct and require operators and attendants to take reasonable steps, including stopping the device if necessary, to prevent passengers:

- intentionally misusing equipment provided for their safety;
- behaving recklessly;
- recklessly disregarding clear and reasonable instructions.

Selecting and training staff

246 Controllers should be competent to carry out safety-related tasks, or ensure the competence of others who carry out such work for them. Key safety-related tasks in relation to amusement devices are daily checks, inspection, repair, maintenance, supervision and operation.

247 Make sure employees are competent in the work they are expected to do. This involves employee selection, training, monitoring and keeping records. The levels of competence required will depend on the nature of the work, and this should be identified by a risk assessment.

248 Select people who have a work attitude that puts the safety of the public first and who are likely to be conscientious and reliable in following this guidance. Look for people who have the maturity to:

- be reliable and have the necessary authority;
- give confidence to the public, particularly on children's and family devices.

249 Do not allow anybody under the age of 18 to operate the following:

- a ride (except simple slow-moving rides designed for use by children);
- a shooting gallery where hazardous projectiles are used;
- an enclosed structure which holds more than 30 people or is intended primarily for the amusement of children.

250 Operators of other devices should be least 16 years old. Every attendant who performs a safety-related function should be at least 16 years old. All work relating to the containment of passengers should be considered safety-related.

Information and training

251 You must provide adequate information and training to all employees. Training should be appropriate to the risks and given in a way that people can understand. You may need to liaise with other people to help, for example, with fire precautions training.

252 General information and training for all employees involved in running a device need to cover at least the following areas:

- general health and safety requirements relating to the device;
- safety of the device(s) to be used;
- the importance of daily checks, maintenance and inspection programmes and the need for competence in the work to be done;
- site safety;
- dealing with problems to include:
 - procedures for managing people who misbehave/are distressed etc;
 - how to deal with defects and malfunctions;
 - reporting procedures for accidents/incidents;
 - emergency procedures;
 - adverse weather conditions.

253 You are strongly recommended to keep a record of any training given and any tests of how well the employees understand it.

254 Operators and attendants of devices will need specific information and training on:

- systems of work for operating a device safely;
- safe loading/unloading of the device;
- details of any passenger restrictions, for example height, weight or medical conditions;
- safe waiting/viewing places for intending passengers and spectators;
- using the passenger-containment system, including checking closure of passenger restraints where necessary.

255 Staff will need regular training and refresher training especially after changes caused by a safety-related modification (see paragraphs 182–186) or changes to your procedures or a change in the way you manage the public. If you change lighting, introduce smoke or alter the access points to a device you will need to assess these effects and whether procedures should be changed.

256 You should also have a system for monitoring staff to check that they are following your instructions.

Emergency procedures

257 Risks at fairgrounds and amusement parks can arise from:

- fire;
- major failure of a device;
- severe weather;
- other factors, eg criminal behaviour.

258 You should have procedures for foreseeable emergencies that may affect the site. These should be identifiable by a risk assessment (see Section B).

259 If the emergency involves your device, you may have different groups of people to consider, for example:

- passengers who may be young, old or have disabilities;
- other spectators (some of whom might be relations of passengers and therefore distressed);
- employees;
- public and employees on nearby attractions.

260 Make sure your staff know what to do if there is an emergency. This should include taking reasonable steps to test your emergency procedures to ensure they are effective.

Accidents and incidents

261 Instruct your staff to report to you as soon as possible any accident or incident which causes injury or damage, including threats or acts of violence. Deal with any casualties first, but after the incident report the event.

262 Certain injuries and incidents are reportable to the enforcing authority by the 'responsible person'. This person is likely to be:

- the controller if the incident occurs at a device; or
- the organiser if it occurred elsewhere on the fairground.

263 Further information is given in *A guide to the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995* (RIDDOR).¹⁵

264 If it is possible that a defect on a device could lead to danger, do not allow the public to use it until you are satisfied that the cause has been identified and remedied. This may include checking all similar components in addition to the one giving rise to the fault. If you have any doubt about the continued safety of a device, do not allow it to be used until a competent person (eg an inspection body) has confirmed that it is safe to do so. Keep records of all incidents and the action taken in the operations manual as you may need to:

- give details to HSE, your trade association, insurers, the designer, manufacturer or supplier;
- discuss the safety implications with an inspection body;
- provide a detailed operational history of the device, for example for a buyer.

Review

265 Review your safety arrangements regularly, for example at the beginning of each season, and make any changes necessary to maintain or improve their effectiveness.

Section G

Guidance for operators and attendants

Safe attraction

266 Operators and attendants need to do everything reasonably practicable to make sure employees and others are safe in areas under their control. You should make every effort to understand the nature of the device you are responsible for, including where necessary reading and discussing the relevant operating instructions, inspection reports and any other information provided by the ride controller. You can make sure an attraction is safe by:

- understanding your general responsibilities (paragraphs 267–268);
- carrying out daily checks (paragraph 269);
- safe operation (paragraphs 270–275);
- proper supervision (paragraphs 276–284).

General responsibilities

267 You as operators and attendants must:

- follow your employer's instructions relating to safety;
- report incidents and safety hazards immediately;
- not misuse anything provided for health and safety.

268 The dangers of deliberate misuse are obvious, but you should also make sure that you do not alter things unintentionally, for example, making an unauthorised adjustment to the catch of a lap bar to make it easier to use might be misuse if it reduces its safety.

Daily check

269 Before a device is opened to the public, you need to carry out a daily check, including a trial run. Check that everything is working properly and report anything unexpected, or that you think might be wrong (see paragraphs 191–194).

Safe operation by operators

270 Make sure when the device is open to the public that:

- your employer has provided adequate training and information to you to allow you to operate it safely. Inform your employer if you are unsure of your ability to operate the ride safely;
- you are in immediate control at all times;
- the minimum number of attendants needed for safe operation are on duty;
- no one other than yourself, an attendant, or a trainee under direct supervision interferes with the operation of the device, except to use an emergency stop in an emergency situation;
- your full attention is given to safe operation – do not operate more than one device at a time;
- attendants wear distinguishing clothing such as caps, uniforms or arm bands etc.

271 Do not operate the device outside the operating conditions in the operations manual, or any other condition that has been set by the controller or an inspection body.

272 Make sure that you load the device to accommodate all users safely. This may include:

- making sure that people for whom the device may be unsuitable are excluded;
- taking all reasonable steps to exclude those whose behaviour suggests they may not be able to use the device safely;
- on a ride:
 - loading cars in a particular pattern, for example the largest/smallest passengers in the correct position;
 - correctly balancing the cars and the ride;
 - not allowing passengers to use any part of the ride where the passenger-containment system is defective;
 - making sure that all passengers are safely contained and no spectators are in a dangerous place before starting.

273 Remain aware at all times of the factors which may affect the safety of the device, in particular:

- bad weather conditions, for example:
 - strong and gusting winds;
 - heavy rain which may make the ground soft;
 - lightning;
- changes in the way the device is running;
- deviating from operating procedures;
- unsafe behaviour by attendants including horseplay and the effects of taking drink or drugs;
- dangerous overloading or congestion of loading platforms or access points;
- unsafe behaviour by users or spectators.

274 Make sure you follow the controller's instructions to deal with any problem. This might include stopping the device or making it safe.

275 Where you do not have a clear view of all loading or unloading points, or all passengers, use positive signals to check with attendants that it is safe to start. Make sure that every person using the signalling system clearly understands each signal. Do not allow smoke, lighting or other effects to block your view.

Supervision by operators

276 It is important that you as operators watch closely the behaviour of attendants and members of the public. Take immediate action if attendants behave in an unsafe way, fail to follow procedures, are distracted or set a bad example. If attendant misbehaviour is serious or repeated, tell the controller. Set a good example yourself.

277 Make sure that you and the attendants know about what people should, and should not do, and these rules are followed, for example:

- not to carry loose personal possessions, eg handbags, umbrellas or wear clothing such as scarves where these might create a risk by being dropped, ejected or becoming trapped in moving parts;
- where to place hands, feet etc particularly where passengers need to brace themselves against the forces they will experience;
- not to ride if they have certain injuries or are pregnant or for any reason cannot be securely contained.

278 Do not operate any device unless all passengers:

- have been safely loaded;
- are safely contained in the correct position with any passenger restraint or other device physically checked to make sure it is correctly fitted and adjusted properly. Physical checks are essential because of limitations in automatic systems;
- have been told anything they need to know for them to ride safely. Where necessary, remind them over the public address system before starting the device.

279 When operating a device, keep watching to make sure that passengers remain safely contained and that no spectators are moving into places of danger. Where appropriate use the public address system to give any necessary warnings. If you see any person who appears to be going to fall out, climb out, be hit by part of the ride, or otherwise could be at risk, stop the ride or make it safe as soon as you can.

280 Any ride (or part of a ride, eg an individual car) taken out of service for any reason needs to be conspicuously marked and the controls locked in an inoperative position where applicable.

Attendants

281 Follow the instructions given to you by the controller and/or operator. Give your full attention to the safe operation of the device. Constantly watch out for the safety of the public and the people you work with. In particular, make sure you follow the operator's or controller's instructions about loading passenger cars and controlling spectators, for example:

- load cars in any necessary particular pattern with largest/smallest passengers in the right position, where applicable;
- correctly balance the device, where applicable;
- exclude passengers who may be physically unsuitable and take all reasonable measures to exclude those whose behaviour suggests they may not be able to ride safely;
- do not allow passengers to use any part of a ride where the passenger-containment system is defective and may put passengers at risk;
- make sure all passengers are safely and correctly contained and that no spectators are in places of danger;
- indicate to the operator by a positive signal that the ride is ready to start.

282 Make sure you remain able to communicate effectively with the operator. Make sure that passengers stay safely inside the ride and that no spectators are moving into places of danger, for example walking onto the ride. Where appropriate, give verbal warnings. If you see any person who appears to be at risk of falling, ejection or contact with part of the ride, tell or signal the operator immediately.

283 Make sure people leave safely when the ride finishes.

284 Do not:

- ride in an unsafe way or position;
- jump on or off a ride if it could be dangerous;
- encourage or allow passengers to adopt unsafe positions or practices;
- be distracted while the ride is operating;
- tell or signal the operator to start a ride until:
 - you have physically confirmed that all passengers are safely contained with any passenger restraint or other device correctly fitted and properly adjusted;
 - passengers have been given any information needed for them to ride safely;
 - operators, attendants and spectators are in a safe place.

Appendix 1

Relevant legislation

Introduction

1 Sections A to G in this book provide the practical information to enable dutyholders to comply with health and safety legislation. There are a number of different pieces of legislation, and at first glance these can appear daunting. However, the basic requirement is the same:

- identify and assess the risks;
- take action to manage those risks;
- monitor to ensure action takes place; and
- check that it is effective.

2 It is also worth remembering that where a piece of legislation requires a risk assessment that has already been carried out under other legislation, it need not be repeated.

3 The main legislation covering the various hazards and work activities found within fairgrounds and amusement parks is listed, followed by a brief outline of the duties imposed.

