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## INTRODUCTION

Inflatable bouncers are often used at school fund-raising events and provide a popular attraction to young children.

This guideline describes various factors that can contribute to accidents involving inflatable bouncers and the precautions that should be taken to avoid them, and, as such, is intended for operators, attendants and anyone else concerned with the safe operation of these devices.

Compliance with this guidance will reduce the risk of accidents on these devices. See also the spotlight on School Games and Play Activities articles in Sports Activities section of this manual.

Bouncy castles are covered by HSE Guidance Note PM76 but this has been replaced with a free Information Sheet on Inflatables. Both address issues such as siting, stability, daily checks, safe access/egress, matting, supervision and customer safety (overcrowding, segregation of large and small children, removal of sharp objects and spectacles, discouraging horseplay, etc). The main change introduced in the new free sheet involves an annual examination that should be carried out by a competent individual or inspection body registered with the Amusement Devices Inspection procedures Scheme (ADIPS).

Following incidents where inflatables have been blown away (sometimes in dramatic circumstances eg: over a barn or out to sea), "The industry recommends a maximum wind speed of Force 5 or 19-24 mph (Force 5 is a fresh breeze when small trees in leaf begin to sway, whereas Force 6 is a strong breeze when large branches are in motion; whistling can be heard in telephone lines and umbrellas can only be handled with difficulty)". Managers/operators should also ensure that attendants are at least 16 years old and advise users not to eat, drink or chew gum when bouncing!

An accident in Bristol during 1996 drew attention to the problem of adults using inflatables designed for children. Andrew Day, 28, was awarded £950,000 after a fellow reveller at a Territorial Army ball fell on him, injuring his spinal cord. He was subsequently paralysed and confined to a wheelchair. Responsibility for two-thirds of the damages was allocated to the company who supplied the bouncing castle, and the remaining third was apportioned to 266 Operation Battery, Royal Artillery (*Daily Telegraph*, 12.3.1996). (While some manufacturers discourage adults using their inflatables designed for children, others make such devices specifically for the adult market.)

Managers must take care with the provision of matting as thick, pliant crash mats will certainly absorb impact but tend to be perceived by users as an extension of the inflatable. Children (and some adults!) will be tempted to make running jumps, with the risk of "overshooting" the matting. (This problem will be aggravated by crash matting being pushed apart by vigorous use, and exposing hard floor surfaces.) Although guidance has always advocated that mats between 25mm-125mm (1-5ins) thickness be placed by the front apron, operators may find that firm mats are preferable to crash mats.

Managers/operators should seek the manufacturer's guidance on maximum usage restrictions rather than be tempted to invent their own; most use age or height as their criteria. One manufacturer recommends that rules of play are displayed by inflatables. Even if children cannot read such rules, or ignore them, they should be on show for parents to follow.

Rules of play should specifically exclude somersaults: a 13-year-old boy was paralysed after breaking his neck on a bouncing castle provided at a Liverpool playgroup during 1998. It was reported in the press that he was attempting a back flip at the time (*Daily Telegraph*, 8.8.1998).

If folded inflatables, which can weigh around 150kg, have to be stored upright in a public place, they should be secured to prevent them falling on a small child. Finally, operators should avoid packing inflatables when wet – allowing them to dry so that they do not split.

Keep adults off unless inflatable is specifically designed for them.

## **DEFINITIONS**

### **Passenger Carrying Amusement Device**

An inflatable bouncing device is a "passenger carrying amusement device". An "amusement device, is one which is either designed to allow passengers or patrons to move or travel on it by means of cars, carriages or other means, or is large enough for them to enter onto or into the structure of the device.

### **Controller**

This means the person or organisation having the overall control of an amusement device. This may be an individual or a corporate body owning the amusement device or the concessionaire or lessee having been granted control of the amusement device by the owner for a specific period.

### **Operator**

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

### **Attendant**

This means any person appointed to work under the control and direction of a ride operator to assist in the operation of an amusement device available for use by the public.

## **TYPES OF INFLATABLE BOUNCING DEVICES**

There are three main types of inflatable bouncer, which are covered by this guidance namely:

- open-sided, often referred to as flat beds;
- open-fronted, often referred to as "castles";
- totally enclosed.

This guidance is not intended to cover water-borne inflatables, inflatable mazes and inflammables designed for therapeutic purposes.

### **Description**

The inflatable bouncer is an amusement device manufactured from flexible fabric, the device being inflated by one or more blowers, which are connected to the structure.

