



Device	-	Bungee Trampoline
Client	-	Airmax Inflatables Ltd
Date	-	29.3.17
Manufacturer	-	Airmax Inflatables
Generic Name	-	Mobile 4 in 1 assisted bounce device
Serial number	-	NK
Year of Manufacture	-	2017
Inspection type	-	Design Review
TMA reference	-	GS.BT.DR
Comment	-	This Design Review is only applicable to the mobile 4 in 1 Bungee Trampoline produced by Airmax Inflatables

Table 1

Outstanding issues	Detail and Date	Resolution
BSEN7671	At each new “build up” the Controller must carry out an electrical inspection – this must include a visual check of the cables and plug for damage and deterioration, routing of cables to avoid damage, and a measurement of earth loop impedance. This can be achieved using a Martindale plug in Earth Loop Impedance tester	
BSEN7671	An earth stake must always be provided with the generator	
BSEN7671	All protective devices must be labelled	
Signs	Electrical warning signs must be fitted to the cabinet	
Earthing	A 4sqmm earth bond between the Main earth terminal and the conductive parts of the trailer	



Contents – Design Review

Paragraph	Item	Page
1.0	Brief	3
1.1	Areas Considered	3
1.2	Initial Inspection	3
1.3	Documents supplied	3
1.4	Ride description	3
2.0	Review Objectives	3
3.0	Design Assessment	3
3.1	Summary of Requirements	3
4.0	Assessment of the design	3
5.0	Conclusion	6

Table	Item	Page
Table 1	Outstanding Issues	1
Table 2	Containment Assessment	NA
Table 3	Design Risk Assessment	NA
Table 4	NDT Schedule	NA
Table 5	Compliance with HSG175	5
Table 6	Report of Design Review	7

DESIGN REVIEW

1.0 **Brief** - TMA Ltd was commissioned by Airmax Inflatables Ltd to carry out a Design Review, Initial Test and Assessment of Conformity to Design, under the 'Amusement Device Inspection Procedure Scheme' (ADIPS) for their Bungee Trampoline, Manufactured by Airmax Inflatables. This design review is for a device that is one of a series.

1.1 **Areas Considered** - This Design Review has only considered the electrical and control system.

1.2 **Initial Inspection** - An inspection was carried out, on site at Lee Mill. A pre-use inspection of the device was carried out as part of the Design Review process in line with the Amusement Device Inspection Procedure Scheme

HSG – 175: Fairgrounds and Amusement Parks – Guidance on Safe Practice.

BSEN13814 - Fairground and amusement park machinery and structures. Safety

ADIPS – Safety of amusement devices – Design

Consideration was also given to NAFLIC Safety Bulletins and Advice on Design

1.3 **Documents supplied**

Design Review by ACA of all areas with the exception of the Electrical Circuits

1.4 **Ride description**

This is a mobile 4 in 1 Bungee Trampoline

2.0 REVIEW OBJECTIVES

The prime objectives of this review are to check as necessary, that -

- i) The electrical circuits are consistent with the requirements of BSEN7671
- ii) the inspection and maintenance instructions are consistent with BSEN7671

The fundamental requirement of the device is that it must be safe and without risks to health at all times when it is being used to entertain the public or being maintained. In addition, there are a number of general requirements and the design and operation of the device should guard against:

- iii) failure of elements of the control system;
- iv) unsafe working practices by operators during operation, inspection and maintenance;
- v) foreseeable misuse by passengers, so far as is reasonably practicable.

3.0 DESIGN ASSESSMENT

3.1 Summary of the requirements of the Design Review

The requirements of the "Operation and Maintenance Manual" and this "Design Review" must be followed.

Some of the issues identified arise as a result of the other pre-use inspections but are reproduced here to emphasise the need for proper care and attention.