Health and Safety at Work etc Act 1974

Management of Health and Safety at Work Regulations 1999 (SI 1999/3242)

Provision and Use of Work Equipment Regulations 1998 (SI 1998/2306)

Manual Handling Operations Regulations 1992 (as amended) (SI 1992/2793)

Lifting Operations and Lifting Equipment Regulations 1998 (SI 1998/2307)

Workplace (Health, Safety and Welfare) Regulations 1992 (SI 1992/3004)

Work at Height Regulations 2005 (SI 2005/735)

Personal Protective Equipment at Work Regulations 1992 (SI 1992/296)

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (SI 1995/3163)

Health and Safety (First Aid) Regulations 1981 (as amended) (SI 1981/917)

Health and Safety (Consultation with Employees) Regulations 1996 (SI 1996/1513)

Safety Representatives and Safety Committees Regulations 1977 (SI 1977/500)

Health and Safety (Safety Signs and Signals) Regulations 1996 (SI 1996/341)

Regulatory Reform (Fire Safety) Order 2005 (SI 2005/1541)

Control of Noise at Work Regulations 2005 (SI 2005/1643)

Control of Substances Hazardous to Health Regulations 2002 (as amended)
(SI 2002/2677)

Electricity at Work Regulations 1989 (SI 1989/635)

Disability Discrimination Act 1995

Health and Safety (Enforcing Authority) Regulations 1998 (SI 1998/494)

Construction (Design and Management) Regulations 2007 (SI 2007/320)

Health and Safety at Work etc Act 1974 (the HSW Act)

3 This is the primary Act governing health and safety in the fairground and amusement park industry. It applies to all employers and self-employed people. The Act protects not only people at work but also members of the public and volunteers who may be affected by a work activity.

Duties of employers to employees

4 All employers have a duty under section 2 of the HSW Act to ensure that the health, safety and welfare of their employees are protected when they are at work, so far as is reasonably practicable. In practical terms, fairground and theme park controllers must ensure they provide a place of work that is safe and without risk. They should ensure that:

- safe working practices are set and followed;
- machinery and equipment is properly maintained and safe to use;
- equipment and harmful substances are used properly and stored safely; and
- employees have healthy working conditions.

Duties of the self-employed

5 Self-employed workers have similar duties to those placed upon employers. Self-employed workers should not create risks to themselves or other people.

6 Under section 3 of the HSW Act, fairground and theme park controllers have a responsibility for the health and safety of non-employees, eg:

- members of the public;
- self-employed workers or contractors;
- volunteer workers;
- others who may be involved in the activities of the fairground and theme park.

7 Information may need to be provided so that these groups are not put at risk.

Duties of employees

8 While at work, employees have a legal duty under section 7 of the HSW Act to take reasonable care of themselves and other people. Employees must co-operate with their employer where safety is concerned.

Duties of people in control of premises or equipment

9 Many fairgrounds and theme parks have equipment or substances that they provide for people to use on site, eg lifting equipment, chemicals etc. Under section 4 of the HSW Act, each person who has any control of premises or equipment must take reasonable precautions to make sure that the location and equipment to be used there is safe and without risks to health. Also, where people come into the fairground and site to use it as a place of work, eg contractors, the people in control of the site should make sure, so far as is possible, that it is safe and does not present a health risk.

Duties of designers, manufacturers, importers or suppliers of fairground equipment

10 Section 6 of the HSW Act places duties on designers, manufacturers, importers and suppliers of fairground equipment. These duties include taking reasonable steps to ensure:

- fairground equipment is designed and manufactured to be safe when it is being built up and dismantled, operated and maintained; and
- suitable tests and checks have been carried out to prove this is the case; and
- there is adequate information provided with fairground equipment to allow a controller to build it, dismantle it, maintain it, inspect it and operate it safely; and
- they have a system for passing on safety updates on fairground equipment to people who have been supplied with it.

11 Anyone who wishes to design or manufacture a piece of fairground equipment should take reasonable steps to research and eliminate any risks to health and safety which the completed fairground equipment might pose, eg carry out research on the health effects of acceleration forces to make sure the ride operates within an acceptable limit.

12 If, as a designer, manufacturer supplier or importer, you install and/or erect a piece of fairground equipment, you need to take reasonable steps to ensure that it can then be used safely (including maintenance, inspection and operation).

13 The duties under section 6 only apply where there is a trade, business or other undertaking (for profit or not). They would not, for example, apply to a householder who lends out a bouncy castle to a next-door neighbour as a favour.

14 A piece of fairground equipment may be designed, manufactured, imported or supplied to, or for, someone else with a written agreement that this other person will take specified steps to ensure that the fairground equipment will be safe (as described in paragraphs 10–12 above). The agreement 'shall have the effect of relieving the first mentioned person from the duty imposed to such extent as is reasonable having regard to the terms of the undertaking' (section 6(8)). It should not, however, be assumed that all duties can be delegated to others. This exemption is a qualified one, and should be approached with caution and a clear understanding of what everyone involved has to do to ensure that the finished piece of fairground equipment is safe and without risks to health.

Duty not to misuse anything provided for the purposes of health and safety

15 Section 8 of the HSW Act places a duty on anyone who is at a fairground or theme park (including employees and members of the public) to behave sensibly and not to misuse or recklessly interfere with safety precautions. For example this would include the duty on passengers on a fairground ride not to damage ride restraints, and on operators and attendants not to defeat safety interlocking on devices.

Management of Health and Safety at Work Regulations 1999

16 The Management of Health and Safety at Work Regulations (MHSW Regulations) 1999¹⁶ require employers and the self-employed to assess the risks arising from work activities to identify the control measures which need to be taken to comply with relevant health and safety legislation, eliminating risks where possible and reducing risk from those activities which remain. If a young person is employed then the assessment must examine a specific list of risks in light of the young person's inexperience and immaturity.

17 The Regulations also require that employees must be given information about the risks to their health and safety identified by the assessment and protective and preventative measures that can be taken. This information must also identify emergency procedures in case of imminent danger and people nominated to implement those procedures. If the employer employs someone on a temporary contract, he or she must provide that person (and the employment agency who supplies such workers) with information on any special qualifications required for the worker if he or she needs to be able to carry the job out safely.

18 Regulation 11 requires that where two or more employers share a workplace they should:

- co-operate with each other to enable them to comply with statutory provisions;
- take reasonable steps to co-ordinate measures taken to comply with statutory provisions;
- take reasonable steps to inform each other of the risks to health and safety arising out of their work.

19 Regulation 12 requires employers to provide information to the employers of other people who are working in their undertaking. This information concerns:

- the risk to those people arising out of the undertaking;
- the measures taken to comply with the law.

Provision and Use of Work Equipment Regulations 1998

20 The Provision and Use of Work Equipment Regulations 1998 (PUWER)^{17, 18} expand upon the general duties of the HSW Act and require that work equipment supplied to employees is suitable, correctly installed (if applicable), safe to use and used only by people who have received adequate training. Work equipment should be regularly maintained and, if necessary, inspected by a competent person to ensure that it remains safe to use. Work equipment, regardless of its age, should not cause a risk to health and safety.

21 PUWER makes more explicit the general duties already placed on an employer, self-employed person or someone with control to any extent of plant and operations to provide safe plant and equipment and to ensure employees are adequately trained in its use.

22 While the current industry-agreed examination and inspection scheme (ADIPS) will generally be sufficient to allow controllers to comply with their duty to have their devices adequately inspected, it is important for them to consider the other duties imposed by PUWER, for example:

- the duty to maintain a device in a safe condition;
- the duty to ensure the safety of dangerous parts of the ride and ride machinery; and
- the duty to provide information, instruction and training to employees and others who may be expected to use work equipment.

23 These duties apply to all equipment provided for use at work (within the scope of the Regulations), and not just to amusement devices.

Manual Handling Operations Regulations 1992 (as amended)

24 The Manual Handling Operations Regulations 1992 (as amended)^{19, 20} apply to the transporting or supporting of loads by lifting, putting down, pushing, pulling, carrying and moving, either by hand or by bodily force. Employers must avoid, so far as is reasonably practicable, the need for their employees to undertake any manual handling operations which could lead to them being injured. Where this is not possible then employers need to consider the risks that arise from manual handling that could impact on the health and safety of their employees.

Lifting Operations and Lifting Equipment Regulations 1998

25 The Lifting Operations and Lifting Equipment Regulations (LOLER)^{21, 22} replaced most of the old legislation on lifting and created a single set of regulations. Though PUWER applies to all work equipment including lifting equipment, LOLER applies over and above the general requirements of PUWER, in dealing with specific hazards/risks associated with lifting equipment and lifting operations.

26 It is the responsibility of dutyholders to ensure that any lifting operations they carry out, and any lifting equipment they operate, or provide for others to operate at work is both suitable and safe. Risk assessments should look at the risks to people being lifted by the equipment (if applicable) and to the risk to people by the operation of the equipment. All lifting operations should be properly planned, supervised and carried out safely.

27 In the fairground industry many devices require the use of lifting equipment for assembly and dismantling, for example trailer-mounted cranes, and passenger-carrying cars (eg found on big wheels and drop towers etc). Dutyholders are expected to have these thoroughly examined and inspected at intervals provided for in LOLER, or in accordance with an examination scheme. This examination is over and above any examinations and tests required to be carried out on fairground equipment under the current industry-agreed inspection scheme (ADIPS).

28 LOLER is unlikely to apply to a device itself, even those that have been described as 'having a lifting element', for example big wheels or drop towers or to the rams and pulley systems used to position a ride from the horizontal travelling position to its working position. LOLER may apply to parts of the ride used, for example, to lift carriages vertically from maintenance or storage areas (as seen with some larger fixed roller coaster rides).

Workplace (Health, Safety and Welfare) Regulations 1992

29 The Workplace (Health, Safety and Welfare) Regulations 1992²³ expand on the general duties of the HSW Act and cover a wide range of basic health, safety and welfare issues. They apply to most workplaces and place requirements on employers and people having (to any extent) control of workplaces. They cover areas such as: temperature; ventilation; lighting; cleanliness and waste materials; room dimensions and space; maintenance; floors and traffic routes; windows, doors, gates and walls; cleaning windows etc safely; escalators and moving walkways; toilet, washing, employees' changing and clothes storage facilities; supply of fresh drinking water; and facilities for rest and eating meals.

Work at Height Regulations 2005

30 The Work at Height Regulations 2005²⁴ apply to all work at height (including work below ground) where there is a risk of a fall liable to cause personal injury. They impose duties relating to the organising and planning of work at height. See Appendix 4 for more information.

Personal Protective Equipment at Work Regulations 1992

31 The Personal Protective Equipment at Work Regulations 1992 (PPE Regulations)²⁵ expand on the general duties of the HSW Act and build on the MHSW Regulations.