Open-sided inflatables (flat beds) are distinguished by their lack of walls. Open-fronted inflatables (eg: castles) have walls on all sides except one. The totally enclosed type of inflatable (eg: disco bouncers) has all sides enclosed by an inflatable dome.

## **HAZARDS**

The safe design and safe operation of the inflatable bouncer should guard against the following main hazards:

- blowing over or away of the whole structure by the wind;
- splitting of the fabric when under pressure;
- failure of the seams;
- accidental spilling of users;
- injury to the users caused either by themselves or other users;
- overcrowding;
- injury to the users when getting on or off the bouncer;
- large users disregarding little ones;
- air loss due to the blower disconnection, blower failure or power supply interruption;
- zip failure;
- inadequate means of escape in case of fire;
- dangerous siting of equipment, including siting near overhead power lines.

## **ACCESS TO THE DEVICE AT OUTDOOR EVENTS**

At outdoor events where the inflatable bouncer is the only or main attraction, and where crowds can be expected, then a perimeter fence for crowd control must be provided. In these circumstances the crowd control barrier must surround the device.

The barrier must be at least one metre high and must be capable of withstanding people leaning on it, or being pushed against it.

Where metal stakes are used to secure the barrier, it must be ensured that any sharp metal edges on the top caused by bedding them into the ground with a sledge-hammer, or similar, are suitably encapsulated or covered so that a "cut" injury is not possible.

At events where crowds can be expected but where the public does not have access to the side or rear of the inflatable bouncer then a limited crowd control barrier may be provided in place of a full perimeter fence.

In all cases the operating area in front of the step/front apron must be kept clear of onlookers so that the operator or attendant has a clear field of vision and can thus ensure that the users mount and alight safely.

Non-inflatable gym mats or an equivalent soft landing material of minimum 3cm. (or 1 inch) to maximum 12 cm (or 5 inches). Thickness must be provided to cover any hard surfaces adjacent to all open sides and entrances/exits.

## **SAFE OPERATION**

It is essential for the safe operation of a bouncer to ensure that, when it is erected outdoors, all the anchorage points are used at all times.

The bouncer must not be used or erected in high winds, i.e. when the manufacturer in excess of the maximum safe wind speed for the bouncer specifies the wind speed.

The bouncer must be secured to the ground with anchor stakes, where the ground is suitable to receive them.

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On areas of hard standing some equally effective method, eg: anchoring to vehicles should be used.

The operator must determine the minimum number of attendants needed to operate the device safely, and must ensure that at least that number of attendants are on duty when the bouncer is in operation.

There must be a sufficient number of attendants to control the access and egress of the public to and from the bouncer.

It is particularly important that a responsible person, capable of exercising some authority over users, especially children, supervises the use of the bouncer at all times.

A "safe system of work" must be established to ensure that the users are admitted to the inflatable bouncer in a controlled and safe manner.

The operator must:

- ensure that all users remove their footwear (except socks) and any other hard, sharp or dangerous objects from their person, such as buckles, pens, purses etc. It is advised that spectacles be best removed;
- not allow anyone to bounce on the step/front apron. The step is only to be used to assist the users on or off;
- not allow anyone to climb or hang from the outside walls;
- not allow users who are taller than the outside walls when standing on the inflated bouncing surface to use the bouncer.

The operator must watch the activity on the bouncer constantly. They should use a whistle or other device to obtain attention and take action at the first sight of any misbehaviour, keeping an eye on the safety and well-being of all the users, particularly children and especially the smaller, more timid ones. Rough horseplay must not be allowed.

It is the responsibility of the operator to ensure that the equipment is not overloaded, therefore, creating possible danger to the users.

Larger, more boisterous children should, where possible, be segregated from smaller children. The number of users at any one time must be limited to that figure which allows each user enough room to play safely.

### **TRAINING OF OPERATORS AND ATTENDANTS**

Each operator must receive full and sufficient training in the operation of the inflatable bouncer.

This should include adequate instruction on:

- the method of operating the bouncer;
- safe loading of the bouncer;
- the system of work necessary to ensure the safety of the users and members of the public;
- training needs of attendants;

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**Section 3(8): Inflatable Bouncing Devices**

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- safe methods of assembling/dismantling, where applicable;
- how to make a daily inspection of the bouncer (where available, advice from the manufacturer/supplier of the bouncer must be incorporated into this instruction).

Where appropriate controllers/operators must also be aware of the requirements relating to the intervals at which thorough examination and testing should be carried out.