32 PPE should always be the 'last resort' and should only be used to protect against the risk if engineering controls are not sufficient to reduce the risks to an acceptable level. In these circumstances, the Regulations require that an assessment be made to ensure that any PPE provided is suitable, compatible with other PPE required for the work, and is the last resort. Again, risks and hazards must be assessed and if engineering controls/systems will not overcome the hazards, suitable PPE must be provided. This can range from gloves to glasses, headgear to full-body options. In assessing the requirement for PPE, all parts of the body must be considered.

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR)

33 The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995¹⁵ apply to events that arise out of, or in connection with work activities covered by the HSW Act. Where certain events specified in RIDDOR take place, eg the death of any person as a result of an accident, someone at work suffering a major injury, someone not at work being injured as a result of an accident and taken from the scene to a hospital (for example a member of the public injured on a fairground ride), or a dangerous occurrence as defined in RIDDOR under regulation 2(1), it must be reported and a record kept.

34 The following incidents on fairground equipment in use or under test are considered to be dangerous occurrences and reportable under RIDDOR:

- the failure of any load-bearing part;
- the failure of any part designed to support or restrain passengers;
- the derailment or the unintended collision of cars or trains.

Health and Safety (First Aid) Regulations 1981

35 The Health and Safety (First Aid) Regulations 1981^{8,9} require employers to provide adequate and appropriate equipment, facilities and personnel to enable first aid to be given to employees if they are injured or become ill at work.

36 You also need to consider whether trained first-aiders are needed, the items that should be included in their first-aid kit and whether a first-aid room is required.

37 The Regulations do not oblige you to provide first aid for members of the public, however, HSE and the industry trade associations strongly recommend that employers at fairgrounds and theme parks provide adequate first aid for members of the public.

Health and Safety (Consultation with Employees) Regulations 1996

38 The Health and Safety (Consultation with Employees) Regulations 1996²⁶ state that you should consult any employees (not in groups covered by trade union safety representatives) either directly or through elected representatives. If you decide to consult your employees through elected representatives, you must make the arrangements for an election. The Regulations outline general requirements for employee consultation and the rights and functions of elected representatives including the right to 'time off' with pay to carry out their functions and to undergo training.

Safety Representatives and Safety Committees Regulations 1977

39 Employees may be represented by safety representatives appointed from among the employees by a recognised union. The Safety Representatives and Safety Committees Regulations 1977²⁷ require you to consult safety representatives on arrangements that will enable them and employees to co-operate effectively in promoting and developing measures to ensure the health and safety of the employees, and to check the effectiveness of such measures. They set out the rights and functions of safety representatives, including the provision of information, facilities and assistance, and the right to take 'time off' with pay to carry out their functions and undergo training. If two or more safety representatives request a safety committee, one must be set up.

Health and Safety (Safety Signs and Signals) Regulations 1996

40 The Health and Safety (Safety Signs and Signals) Regulations 1996²⁸ require you to provide specific signs whenever there is a risk that has not been avoided or controlled by other means, eg by safe systems of work. There is no need to provide a sign if it would not help to reduce the risk, or where the risk is not significant. You will need to take into account, as part of the risk assessment, the provision of safety signs as an effective way to help control the risks, particularly in relation to emergency exits etc.

Regulatory Reform (Fire Safety) Order 2005

41 The Regulatory Reform (Fire Safety) Order 2005²⁹ came into force on 1 October 2006. It places emphasis on the prevention of fire in non-domestic premises, including the voluntary sector and self-employed people with premises separate from their homes.

42 The Fire Safety Order applies in England and Wales (Northern Ireland and Scotland have their own laws). It covers 'general fire precautions' and other fire safety issues which are needed to protect 'relevant people' in case of fire in and around most premises. The Order requires fire precautions to be put in place 'where necessary' and to the extent that it is reasonable and practicable in the circumstances of the case. Fire certificates have been abolished and will no longer have legal status.

43 Responsibility for complying with the Fire Safety Order will rest with the 'responsible person'. In a workplace, this is the employer if they have any control over the workplace. Otherwise it is the occupier if they use the premises for their business etc. If the occupier does not use the premises as such, then the responsible person would be the owner. In all other premises the person or people in control of the premises will be responsible. If there is more than one responsible person in any type of premises, they must take all reasonable steps to work with each other.

44 If you are the responsible person you will have to carry out a fire risk assessment which must focus on the safety in the event of a fire of all 'relevant people'. It should pay particular attention to those at special risk, such as the disabled and those with special needs, and must include consideration of any dangerous substances present on the premises. Your fire risk assessment will help you identify risks that can be removed or reduced and to decide the nature and the extent of the general precautions you need to take to protect people against the fire risk that remains.

45 If you employ more than five people you must record the significant findings of the assessment.

46 *A short guide to making your premises safe from fire*³⁰ provides entry level guidance on how to make sure you are meeting the requirements of the Regulatory Reform (Fire Safety) Order 2005. Visit www.communities.gov.uk for more details. Also see Appendix 6 of this guidance.

Control of Noise at Work Regulations 2005

47 The Control of Noise at Work Regulations 2005^{31, 32} require employers to prevent or reduce the risks to health and safety from exposure to noise at work. They require you as an employer to:

- assess the risks to employees from exposure to noise at work;
- take action to reduce the noise exposures that produce those risks;
- take specific actions at the action levels and make sure the limits for noise exposure are not exceeded;
- provide employees with hearing protection if you cannot reduce the noise exposure enough by using other methods;
- provide your employees with information, instruction and training;
- carry out health surveillance where there is a risk to health.

48 As a rough guide, noise is likely to be at a hazardous level if people have to shout or have difficulty being heard clearly by someone about 2 m away. If there is a likely noise hazard, you will need to arrange for a competent person to complete a noise assessment. This will identify the daily individual noise exposure for each of your employees who might be at risk of over-exposure, and will provide information to help you decide what you will do to control the noise exposure. This should be the first step for you in developing an action plan for introducing noise-control measures. Hearing protection for employees should be provided as a last resort.

Control of Substances Hazardous to Health Regulations 2002 (as amended)

49 The Control of Substances Hazardous to Health Regulations 2002 (COSHH) (as amended)³³ require a COSHH assessment to be carried out to protect employees and visitors against health risks from hazardous substances used or generated. Hazardous substances can be biological agents, dusts, substances with exposure limits, or substances highlighted as hazardous in the safety data sheet.

50 The Regulations require you to take the following steps:

- assess the risks from hazardous substances;
- decide what precautions are required;
- prevent or adequately control exposure;
- demonstrate that you have achieved adequate control;
- ensure that control measures are used and maintained;
- monitor the exposure;
- carry out appropriate health surveillance;
- prepare plans and procedures to deal with accidents etc;
- ensure employees are properly informed, trained and supervised.

Electricity at Work Regulations 1989

51 The Electricity at Work Regulations 1989³⁴ impose detailed requirements on employers in control of an electrical system to ensure that the system is safe. These requirements are concerned with the design of systems covering matters such as earthing and bonding, the means for protecting against excess of current, insulation and placing of conductors, means of isolation, and fault withstand capability etc.

52 The Regulations also require all electrical systems to be maintained to prevent, so far as is reasonably practicable, any danger, but maintenance should be carried out so that it does not give rise to danger. The Institution of Electrical Engineers publishes guidance on inspection and testing of low-voltage electrical installations and equipment.

53 The Regulations also require people working on electrical systems where danger may arise to be competent or to be supervised. Helpful advice on safe systems of work on electrical systems is published in HSE's guidance book HSG85 *Electricity at work: Safe working practices*.³⁵

54 The EAW Regulations should not be confused with BS 7671 *Requirements for electrical installations*,³⁶ previously, but still commonly, known as the IEE Wiring Regulations. This has the status of a code of practice, so that compliance with it is likely to lead to compliance with the relevant parts of the EAW Regulations. However whereas BS 7671 deals with the safety of electrical power distribution systems, it does not cover safe working practices on electrical systems and for that you must refer to these Regulations.

Disability Discrimination Act 1995

55 The Disability Discrimination Act 1995¹⁴ gives disabled people rights to access your rides and you may have to make 'reasonable adjustments' to help. You should know what safety precautions are needed to allow the public to use your device safely (use of restraints, hand and foot bracing points, information and instructions etc), and where you think a disabled person may have problems complying, consider whether there are any adjustments that you can make to enable them to use the ride safely.

56 You may, however, be able to justify less favourable treatment of a disabled person and not making an adjustment for a disabled person, but only if this is necessary to protect people's health and safety, eg other customers, the disabled person themselves or the operator (see shaded example). You will need to consider the unique nature of your amusement park or fairground and the individual circumstances of your client. You are likely to discriminate if you have a 'blanket' rule that treats disabled people differently, eg if you ban all disabled people from your rides.

57 Avoid making assumptions and seek to involve, where you can, disabled customers or those supporting them. They are likely to have thought about the suitability of rides beforehand and together you can make an informed decision.

Example

A fairground operator refuses to allow a person with multiple sclerosis onto a physically demanding, high-speed ride. Because of her disability, the disabled person uses walking sticks and cannot stand without help. The ride requires users to brace themselves using the strength in their legs. The refusal is based on real concerns for the health and safety of the disabled person and other users of the ride. This is likely to be justified.

58 Find out more from the Disability Rights Commission at www.drc.gov.uk and from HSE's website www.hse.gov.uk.

Health and Safety (Enforcing Authority) Regulations 1998

59 The Health and Safety (Enforcing Authority) Regulations 1998³⁷ allocate premises to either the local authority or the Health and Safety Executive for the purposes of enforcing relevant health and safety legislation. In general, this means that travelling fairgrounds and theme parks will fall to HSE, and inflatable devices, bungee and go-karts will fall to the local authority for the purposes of inspection (HSE will always be the enforcing authority for section 6 of the HSW Act). Where inflatable devices and go-karts are found within the overall provision of a theme park or travelling fair, HSE will normally be the enforcing authority.

60 The regulations allow for local arrangements to be reached between HSE and a local authority that transfer enforcement responsibility for a particular dutyholder from one authority to the other.

Construction (Design and Management) Regulations 2007

61 The Construction (Design and Management) Regulations 2007³⁸ apply to specified construction activities and place duties on clients, designers and those involved in the construction work. They do not apply to the erection and dismantling of marquees, tents or the erection and dismantling of travelling fairground rides. For the most part they will not apply to the installation of rides intended to be permanently installed (eg at amusement parks) as fairground rides are not considered to be structures, as defined in the Regulations. However the Regulations may apply to construction work that accompanies the installation or dismantling of such devices, or is carried out within a theme park (construction of fixed structures such as offices, cafés etc).

Appendix 2

Risk assessments to establish maturity of design for fairground rides

Introduction

- 1 The following information may help with preparing a suitable maturity risk assessment and checking that existing ones are suitable. It includes advice on when an assessment would be appropriate and how it could be carried out.
- 2 Section 6 of the HSW Act (as amended) puts very specific responsibilities on the designers, manufacturers, importers and suppliers of fairground equipment to ensure that devices are designed and constructed to be as safe as far as is reasonably practicable.
- 3 The series of pre-use inspections (design review, assessment of conformity to design and initial test) described in this guidance, if completed diligently, will allow for compliance with the HSW Act section 6 duty. These pre-use inspections form part of the Amusement Devices Inspection Procedures Scheme (ADIPS).
- 4 When ADIPS was introduced in October 1997, it was recognised that there would be a significant number of rides which had not been subjected to the initial pre-use inspections, but which were well-designed and constructed. In these cases the manufacturer may have complied with section 6 of the HSW Act in a different way and it was clear that interim arrangements would be required to allow the ADIPS scheme to function and to allow Declarations of Operational Compliance (DOCs) to be issued in the absence of information on initial inspection.
- 5 These interim arrangements only applied to devices that existed in the UK **before October 1997**. They introduced the concept of a ride that was of a mature design. This means there is sufficient relevant information available to determine that the ride design has a history of safe operation and has therefore stood the test of time.

Maturity risk assessment

6 The responsibility for producing a maturity risk assessment lies with the controller of a device. Controllers cannot claim maturity for an older ride by right. Just because a ride is old, it does not automatically follow that it is mature. When a device has been declared mature, this should be justified by a risk assessment that supports this conclusion.

7 Ride controllers can establish that a ride is well-designed and constructed in the absence of pre-use inspection information by undertaking a maturity risk assessment. Such an assessment is in addition to, and separate from, the operational risk assessment required for all rides. Ride controllers may use others to help with this process, eg inspection bodies may be able to help in areas where they are competent, such as mechanical, structural, or electrical aspects.

8 While the history of other rides is useful supporting evidence, controllers should be wary of placing too much emphasis on such information unless they are certain that the other rides are identical in design and manufacture. In theory it is possible to build a new ride to an established design, then claim maturity for the device. However, unless it can be demonstrated that the design **and** manufacture were identical, it cannot be declared to be mature.

When is a maturity risk assessment appropriate?

9 The following issues should be considered:

- if the ride has a relevant design review and initial inspections then it does **not** need a maturity assessment;
- if the ride was not in existence in the UK before October 1997 it **cannot** be considered mature;
- to carry out a satisfactory maturity risk assessment a controller will need at least five years of relevant history for the ride under consideration. (The required history is described below.) Although the figure of five years is given as guidance and will need to be considered in the context of the risk assessment, it is unlikely that a ride with less than five years' history could be declared mature;
- a ride which has had very little use in the last five years may require more than five years' history to demonstrate that it is capable of operating safely over a sustained period;
- ride histories are best presented in written form;
- a controller must know whether the ride or any part of the ride has been modified. If any of the safety-critical parts of the ride have been modified since October 1997, a partial design review of the ride which covers the modified part (and any consequences it may have on the safe operation of the ride as a whole) is required;
- modifications that took place before October 1997 may have sufficient history of safe operation to be considered mature. The period of five years is given as a guide. If the rest of the ride is unmodified it could be the subject of a maturity risk assessment as long as the other criteria are met;
- if the whole ride has been modified, a complete design review is required and maturity assessment is not appropriate.

Documents required for a maturity risk assessment

10 Before a controller undertakes a maturity risk assessment they will need the following documents and information:

- HSG175 (this book);
- the accident history for the particular ride and the class of ride (as far as possible), detailing accidents arising from the ride design (for at least five years). Accident history for classes of ride may sometimes be difficult to obtain, however, inspection bodies, trade organisations etc may be able to help;
- details of modifications to safety-critical parts;
- the operational risk assessment;
- maintenance records (including repairs) and records of previous inspection including non-destructive testing for at least five years. These are important because they may indicate areas of concern with the design. They are also important because they indicate the parameters within which the device should work and which will have contributed to its record of safe operation;
- details of ease of accessibility and frequency of testing and inspection of safety-critical parts. If safety-critical parts are inaccessible then it may not be possible to spot emerging problems at an early stage and it may be that they have not been inspected thoroughly over the years. Under these circumstances it is likely that a partial design review will be a more appropriate method to decide that these parts are safe;
- other information, eg HSE guidance, National Association for Leisure Industry Certification (NAFLIC) bulletins, manufacturers' information etc which relates to the class of ride and any problems with design;
- an operations manual. This is an essential aid to the maturity assessment. It is unlikely that maturity could be established without one, as all of the evidence required to support the conclusions of the assessment should be contained within such a manual. Further information on operations manuals is in Appendix 3.

Content of a maturity risk assessment

11 Controllers will need to have identified that:

- there is a hazard from injury due to the failure of a safety-critical part as a result of poor design;
- people at risk may be riders, operators or bystanders;
- the principal control measure, for the purposes of this assessment, is the integrity of the design and construction which has reduced risk to an acceptable level. The evidence that the design is adequate is based on a number of years of safe operation and should be contained in the documents listed above;
- the design and construction must be capable of withstanding all types of failure including corrosion, wear and fatigue and the evidence for each must be considered;
- the ability of the design to withstand deterioration is dependent on the correct operation of the ride coupled with adequate maintenance and inspection.

12 The findings of the assessment must be recorded in a suitable form to allow controllers to support the conclusion that a ride is mature. The maturity assessment should be appended to the operations manual.

13 If it cannot be established that the ride is mature, then the necessary design review(s) should have been completed by March 2004.

Checklist for controllers

14 These questions should help controllers assess whether or not a maturity risk assessment is appropriate for their device, and whether they have adequate information to complete it satisfactorily:

- Does the device have evidence of initial inspections?
- Was the device in the UK before October 1997?
- Have you identified the safety-critical parts with the help of an inspection body?
- Have any safety-critical parts of the ride been modified since 1997? (If yes, consider a partial design review of new parts and consider maturity for older parts.)
- Has the ride been used continuously and do you have at least five years' history of operation (in your operations manual)?
- Does this history indicate the ride has operated safely for at least five years?
- Do you have maintenance records, details of repairs and details of past examinations for at least five years?
- Do these indicate that the design of any part of the ride may have been a cause for concern taking into account foreseeable modes of failure and the existing control measures (including inspection and maintenance)?
- Are all of the safety-critical parts of the ride accessible? (If no, what measures have been taken to ensure the continuing integrity of these safety-related parts?)
- Do you have the accident history for this class of ride?
- Does this indicate that there might be a problem which might affect your ride?
- Do you have access to HSG175, other relevant HSE guidance and industry guidance such as NAFLIC bulletins for this type of ride?
- Do these documents indicate that there might be a problem which might affect your ride?
- Does the operating manual contain other details required in HSG175 Appendix 3?
- Do these indicate how the ride should be operated, inspected and maintained?

15 Does the above information, when considered as a whole, demonstrate that the ride has an adequate history of safe operation which indicates that the risk of injury arising from a failure of design is at an acceptable level?

Appendix 3

The operations manual and other information for the safe operation of an amusement device

Information requirements

- 1 The successful operation, maintenance and inspection of any amusement device will require access to information by different individuals at different times, for example:
 - operators may need information about the safe way to operate the ride, emergency procedures and the periodic checks that need to be done before the ride is operated;
 - maintenance fitters may need information about the schedules of inspection to allow them to carry out safety checks;
 - registered inspection bodies may need access to design review information and previous in-service inspections; and
 - regulatory inspectors (eg from HSE) may wish to see records of training and records of scheduled inspections.
- 2 The controller should ensure that each amusement device has adequate information available to allow it to be safely operated, maintained and inspected.
- 3 Some of this information will need to be kept with the ride for ease of reference. Other sources of information may be complex and bulky and not necessarily required to be kept with the ride, but in a location where they can be retrieved easily when required.
- 4 The types of information that are likely to be complex and bulky are the records of design and manufacture, and the details of the pre-use inspections. It is not always necessary that this information needs to be kept with the ride as long as it is readily available to the controller when required, eg when needed by an inspection body.
- 5 The documents and information that need to accompany any amusement device should be kept in an operations manual and be with the device when it is operational. This should include all the necessary documentation relating to the operation, maintenance, and in-service inspection of the ride.
- 6 Examples of documents that that should normally be kept with the ride include:
 - the Declaration of Operational Compliance (DOC);
 - all the necessary risk assessments;
 - operator instructions, including emergency procedures;
 - records of attendants who are allowed to operate the ride;
 - details of the daily and periodic inspections;
 - schedules for the in-service inspection, including schedules for the mechanical, hydraulic, electrical, pneumatic and non-destructive testing of the device as required;

- details of safety-critical modifications. This should include the following:
 - details of design review of all safety-critical modifications which have caused the device to differ from the original specification;
 - details of assessment of conformity to design of all safety-critical modifications, as above;
 - details of initial test of safety-critical modifications, as above;
 - confirmation of witnessing and verification by inspection bodies of initial tests of the above safety-critical modifications.
- 7 The extent of this information will depend on the nature of the device, and the nature of the modification carried out.

Information on transport, installation, erection and dismantling

8 The operations manual should contain information on transport, installation, erection and dismantling, including:

- diagrams to show the correct assembly of the component parts;
- a key to the identification of non-interchangeable parts;
- information on the correct use of any special equipment required for assembly;
- details of the weight distribution and recommended packing points, together with the maximum applied load at each point and any foundations required;
- diagrams and drawings of the safe means of erecting and dismantling the ride, along with any required clearance distances necessary for safe operation;
- procedures for setting up and dismantling the device correctly including, where relevant, details of:
 - any safe systems of work required, along with details of personal protective equipment needed;
 - emergency rescue plans (eg for working at height);
 - advice on ground or foundation preparation;
 - order of assembly/disassembly of component parts;
 - any temporary measures needed to support a partially completed device;
 - torque settings essential to the safety of screws or bolts;
 - any procedures needed to prevent or relieve stress concentration during assembly/dismantling;
 - jacking and packing points and procedures, including selection of materials, load spreading and ballasting where relevant;
 - levelling and out-of-level tolerances;
 - barriers, fencing etc;
 - mechanical and electrical power requirements;
 - correct methods for connecting electrical equipment to the power supply;
 - grounding for lightning protection;
- any checks or testing needed to make sure the device has been assembled correctly and is functioning in the intended manner.

Information on safe use

9 The manual needs to contain information on safe use, including:

- a description of the normal functioning of the device (including the function and motion of the major components);
- the normal safe operating procedure (including the functions and responsibilities of the operator and attendants);
- details of operating speeds. The maximum or limiting speed should not be based solely on the forces that the device can withstand but should also take account of the need to prevent injury to users;

- information on loading which should specify:
 - the maximum working loads;
 - maximum passenger numbers;
 - permissible out-of-balance loading;
 - order of passenger loading;
- limitations to use, eg passenger dimension (size, weight), medical condition, adverse environmental conditions (especially wind speed);
- details of any passenger-containment system and guidance on its use;
- information on relative positioning of passengers in the same car;
- potentially dangerous passenger behaviour;
- detailed explanation of the controls and their function;
- safe passenger access;
- limitations required to prevent static overload in waiting areas;
- safe and unsafe operating practices;
- faults and fault finding, including indications of malfunction and the action to be taken;
- emergency procedures, including evacuation.