Each attendant must receive suitable and sufficient training for the type of work that they are expected to do. Training may need to include adequate instruction with regard to:

- arrangements for the safe anchoring of the bouncer;
- locations, which require a crowd, control enclosure;
- arrangements for controlling the public to and from crowd control enclosures;
- arrangements for the safe loading of the bouncer;
- risks and precautions associated with the work;
- procedures for recording defects or breakdowns;
- measures which should be taken in the event of a power failure or other emergency.

## **EXAMINATION AND INSPECTION**

### **Examination**

This section is particularly applicable to those establishments who own their own inflatable bouncers. Each inflatable must be thoroughly examined at least once in every 14 months.

The manufacturers of the equipment can normally provide information on persons who can carry out a thorough examination.

In the-case of equipment used on a seasonal basis, the thorough examination should be carried out where practicable before the commencement of each season, but, in any case, within 3 months of its commencement.

The thorough examination should include the following:

- Blower
  - provision of secure guarding for dangerous moving parts, in particular guarding for the air inlet and outlet;
  - security of the impeller fixing and examination for cracks;
  - integrity of electrical wiring.
- Inflatable
  - Checks of the anchorage system for wear, rips or chafing. Checks of the structure for wear or rips in the fabric, particularly on the main bouncing surface, between the walls and towers, walls and the bouncing surface, and the surface of the step/front apron.

Checks that the walls and towers, when fitted, are firm and upright when inflated, and that the pressure in the bouncing area and step/front apron is sufficient to give a reliable and firm footing. If possible, an inspection of the internal ties should be carried out from inside the structure. These should be checked for wear or tearing, particularly at their loose or exposed ends. Checks of the security of bed seams, and wall to bed seams from inside should also be made.

- **Electrical Installation**

The complete installation must be checked formally. A Residual Current Device must protect the electrical supply.

**The above list is not exhaustive and the examination must include any part which may affect the safe operation of the inflatable bouncer.**

### **Inspection**

An inspection must be carried out before use on any day. Where available, advice provided by the manufacturer must be taken into account.

The inspection must include checks to ensure that:

- all anchor points are intact and not damaged;
- anchor ropes are not worn or chafed;
- anchor stakes and their location remain sound for continued use;
- the wall-to-tower fixings are not torn;
- there are no holes or rips in the surface or seams of the bed and step/front apron;
- when fully inflated, all walls and towers (when fitted) are firm and upright, and the pressure in the bed and step/front apron are sufficient to give a reliable and firm footing;
- the blower has no exposed wires or loose bolts, screws etc. and that the mesh guards over the air inlet and outlet are secure and intact;
- electric cables are not worn or chafed and that plugs, sockets and switches are not damaged;
- the blower/inflation tube connection is good.

**The inflatable bouncer must not be used by the public until any adjustments or repairs judged to be necessary as a result of the inspection have been satisfactorily carried out.**

**MAINTENANCE**

The inflatable bouncer must be properly maintained. Where manufacturer's guidance and maintenance schedules are available, these must be followed. Where maintenance schedules are not available, the contractor must specify the procedures in the light of experience and any advice received.

**MODIFICATION**

Where changes are planned which may affect the integrity of the inflatable bouncer, the modification must be designed in accordance with the manufacturers' and designers, instructions, or with a plan and specification drawn up by a designer competent to prepare such instructions. The modifications must be submitted before implementation to either the manufacturer or an independent consulting engineer, to establish that the modification is sound and that any calculations are correct.

Any such modification must incorporate only compatible materials, and must be carried out in accordance with the revised design specification and/or the manufacturers' instructions, if available.

Subject to any modification as indicated in Section 3(8), a further thorough examination and test (if appropriate) is required before the inflatable bouncer is used.

**RECORD-KEEPING**

A record of all examinations and daily inspections must be maintained and be readily available.

**DESIGN/MANUFACTURE****Access/Egress**

On any open side the maximum fall-off height must be no greater than 75cm (30 inches). This must be compatible with the use of non-inflatable gym mats or equivalent soft landing materials of a minimum 3cm (approximately 1 inch) to a maximum of 12 cm (approximately 5 inches) to cover any hard surfaces adjacent to all open sides and entrances/exits. The soft landing material must be of sufficient width to protect any users falling from any open side of the bouncer. The designer/manufacturer must specify the width of soft landing material required for the bouncer.

**Anchorage**

- Inflatable bouncers must be provided with an adequate anchorage and/or ballast system. The size, number and strength of anchorage points on the bouncer must be adequate for the size/height, taking into account the likely wind loading. The designer/manufacturer must carry out or arrange for any research to be carried out to discover the environmental limitations, ie: the conditions of maximum wind speed under which an inflatable bouncer can safely be operated. These maximum safe wind speeds must be specified for each bouncer and the type of anchoring arrangement with which it is fitted.
- On open sides (eg: flatbeds) or when, for security, it is necessary to have anchorages near to an entrance/exit, they must be connected in such a way as to minimise the danger of tripping.