Instructions and guidance on any maintenance and inspection

10 The information needs to cover:

- components which require regular lubrication including information on suitable lubricants and the frequency required;
- components which require regular replacement and the period between replacement;
- components which require inspection for wear, correct setting etc together with details of the correct settings and allowable tolerances;
- electrical equipment together with any checks to be done by the user and details of safe isolation procedures;
- maintenance and testing of controls and interlocks.

11 The controller should add any other relevant information gained from operating the device.

12 The manual needs to be in the controller's first language. The controller should also take into account the needs of any foreign workers employed and ensure they are provided with sufficient information to allow them to work safely. It is important that the manual is 'user-friendly' and gives clear information on how the device can be used safely.

Appendix 4

Working at height

Work at Height Regulations 2005

1 The Work at Height Regulations 2005 apply to all work at height where there is a risk of a fall liable to cause personal injury. They place duties on employers, the self-employed, and any person who controls the work of others, eg a ride controller who may contract someone to work at height.

2 As a dutyholder you must ensure:

- all work at height is properly planned and organised;
- those involved in work at height are competent;
- the risks from work at height are assessed and appropriate work equipment is selected and used;
- the risks from fragile surfaces are properly controlled; and
- equipment for work at height is properly inspected and maintained.

3 There is a simple hierarchy for managing and selecting equipment for work at height. You must:

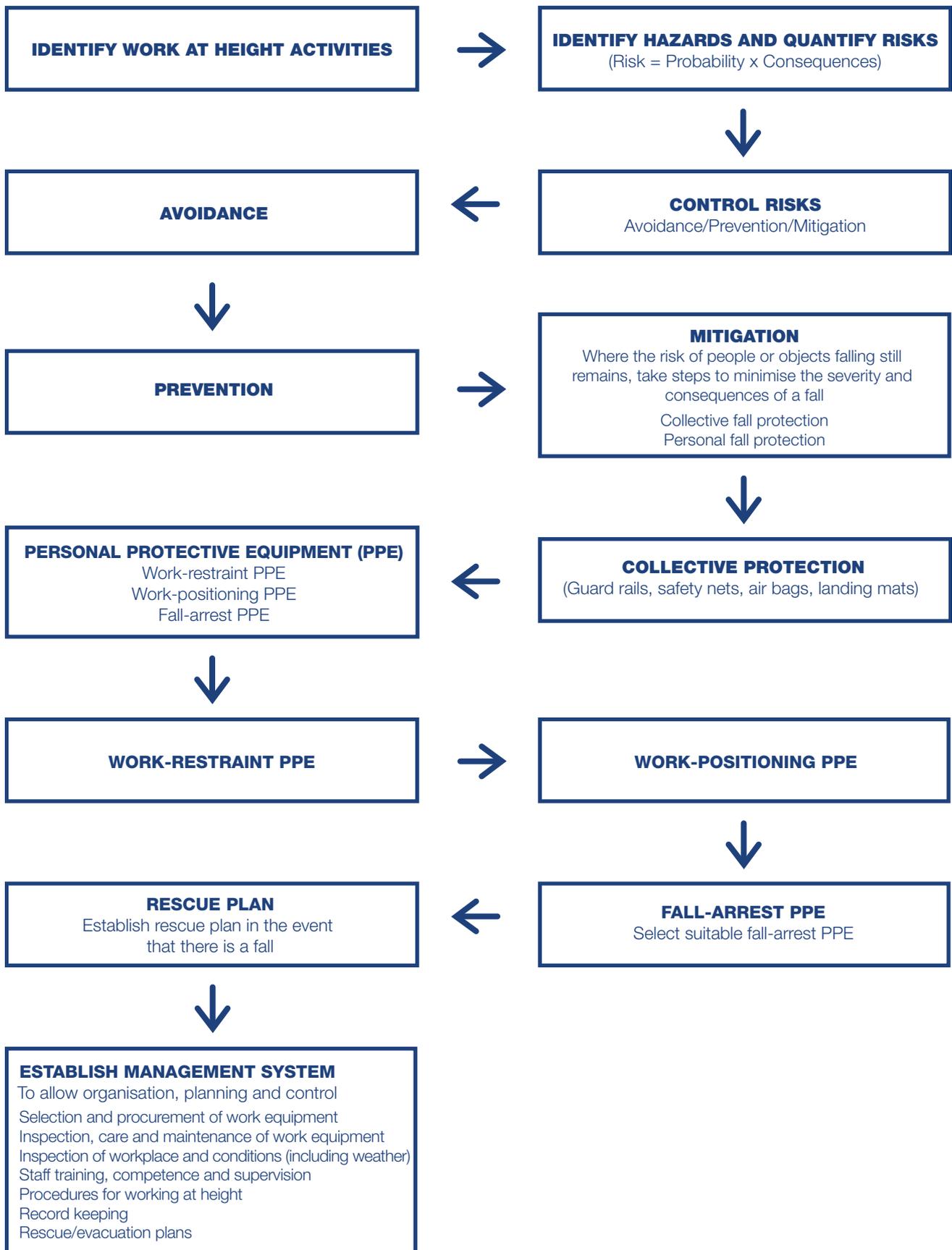
- avoid work at height where possible;
- use work equipment or other measures to prevent falls where you cannot avoid working at height; and
- where you cannot eliminate the risk of a fall, use work equipment or other measures to minimise the distance and consequences of a fall should one occur.

4 There are occasions when work at height is required in the fairground industry, for example during:

- assembly and dismantling of devices;
- commissioning;
- maintenance;
- inspection;
- breakdown repair;
- emergency evacuation.

5 Flow Chart 1 is intended to help dutyholders within the fairground sector who may either work at height themselves, have employees who as part of their duties may have to work at height, or control the work of others working at height.

Flow chart 1 Risk assessment process for working at heights illustrating the general risk assessment process adopting the safe working at heights hierarchy approach of avoidance, prevention and mitigation.



Appendix 5

Non-destructive testing

General principles

1 Non-destructive testing (NDT) is the testing of materials, for surface or internal flaws or metallurgical condition, without interfering in any way with the integrity of the material or its suitability for service. It may be performed during manufacture as part of quality assurance procedures to make sure that a structure or component is fit for use, free of significant defects and conforms to the design specification. It is also used as part of in-service annual inspection to determine whether structures or components continue to be fit for service.

Written schedule of NDT

2 The controller of a device should have a written schedule of inspection for NDT available that specifies the frequency of in-service NDT that is required (this can be measured in either time and/or ride cycles as appropriate), the type of NDT to be used, the location and defect acceptance criteria. It should have been drawn up by a suitably qualified mechanical/structural engineer along with a person qualified in the NDT techniques to be used.

3 The mechanical/structural engineer should identify the parts of the device that require testing, the frequency of inspection and the extent of dismantling required to gain access to them.

4 The NDT practitioner should specify the appropriate test methods and techniques to be used. These must be reliable and repeatable, so that results can, if necessary, be compared to previous results.

5 The types, size, locations and orientations of defect indications should be referred to the relevant inspection body for a decision on the action to be taken, eg repair, replace or allow continued use.

Report of NDT

6 In this document the NDT practitioner provides a record for the inspection body and controller of the parts tested and the results obtained. The inspection body will need to assess these results when preparing the report of in-service annual inspection. An NDT report needs to include:

- confirmation that the inspection has followed the written schedule and any further tests carried out;
- the date of inspection;
- the inspector's name and their qualifications relevant to the type of inspection;
- the parts or elements examined which form any sample;
- details of the NDT methods, techniques and procedures used;
- the results of inspection.

7 The controllers should keep copies of NDT reports for the life of the device.

- 8 When assessing the reports, the inspection body should:
- be competent to distinguish between original manufacturing flaws and flaws which have developed during use. Having the results of previous NDT in the operations manual can be a valuable reference;
 - be competent to distinguish between significant and insignificant indications. This will require, for example, a sufficient understanding of:
 - the manufacturing methods used and the types of flaws likely to be introduced during manufacture;
 - the significance of the type, size and orientation of the flaw with regard to the geometry, material and loading of the component;
 - the purpose and limitations of the NDT method used.
- 9 The inspection body may need to seek specialist advice if necessary.

Qualifications and competence

- 10 Every NDT practitioner should be competent to do the test and to accurately report the results.
- 11 There are three main qualifications commonly used in this country: ASNT (American Society for Non-destructive Testing); PCN (Personal Certification in Non-destructive Testing) and welding inspector.
- 12 A person qualified under ASNT is able to carry out a certain type of inspection which is specified in a written procedure. They are not normally qualified outside that procedure. Before a person claiming compliance with ASNT is engaged to do NDT work, enquiries should be made about the scheme and syllabus of that person's training and whether it is within the scope required to inspect an amusement device.
- 13 PCN is a recognised world-wide scheme. A certificate issued under the scheme is valid for a maximum of five years and may be withdrawn at any time by the issuing authority. The scheme has three levels of competence:
- **Level 1:** an inspector requires supervision by a person qualified at least to Level 2.
 - **Level 2:** the main level of practitioner. They can prepare written instructions from appropriate NDT standards and evaluate the results.
 - **Level 3:** an inspector competent to write and validate NDT procedures usually needs five years' experience.
- 14 A welding inspector is qualified to inspect the welding process as well as the finished weld. A person holding this qualification can test existing welds and inspect any remedial work in progress as well as the finished result. However, in the absence of other qualifications, a welding inspector may not be competent to undertake other forms of NDT.

Typical defects

- 15 Typical defects encountered in testing of amusement devices are:
- in-service-induced fatigue cracking;
 - corrosion;
 - manufacturing-induced defects.

Typical test areas

16 Typical test areas are:

- safety-critical welds;
- weld repairs;
- axles;
- bolts and fixings;
- glass-reinforced plastic (GRP) laminates.

Typical NDT techniques used to test amusement devices

Visual and optical inspection

17 Visual inspection involves looking for defects. Special tools such as magnifying glasses, mirrors, or borescopes can be used to enable access and inspect in greater detail the subject area. This technique can be useful as part of an overall mechanical inspection of an amusement device, but will not normally be sufficient to complete an adequate NDT inspection of most amusement devices.

Dye penetrant (DP)

18 Dye penetrant requires careful preparation and pre-cleaning to ensure that there are no contaminants in the crack that would prevent the penetrant being drawn into it. The parts of the device to be examined are painted or sprayed with a visible or fluorescent dye solution and left for a period of time (normally around 15 minutes). The excess is removed and a developer agent (frequently white chalk) is applied. This acts as a 'blotter' and draws the trapped penetrant out of defects that are open to the surface. With visible dyes, vivid colour contrasts are used between the penetrant and developer to make the defect easy to see. With fluorescent dyes, ultraviolet light is used to make the defect visible.

19 It is relatively simple to carry out and it is useful in detecting surface-breaking defects in non-ferromagnetic parts which cannot be tested using magnetic particle inspection (MPI). A disadvantage is that it is restricted to surface-breaking cracks, and the presence of paint on the test piece can adversely affect detection of defects.

Magnetic particle inspection (MPI)

20 Magnetic particle inspection (MPI) is a method used for defect detection of surface or near-surface-breaking defects. These distort the magnetic field and concentrate iron particles near imperfections, giving a visual indication of the flaw. This test is carried out by inducing a magnetic field in a ferromagnetic material and then dusting the surface with iron particles (either dry or in suspension). The technique is used widely in weld testing and inspection.

21 It is important to remember that the component being inspected must be made of a ferromagnetic material such as iron, nickel, cobalt, or some of their alloys. This is because the component must be capable of being magnetised to a level that will allow the inspection to be effective.

22 With magnetic particle inspection the flaw indications generally look like the actual flaw. Cracks on the surface of the part appear as sharp lines that follow the path of the crack. It is another relatively simple process, but with the disadvantages that it can only detect surface or near-surface defects and can only be used on ferromagnetic material. Unbroken, tightly-adherent paint layers up to about 0.05 mm (50 microns) do not normally impair detection sensitivity. See EN 9934-1³⁹ for further details.

Eddy current

23 Eddy current (EC) is used for the detection of surface or subsurface flaws – the paint does not need to be removed. It can only detect cracks up to 2 mm deep. Eddy currents can be produced in any electrically conducting material that is subjected to an alternating magnetic field. The field is generated by passing an alternating current through a coil, which is wrapped round a ferrite rod and placed on the surface to be examined. When a crack, for example, occurs in the product surface, the eddy currents must travel further around the crack and this is detected by a change in the impedance measured in the coil.

Ultrasonic (UT)

24 High-frequency sound waves are passed into the test object and reflections (echoes) are returned to a receiver from internal imperfections or from the part's geometrical surfaces. This technique is widely used in the fairground industry and when used correctly can be a highly efficient method of detecting subsurface imperfections. It is important that the interpretation of results is carried out thoroughly. As with all other test techniques it has limitations, for example:

- if the test area is rough, irregular in shape or small, it can be difficult to detect defects;
- cast iron and other coarse-grained materials are difficult to inspect due to low sound transmission and high signal noise;
- linear defects oriented parallel to the sound beam may go undetected.

Radiography

25 Radiographic testing (RT) is used to detect internal defects in metals. X-rays or gamma rays are transmitted through the material and are differentially absorbed by the material through which they pass. An image is produced on a photographic film placed on the opposite side. It requires access to both sides of the weld. It is not suitable for surface-breaking defect detection and does not give an indication of the depth of a defect from the surface. While it has been shown that radiography can be used successfully by suitably trained operatives on certain parts of amusement devices (for example welds which cannot be examined using UT that are hidden underneath strengthening plates) the expense and detailed procedures that are required mean that it is not commonly used.

Appendix 6

Fire precautions and gas safety

Introduction

1 This appendix covers both fixed and temporary sites. It gives practical advice on fire safety, but does not provide an authoritative interpretation of fire safety legislation. Organisers and controllers may need to liaise with the appropriate authorities for further information on how to comply with legal requirements. Guidance on fire safety is given in *Fire safety risk assessment – Small and medium places of assembly* and in *Fire safety risk assessment – Open air events and venues* both available to download at www.communities.gov.uk.²⁹

2 Typical fire hazards in fairground and amusement parks with some of the practical precautions are shown in Table 3. As well as the fire hazards themselves, the organiser may need to consider what could affect the spread of fire, such as:

- site layout, particularly separation distances between structures;
- features within structures, such as lift shafts, ducts, flues, openings in floors or walls, combustible linings;
- local environmental factors, particularly those that affect wind speed or direction, eg through channelling effects;
- distance from surrounding buildings (in street fairs it is important to consider how a fire in a neighbouring building could affect the fair and vice versa).

3 As well as the precautions in Table 3, other general precautions are:

- remove materials which are flammable or give off toxic fumes in fires and replace them with less hazardous ones;
- provide fire warning arrangements;
- provide means of escape;
- provide appropriate fire-fighting equipment and training in how to use it;
- make sure that staff are adequately trained in general fire precautions and good housekeeping and know what to do in case of fire (this should include practical exercises).

Table 3 Typical fire hazards and some practical precautions

Fire hazard	Practical precautions
<p>1 Presence of combustible materials, in particular:</p> <p>(a) Structures</p> <p>(b) Fuels, including flammable liquids and LPG</p> <p>(c) Rubbish</p> <p>(d) Vegetation</p>	<p>Keep combustible materials to a minimum and where possible secure.</p> <p>Make sure structures and their furnishings have appropriate fire resistance.</p> <ul style="list-style-type: none"> ■ Do not store more fuel than you need or are allowed to. ■ Keep flammable liquids, eg petrol, in suitable closed containers, clearly marked to show the contents. ■ Store the containers safely and secured against unauthorised access (not under lorries or near cables or other electrical equipment). ■ Provide fire-resistant rubbish containers and empty them regularly. ■ Arrange regular collection of rubbish left on the ground. ■ If you cannot dispose of rubbish immediately, store it away from sources of ignition, other flammable materials etc and keep it secure. ■ Keep grass short and LPG stores free of weeds. ■ Be prepared to damp down vegetation in dry weather.
<p>2 Misuse of equipment using solid, liquid or gas fuels (eg generators, cookers, heaters) including:</p> <p>(a) Lack of maintenance</p> <p>(b) Dangerous location</p> <p>(c) Obstructed ventilation</p> <p>(d) Refuelling</p> <p>(e) Reigniting</p>	<p>Check regularly the condition and use of equipment.</p> <p>Make sure it is maintained according to the manufacturer's instructions. You may need to bring in a competent person to check and maintain it. (See paragraphs 51–61 of this appendix, regarding gas safety.)</p> <ul style="list-style-type: none"> ■ Do not use naked flames near combustible materials. ■ Do not use naked flames in structures (especially tents and marquees) when the public are present. If used at other times, keep the appliance under constant supervision and remove it to a safe place with the flame extinguished before admitting the public. <p>Check that there is adequate ventilation to:</p> <ul style="list-style-type: none"> ■ allow fuels to burn properly and combustion products to escape safely; <p>Only refill fuel tanks or change gas cylinders in the open air or in a well-ventilated area away from sources of ignition. Never refuel when an engine is running or an appliance is lit.</p> <p>Never attempt to reignite a Salamander-type waste oil heater while the heater is hot.</p>
<p>3 Misuse of electrical equipment, including:</p> <p>(a) Inadequate installation, poorly routed cables etc</p> <p>(b) Lack of maintenance</p> <p>(c) Unauthorised and temporary repairs, wrong cables, connectors, fuses etc</p> <p>(d) Overloading</p> <p>(e) Equipment left on when not in use</p>	<p>Regular visual checks with inspection and testing by a competent person as appropriate.</p>

Table 3 Typical fire hazards and some practical precautions

Fire hazard	Practical precautions
4 Smoking and misuse of smoking materials, eg matches	<ul style="list-style-type: none"> ■ Prohibit smoking in hazardous areas, particularly near fuels and in tented, inflatable or similar structures. ■ Provide ashtrays etc where smoking is permitted.
5 Actions of contractors and maintenance workers, eg hazards arising from welding spools and hot metal	<ul style="list-style-type: none"> ■ Make clear what they should and should not do. ■ Make them aware of any particular fire risks and your fire safety policy and precautions. ■ Monitor their work regularly.
6 Unauthorised access/arson	<ul style="list-style-type: none"> ■ Make all staff aware of the importance of security. ■ Keep flammable materials to a minimum and as secure as possible. ■ Make regular checks of the site.

Note: This list is not exhaustive, but should help you identify the main hazards and precautions. The local fire and rescue service can give much more detailed advice, particularly on matters such as the safe storage of flammable materials.

4 The assessment should be monitored regularly to make sure that the fire safety arrangements remain relevant. It should be reviewed if there is a significant change in:

- work activity;
- fire risk, eg changes in the materials used or the way they are stored;
- number of people (staff or public) at risk;
- site or structural layouts affecting the means of escape or other fire safety arrangements or if building work is being considered.

5 A new assessment should be made for every new site to make sure that fire precautions and escape routes will be adequate. Similarly, if a permanent site is taken over by a new organiser a new fire risk assessment should be made as soon as possible.

Emergency plan

6 An emergency plan should be prepared from the findings of the risk assessment. It should be kept on site, be available for inspection and include:

- the action to be taken by staff in the event of fire, including those who have specific fire safety functions, eg nominated deputies, fire marshals etc;
- the arrangements for any people at particular risk, eg builders, contractors, maintenance workers, members of the public, people with disabilities;
- any specific arrangements for parts of the site with high fire risk;
- evacuation procedures for everyone on site, including details of escape routes;
- arrangements for calling the fire brigade and informing them of any special hazards.

7 The organiser may find it helpful to include a simple sketch showing, where relevant:

- essential features such as the layout of the site, escape routes (including those from any structures etc);
- the number, type and location of fire-fighting equipment available, eg extinguishers, hose reels, fire blankets etc;
- the location of:
 - manually-operated fire-alarm call points, automatic fire-detector heads and control equipment for the fire alarm;
 - any automatic fire-fighting system and sprinkler-control valve;
 - the main electrical supply point, the main water shut-off valve and (where appropriate) the main gas or oil shut-off valves;
 - any special hazards or highly flammable substances.

8 After the emergency plan has been prepared, prominent notices should be displayed on site giving clear instructions about what to do in case of fire. They should describe how to raise the alarm and give the location of the assembly points to which people escaping from the site should report.

9 On small sites, the plan can take the form of a simple fire action notice which should be posted where staff can read it and become familiar with it. For example:

FIRE ACTION	
If you discover a fire:	
1	Sound the alarm
2	Call the fire brigade
3	Fight the fire if safe to do so
On hearing the fire alarm, you should:	
4	Follow the emergency plan
5	Report to your assembly point

10 The organiser may also wish to draw up a contingency plan in case the site is damaged by fire.

Information and training

11 Fire safety arrangements should:

- be brought to the attention of new staff and contractors;
- remain familiar to existing staff and contractors;
- be tested by fire drills, any problems remedied, and the results recorded.

Site layout

12 When planning a fair, the organiser needs to consult the local fire authority and consider the following fire safety factors:

- safe access in and out of the site for fire engines and for the public (including people with disabilities);
- risks relating to the spread of fire (see paragraph 2 of this appendix);
- means of calling the emergency services (eg telephones);
- the availability of mains services (particularly water for fighting fire);
- the slope or unevenness of the ground;
- the availability of car parking (so that it can be properly arranged to avoid obstructing emergency access).

13 Where there are more than eight amusement devices designed for use by adults, it is recommended that the organiser should prepare a sketch plan showing the position of attractions, vehicles and caravans (see Section E). The sketch used for the emergency plan (see paragraph 6 of this Appendix) could be used. The plan should be kept up to date and be available to the fire authority before the fair opens.

Access for fire engines

14 Access routes to and within the site should be checked to make sure that they can take the maximum weight and wheelbase of fire engines (see Table 4). Routes will not be adequate for emergency access if they have:

- bridges or other features which make them unusable by fire engines;
- manhole covers not designed for heavy vehicles;
- deteriorated due to bad weather conditions.