### **Inflatable Structure**

- The structure must be so designed that users cannot contact the blower unit. This can be achieved by ensuring that the length of any inflation tube is at least one metre (39 inches) when positioned on a walled side, and at least 2.5 metres (8 feet) when positioned at an open side.
- There must not be any sharp exterior angles or edges present upon which persons can be injured.
- The outside walls of an inflatable bouncer must be high enough and of adequate strength to prevent users from spilling out of the bouncer in normal use. The height of people using an inflatable bouncer must not exceed the height of the outside walls when the person stands on the bouncing surface. However, inflatable bouncers with outside walls of 1.8 metres (6 feet) or higher may be used by persons of any height. The height of the wall is measured from the highest point of the bouncing surface to the top of the wall.
- Internal ties (for shape formation) must be of adequate strength to maintain the shape of the structure during specified conditions of use.
- There must be no places where users can be trapped between adjacent surfaces, eg: walls and towers, walls and the bed or the trough between adjacent bed panels.

### **Materials**

The following recommendations are made for the standard of materials used in the manufacture of inflatable bouncers:

- conventional fabric materials must conform to a British or future European (CEN) standard for the testing of coated fabrics;
- alternatively, where conventional fabric materials are not used, the designer must ensure that the material specified provides sufficient leaking strength, tear strength and bursting strength to ensure safe and durable performance of the inflatable bouncer in operation;
- any materials used must not readily support combustion. They must conform to BS 5438: 1989, Methods of Test, for flammability of vertically orientated textile fabrics and fabric assemblies subjected to a small igniting flame or future European (CEN) Standard for methods of test for flammability of textile fabrics;
- all netting must be suitable for its use and must conform to a British or European (CEN) Standard;
- adhesives must provide a bond of equivalent strength to the strength of the material being bonded;
- zips must be strong enough to withstand the air pressure within the structure. Those zips designed for use, as emergency exits must be easy to use from either side of the wall panel;
- paint and any other decorative substances must meet with the regulations on the lead content of paint for play equipment and must be non-toxic in the finished state;
- anchorages, eg: stakes, ropes etc, must be of sufficient number, strength and size to maintain the stability of the inflatable bouncer for the maximum wind speed specified by the manufacturer for any particular bouncer.

## **Manufacture**

Membrane joints must be formed by sewing, welding, use of adhesive or other tested methods.

### **Totally Enclosed Structures**

In totally enclosed structures the following additional requirements must be satisfied:

- a closing arrangement must be fitted to the dome air tube;
- structures designed to accommodate more than 15 people must have more than one exit.
- The travel distance to the nearest exit must not be more than 24 metres. For smaller structures where only one exit is necessary, the travel distance to the exit must not exceed 6.5 metres;
- simple signs must indicate the positions of exits;
- an independent support system must be provided for any lighting and loudspeaker systems;
- the electrical installation must comply with current regulations;
- any metal supports for the bouncer that are within easy reach must be electrically insulated from any other exposed metalwork associated with the electrical installation. BS 2754: 1976 Memorandum - Construction of Electrical Equipment for Protection Against Electric Shock gives further guidance;
- no electrical equipment must be within reach of the users of the bouncer;
- when a lighting system is installed, emergency luminaries must be provided as a back up. The discharge period for the luminaries, following power supply failure, must be a minimum of one hour. Such luminaries must be fully charged prior to the inflatable bouncer being put into use each day;
- any electrical cables must be kept away from any users or spectators and must be secured by loop to the envelope of the bouncer or by a similar means to an equivalent standard;
- electrical equipment exposed to the weather must be protected to a standard of at least IPS4 (BS 5490 Protection of Classification of Degrees of Protection by Enclosures) or located inside a hut or cabin;
- The operation of the lighting must be proved each day before the totally enclosed inflatable bouncer is put into use. This instruction must be incorporated within the written instructions on the setting up operation and maintenance of the equipment provided by the manufacturer with each of this type of inflatable.

**Test Certification**

A certificate of initial test of the inflatable bouncer must be issued to the purchaser by the manufacturer prior to or at the time of the delivery.

**Provision of Information**

The manufacturer must provide with each inflatable bouncer, written instructions on the setting up, operation and maintenance of the equipment and the name and address of the manufacturer or supplier must be clearly marked on the inflatable.