Table 4 Typical access requirements for fire engines

Appliance type	Width of road (metres)	Width of gateway (metres)	Turning circle (metres)	Clearance height (metres)	Weight (tonnes)
Pump	3.7	3.1	16.8	3.7	12.5
High Reach	3.7	3.1	29.0	4.0	17–25

15 Wherever practicable, roads likely to be used by emergency vehicles are best kept free of parked vehicles. This should be discussed with the police at the planning stage.

16 Fire engines need to be able to get to within 50 m of any structure, including fuel stores. Turning areas are needed in dead-end access routes longer than 20 m.

17 Aluminium trackway can be useful on soft ground, providing it can take the maximum weight and width of fire engines, especially at changes in direction.

18 On-site emergency vehicle routes need to be clearly marked and kept free from obstruction. Hydrants and other water supplies should be clearly visible and easily accessible. Car parks are best sited away from devices, stalls and other structures. Parking should not be allowed on internal routes.

Spacing between caravans

19 The following guidelines, prepared in consultation with the Home Office, are designed to control fire risks to fairground staff and their families. To be effective, they require good planning, effective liaison with the fire authority and a satisfactory fire safety risk assessment

20 Guidance for residential caravans recommends a spacing of 5 or 6 m between each caravan, depending on type. This may be reduced to not less than 1.5 m for showmen's caravans and other vintage living vans, as long as the fire safety arrangements given in paragraph 22 of this appendix have been made to contain any fire and quickly alert people to it.

21 Articulated tractor units or towing vans used for sleeping should be treated as caravans. They should not remain coupled to other living accommodation. Articulated tractor units or towing vans used as dressing rooms and/or for carrying props and small domestic items, but not used for sleeping, may remain coupled to a caravan. However, there should be at least 5 m between such vehicles unless the fire safety arrangements given in paragraph 22 of this appendix are in place.

22 The arrangements needed before spacing can be reduced are:

- all vehicles and caravans need to be positioned so that they can easily be driven away or hitched up and moved if there is a fire;
- a minimum clear spacing between caravans. Porches and/or awnings do not protrude into the space;
- showmen's living accommodation is adequately separated from public areas, for example, by a barrier/fence or suitable distance (unless the caravans are on display to the public);
- cars are parked away from the living accommodation;
- the organiser has ensured that all operators and attendants have received fire training;
- all electrical equipment is in good working order;
- each caravan has:
 - smoke alarm(s);
 - access to a means of calling the fire brigade;
 - fire-fighting equipment suitable for the hazards present;
 - a notice stating the action to take in the event of fire;
 - for each new site, a prominent notice with the full address of the site;
 - suitable emergency lighting, for example handlamps or torches with spare batteries.

Means of escape in case of fire

23 The organiser should make sure there are arrangements for everyone to be able to escape safely from every structure and from the site itself. They should be based on the findings of the fire risk assessment. Ask the advice of the local fire authority if there is any doubt about what is required.

General principles for means of escape

24 The means of escape in case of fire should allow people, regardless of the location of the fire, to move safely along a recognisable escape route to a place of safety (such as a street or open space) without being overcome by fire, heat or smoke.

25 Escape routes should not contain flammable or potentially toxic materials (including furnishings). They should be kept clear of obstruction, free of slipping/tripping hazards and be available for use at all times.

26 Staff need to be trained to make sure that the public leave promptly and by appropriate routes. Arrangements for helping people with disabilities should also be carefully considered.

Means of escape from structures

27 In some structures (eg funhouses) with features such as sloping or moving floors, the controller may need to make special arrangements to ensure that people can escape if a fire breaks out. These may include mechanisms to stop moving floors and emergency lighting in any dark areas.

Means of escape from the site

28 The exit time for the whole site should be discussed with the fire authority.

29 If outdoor areas are fenced or surrounded by buildings, as in a street fair, the organiser should make sure that there are sufficient means of escape to allow for an orderly evacuation, for example:

- the number and width of escape routes and exits are sufficient for the occupant capacity and suitably located;
- there are arrangements for keeping escape routes and exits clear;
- all exits and gateways are clearly indicated;
- the ground conditions on the escape routes will be suitable, particularly for people with disabilities and families with toddlers and pushchairs.

Requirements for escape routes

30 Passageways:

- should be constructed and laid out to provide safe escape;
- should be at least as wide as the exit served;
- should have a non-slip surface, guard rails and handrails as appropriate;
- the gradient of any ramp should be constant, not exceeding 1:12 nor broken by steps.

31 Exit and directional signs should be:

- clearly indicated;
- in the form of pictograms with directional arrows where appropriate.

32 Lighting requirements are that:

- access and escape routes should have adequate artificial lighting, where necessary;
- emergency lighting should be provided for routes which could be affected by failure of the normal lighting.

33 Emergency lighting may use the same power supply as normal lighting but the lighting units should be provided with an independent power source, which will function immediately and automatically if the normal supply fails. These arrangements should be designed so that loss of supply to particular areas will result in the emergency lighting for that area being activated. New emergency lighting systems should conform to appropriate standards. Automatic emergency lighting should be checked regularly and properly maintained. The emergency lighting on mobile amusement devices should be tested before opening at each new site to make sure that batteries have not become discharged during transit or build-up.

34 All final exit doors and all doors leading to them should be checked each day, before the public are admitted, to make sure that they are unlocked and can be opened easily from the inside. Such doors must never be fastened with padlocks and chains while the structure is in use.

Means for detecting and giving warning in case of fire

35 Make sure that there are suitable means for detecting and giving warning in case of fire. Any warning should be audible throughout the site, giving instant notice to appropriate staff but without causing the public to panic.

36 Where a public address system is not available, other means such as loudhailers should be provided. An alarm bell is not suitable, as members of the public may confuse it with the entertainment. Any instruction to the public to leave immediately should be phrased positively to leave no doubt that it is not part of the entertainment.

Fire-fighting equipment

37 Make sure that the site and structures are provided with appropriate fire-fighting equipment for use by staff for the risks identified. The local fire brigade can give further advice on the most suitable type and location for such equipment.

38 Signs should be displayed to show where extinguishers are located. Staff should be trained to use them and to understand the operating instructions printed on them. This will reduce the likelihood of using the wrong extinguisher.

39 Fire-fighting equipment in outdoor areas may also need to be suitable for tackling fires in vegetation, marquees etc. The organiser may need to consult the fire authority about sources of water for fire-fighting, particularly if the fair is large or there is a high risk of spread of fire.

40 Fire-fighting equipment should be serviced at regular intervals (for example yearly). A test certificate should be obtained for each item.

Good housekeeping

41 The organiser needs an effective fire safety policy which promotes good housekeeping and encourages staff to be aware of the common fire hazards and practical precautions. It is particularly important to check the site carefully at the end of each day. It is a good idea to have another inspection 30 minutes later to make sure that nothing is smouldering.

Special precautions for tented, air-supported and pneumatic structures

42 Tented, air-supported and pneumatic structures can have particular dangers. There are the hazards of ignitability of the material and rapid flame spread together with the possibility of toxic smoke if plastics are present. It is important that the organiser finds out what the structure is made of and seeks further advice if unusual materials are present.

Tented structures

43 The term 'tented structures' covers a wide range of structures including:

- large tents housing dark rides at fixed sites;
- boxing booths, travelling exhibitions and similar attractions;
- ghost trains and other mobile rides where part of the structure (usually the back) is made of fabric;
- canopies and awnings in catering areas.

44 It is recommended that all membranes and fabrics used in tented structures be flame retardant. The flame-retardant properties of a fabric may be reduced by weathering or subsequent treatments, eg dyeing. If this occurs, the flame-retardant performance level will need to be restored. Further information on tests for flame retardancy, treatment intervals and methods can be given by the local fire authority.

45 Large tented structures, eg marquees, need to be placed at least 6 m apart to prevent fire spread and allow access by the emergency services. Site them well away from any proposed fireworks displays. Linked tents need to be laid out so that fire engines can get to within 50 m of any part of the structure.

46 Tented structures should have:

- enough emergency exits of a suitable type and size;
- appropriate means of giving warning in case of fire;
- normal and emergency escape lighting and emergency exit signs;
- fire-fighting equipment;
- enough trained attendants to direct the public in an emergency (normally 1 to every 250 people, but 1 to every 75 if the audience is mainly under 16 years of age).

47 Floor coverings need to meet the appropriate British Standard fire tests. Linings and ropes need to be flame retardant. Ropes and cords need to be checked regularly by a competent person and replaced as necessary. All stakes, other types of anchorage and support poles need to be maintained in good order and inspected regularly. Controllers need to make sure that the loss of a supporting rope through fire or other means will not endanger the structure's stability.

Air-supported structures

48 The fabric of an air-supported structure needs either to be non-combustible or not readily able to support combustion. The foundations and safety features of such structures need to be properly maintained and regularly inspected.

49 The structure needs to meet the requirements of paragraph 46 of this appendix, and in addition have:

- maximum and minimum pressure-limiting devices and audible warnings;
- automatically operated standby fans;
- an alternative power source to operate under pressure loss and/or failure of the primary power source;
- an emergency support system.

Pneumatic structures

50 Pneumatic structures need to be made from suitable flame-retardant materials. They also need reliable air supply systems (with secondary support systems) to maintain clear exit routes in an emergency. The travel distance from any part of the structure to the protection of a secondary support system needs to be no more than 12 m, with a minimum headroom of 2.5 m. Small roofless structures, such as bouncy castles, present less of a problem if they collapse as there is little risk of

people becoming trapped inside.

Gas safety

51 Attractions may be supplied with gas from the mains, or liquefied petroleum gas (LPG) from fixed tanks or transportable cylinders. The main risks from the use of gas are:

- accidental release which can lead to fire, explosion, or asphyxiation;
- build-up of fume or poisonous combustion products, particularly carbon monoxide.

52 Appliances, including items such as catering equipment and gas-powered generators, must only be installed and maintained by CORGI-registered gas fitters. To find a CORGI-registered installer in your area contact CORGI on 0800 915 0485 (www.trustcorgi.com).

53 Every gas installation used in an enclosed area must be properly installed and regularly maintained so that:

- gas is efficiently burned to prevent the production of carbon monoxide;
- there is good general and fixed ventilation for the appliance;
- combustion products are safely dispersed to the open air;
- flues are properly installed and free from leaks and obstructions.

Storing liquefied petroleum gas (LPG)

54 Arrange your LPG storage to prevent two main risks:

- leakage followed by ignition – leaks could arise from damage to the vessel or its associated pipework;
- direct heat on a vessel. The most likely source is a fire close to the vessel, so it is very important to keep other combustible materials well away.

Fixed LPG installations

55 The Liquefied Petroleum Gas Association (LPGA) has over 20 codes of practice on LPG, with several relating to bulk or cylinder storage. These are available from LPGA, Pavilion 16, Headlands Business Park, Salisbury Road, Ringwood, Hampshire BH24 3PB (www.lpga.co.uk).

56 HSE Guidance Chemical Sheet 5 *Small-scale use of LPG in cylinders*⁴⁰ gives details on the storage requirements for LPG cylinders when not in use. The recommendations apply equally to 'empty' cylinders as to full ones because they can still contain significant amounts of gas. Remember to store cylinders:

- in a well-ventilated position outdoors on firm, level ground;
- at least 1 m from buildings or boundaries, 2 m from any building openings, drains or gullies and 3 m from other combustible, corrosive or oxidising materials.

57 When in use, site LPG cylinders outside in a well-ventilated position on firm, level ground against the wall of a building or structure (this does not apply to cabinet heaters which are designed to be used indoors and have the cylinder inside the appliance). Any cylinder should be at least 2 m from any openings to cellars or drains and the valve at least 1 m horizontally and 0.3 m vertically below any wall openings, eg opening windows. Protect the cylinders from damage and interference and make sure that you have ready access to the valves in an emergency.

58 Always change cylinders in a well-ventilated area and make sure that there are no naked flames or other sources of ignition in the area while you are doing so.

59 Further guidance on the storage and use of LPG is contained in the LP Gas Association Code of Practice No 24, particularly Part 3 *Use of LPG cylinders in mobile catering vehicles and similar commercial vehicles*.⁴¹

Preventing other risks

60 Flammable gas should not be used to fill balloons or similar items.

61 It is inadvisable to leave heating appliances which have naked flames unsecured in any structure while the public are present. If an appliance, such as a space heater, is required for boosting temperature in a public space it should be switched off before the public are admitted, wherever possible.

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Glossary

amusement device often shortened to ‘device’ this includes rides, transportable structures entered by the public (eg haunted houses, arcades, tents and booths) and shooting galleries where hazardous projectiles are fired.

amusement industry the collective term for the fairgrounds and amusement parks industry. It includes the people who design, manufacture, supply, control, operate, attend, maintain and carry out inspection of articles of fairground equipment and other attractions at fairgrounds and amusement parks.

amusement park a fixed site where fairground equipment is provided for the entertainment of the public.

appointed inspection body (AIB): in-service annual inspection the registered inspection body that has overall control of the in-service annual inspection of an amusement device and the responsibility for issuing the Declaration of Operational Compliance (DOC).

appointed inspection body (AIB): pre-use inspections the inspection body that has the overall responsibility for confirming that the pre-use inspections have been completed and for issuing the Declaration of Operational Compliance (DOC).

arcade a transportable structure housing games, stalls or other attractions at a fairground or amusement park. It does not include buildings housing such attractions.

article of fairground equipment any fairground equipment or any article designed for use as a component in any such equipment (definition from Health and Safety at Work etc Act 1974, section 53).

assessment of conformity to design (ACD) the procedures and investigations necessary to confirm that a piece of equipment or a part of it has been manufactured in conformity with a particular reviewed design specification (see also design review).

attendant any person appointed to work under the control and direction of an operator to assist in the operation of an amusement device.

attraction anything provided for the entertainment of the public at a fairground or amusement park, including rides, games and catering stalls.

coin-operated amusement devices devices such as arcade simulators, kiddie cars or kiddie rides. These devices may be inspected by a BACTA-registered ADIPS inspection body.

coin-operated arcade simulator an amusement device designed to enhance the visual effects of a game or video display with a simple non-violent motion. It is mounted on a stationary base incorporating measures designed to 'fail safe' in the event of a structural, electro/hydraulic or pneumatic failure. The seat height should not exceed 1.5 m from the ground. The device is operated by coins or tokens etc and is designed for the unattended use of no more than two people.

A non-violent movement is one that is not likely to cause a user to be dislodged or fall over resulting in an injury, eg cause people to strike their head etc on the sides of the seats. A 'fail safe' measure is one that will not cause a risk to the safety of a passenger or the public, or others. If any doubts exist, a full inspection procedure, including design review and conformity should be carried out by an ADIPS registered inspection body.

coin-operated kiddie car a battery-powered vehicle with a maximum speed consistent with that laid down in EN 13814⁴² and operated by coins or tokens etc. Designed for the unattended use of children between the ages of 3 and 10 years within the strict confines of a specially designed track.

coin-operated kiddie ride a slow-moving device fitted on a stationary base operated by coins or tokens etc, primarily designed for the unattended use of one or two people between the ages of 3 and 10 years.

Although a ride is designed primarily for the use of children between 3 and 10 years, this does not mean that a parent or guardian cannot accompany the child if the ride is suitable. In certain circumstances the ride may seat more than two people, in which case special conditions should be applied. Rides with more than two seats should be designed (ie slow or gentle movement or other safety measures), to ensure a child will not sustain injury if boarding or alighting when the ride is enabled. The ride should have a sign advising that the passengers should be seated before a coin is inserted and other measures considered such as 'soft start'.

commissioning tests tests designed to compare the performance of a new or modified piece of equipment against its specification.

controller the person or organisation having the overall control of an amusement device (including maintenance and safe use). This may be either an individual or corporate body owning an amusement device or the concessionaire or lessee who has been granted control of the device, by the owner, for a specified time.

daily check an operational check carried out before an attraction is made available to the public, to determine whether or not an amusement device is in such a condition that it may continue to be operated safely. The controller or a person nominated by the controller should do it. The check should identify any defects and indicate what replacement, repair or adjustment is needed before the attraction can be used. For an amusement device, it should also include a trial run with a functional check of any safety-related systems to make sure that they are properly adjusted and work in accordance with the operations manual.

Declaration of Operational Compliance (DOC) the safety certificate that is that is issued by a registered inspection body (RIB) after the satisfactory completion of all the relevant in-service annual inspections on an amusement device. It is used to certify that the device is safe to operate for a period of no longer than 12 months, or less if specified by the inspection body.

design review the procedures and investigations necessary to confirm that the safety-critical aspects of the design of a passenger-carrying amusement device are sound in concept and that the calculations are satisfactory.

design specification documents, drawings, software etc which together make up the descriptions of function, operation, construction, workmanship and materials.

design risk assessment the process of assessing the hazards that the design of a piece of fairground equipment may pose, the likelihood of those hazards posing a risk and the control measures that are necessary to adequately control those risks. Designers should assess the significant risks that arise from its subsequent assembly/dismantling, transport, inspection, maintenance and operation.

device abbreviation for the term 'amusement device'.

dutyholder any person who has duties imposed on them by any relevant statutory legislation.

fair an event at which fairground equipment is used for entertaining the public.

fairground any part of premises which is for the time being used wholly or mainly for the operation of any fairground equipment other than a coin-operated ride or non-powered children's playground equipment. It includes both fixed amusement park and temporary sites.

fairground equipment any fairground ride, or any similar plant which is designed to be in motion for entertainment purposes with members of the public on or inside it or any plant which is designed to be used by members of the public for entertainment purposes either as a slide or for bouncing upon, and includes swings, dodgems and other plant which is designed to be in motion wholly or partly under the control of, or to be put in motion by a member of the public. This definition was inserted in the Health and Safety at Work etc Act 1974, section 53, by an amendment enacted by the Consumer Protection Act 1987. The definition is held to include coin-operated children's rides, but not non-powered children's playground equipment.

functional test a test or combination of tests designed to investigate whether an amusement device continues to carry out its safety-critical functions. The tests may need to include measures of both function and performance using conditions and loading appropriate to those likely to occur in use.

hazardous projectiles mechanically fired projectiles, which could cause personal injury, including live ammunition; other metal projectiles designed to be fired by compressed air, eg pellets, darts and balls; crossbow bolts; and any targets which are projectiles, eg clays. It does not include hand-thrown projectiles.

initial test tests required to confirm that a newly constructed, imported or modified amusement device operates in accordance with a specification which has been the subject of a successful independent design review. Commissioning tests do not substitute for an initial test, but an inspection body may take account of relevant data from such tests as evidence of performance of a device under particular conditions as part of the overall initial test.

in-service annual inspection the procedures, tests and investigations necessary for an appointed inspection body to decide whether an amusement device may continue to be operated safely, or that it requires defects to be remedied either immediately or in a specified time before the device may be operated over a specified period of time.

inspection examination of a product design, product, service, process or plant, and determination of their conformity with specific requirements or, on the basis of professional judgement, general requirements.

log book a section of the operations manual which allows a record to be kept by past and present controllers to provide details of any in-service annual inspections, modifications and repairs that may have been carried out. It would be helpful to retain in this section written records of any examination and inspection work done on the device, including the daily checks.

maturity design evidence from past experience that a design or a component of a design has a history of safe functioning. Such evidence needs to be scrutinised carefully to make sure that it is wholly relevant to any importance that is to be placed on it.

operational limits the limits recorded in the operations manual within which an amusement device should be used.

operations manual full instructions for safe use compiled by the designer, manufacturer, importer or supplier (updated by the user) containing documentary proof of all inspection reports and records of any modifications as well as other records previously kept in the log book.

operator the person appointed by the controller to be in charge of the immediate operation of an attraction at any time when it is intended to be available for public use.

organiser the person who has overall control of a fairground or amusement park. This may be an individual or a corporate body. The organiser may, for example, own the site; be a concessionaire or lessee who has been granted control of the site for a specific period; or have been appointed or elected to co-ordinate the activities of a number of individual employers or self-employed people working at the site.

packing material used between the stationary framework and the ground/foundations to make adjustments for variations in levels.

passenger-containment system a system comprising one or more components, eg seating, footwells, handrails and passenger restraints designed to prevent passengers moving outside a predefined area on a ride either as a result of the ride forces or the behaviour of the passenger.

passenger restraint a particular part of the passenger-containment system moved into position and used to hold a passenger in one place or prevent movement of particular parts of their body, eg lap bars and seat belts.

repair restoration of safety-critical components or safety-critical assemblies to an acceptable condition by mending of worn, damaged or decayed parts, which does not result in a deviation from the design specification.

registered inspection body (RIB) an inspection body registered with a scheme that has been agreed by the member associations and the Health and Safety Executive (at the time of publication the only such schemes are the Amusement Devices Inspection Procedures Scheme (ADIPS) for all amusement devices, and the PIPA scheme for inflatables).

ride a fairground ride. This has the same meaning as the legal definition of 'fairground equipment', found in section 53 of the HSW Act.

safety the freedom from unacceptable risks of personal harm (BS 4778 Part 3: Section 3.1 1991⁴³).

safety-critical component any type of component on an amusement device on which the safety of the passengers (or others who may be affected) is dependent.

safety-critical modification any alteration to the hardware and/or software of a piece of equipment including the introduction of a safety-critical component which results in a deviation from the original design specification.

safety envelope the minimum space around the moving part of a ride necessary to make sure that passengers or other people such as spectators cannot be injured through contact with either static or moving parts. Calculations of the safety envelope should take account of the maximum foreseeable size of people who could be at risk and dynamic as well as static reaches.

stall any other attraction, for example, hoopla, catering trailer etc.

trial run proving run of an amusement device during which no passengers are carried.

Further information

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