- An inspection in line with the requirements of BSEN7671 must be completed annually
- Earth bonding must be provided from the main earth terminal to conductive parts
- All electrical components must be IP45
- Electrical Warning signs must be placed on the electrical distribution box

4.0 TMA Checks and Assessment of the Design

Report Restrictions

This report is produced by Tony Mogford Associates and remains their copy right
It may not be copied in whole or in part without the written consent of Tony Mogford Associates.
Inspection bodies and controllers may request information and clarification by contacting TMA Ltd

Scope of Report

This report takes account of the suitability of safety critical components but only of the following electrical components of the device –

The electrical components of the device
The power supply system for the device
The control system of the device

Comments on the Electrical Documentation supplied –

None were provided
It is our opinion that the following information should be provided by the manufacturer to ensure safe operation -
1. A written description of the expected operation of the electrical system
2. Detailed parts and control system layout
3. The electrical circuit diagram in English

Description of Operation (in relation to the control system)

Following the harnessing of passengers, the operator presses the start button, allowing the ride to gently lift the passenger

The lift or lower operation can be stopped by pressing the stop button
In an Emergency, the lift or lower operation can be stopped by pressing the Emergency stop button.
The device has the following sensors –
Limit switches that stop the device if movement beyond the predetermined norm is sensed.

The hand control is clear, well laid out, and all controls are colour coded
The controls are not labelled

The hand control is not easily accessible to the general public
However, the Operator must take care to have control of the hand control so that it is not misused by the general public

Hazard Assessment

- Device starting without warning
- Device failing to stop
- Device stopping and starting without warning due to failure and resumption of power supply
- Device over speeding
- Failure of the emergency stop system
- Electric shock through direct or indirect contact
- Failure of protective overload devices
- Adequacy of protection from mis-operation

Comments on hazards assessed

1. Device starting without warning

The device is started by a simple contact push button and inadvertent operation of this button could cause the machine to start. However the button is not self latching and as soon as it is released the operation stops.

Should the push button fail to closed mode then the emergency stop button can be used to control the risks associated with such a failure.

2. Device failing to stop

The stop button is backed up by a limit switch on the winch that is activated by a puck on the winch rope. Care must be taken by the operator to ensure the puck is correctly positioned to cut the winch before the knot on the end of the rope pull into the pulley.

3. Device stopping and starting without warning due to failure and resumption of power supply. In the event of a power failure and its subsequent resumption, the electrical circuit as reviewed includes satisfactory protection against restart.

4. Device over speeding

The physical characteristics of the winch prevent the possibility of excessive over speed by natural physical laws.

5. Failure of the emergency stop system

The emergency stop system is of the single contact type and generally considered adequate for this type of device. As previously mentioned the unit does have a back-up in the form of a puck on the rope.

6. Electric shock through direct or indirect contact

Little attention seems to have been given to earthing to the British Standards. No metal work of the device should have an earth path from the Earth exceeding 1 Ohms. This must be improved. A 30mAMP RCD is provided for fault protection

The device must not be used if the earth loop impedance exceeds 1.00 Ohms

7. Failure of protective overload devices



A 16amp Circuit breaker is provided for short circuit protection.

We feel that separate CB's for each winch would be more suited to this installation

8. Periodic checks

At each new "build up" the Controller must carry out an electrical inspection – this must include a visual check of the cables and plug for damage and deterioration, routing of cables to avoid damage, and a measurement of earth loop impedance. The latter can be achieved using a Martindale plug in Earth Loop Impedance tester

9. Annual inspection and testing

The following must be considered

- ELI must be less than 2 Ohms
- Continuity from the main earth terminal to the winch must be less than 0.2 Ohms
- Continuity from the main earth terminal to conductive parts must be less than 1.0 ohms and a conductor must be fitted
- RCD Trip times must be in accordance with BSEN7671
- IP ratings shall be in accordance with BSEN1176

5.0 Conclusion

- 5.1 The brief was to provide an engineering Design Verification of the electrical and control system in accordance with the Amusement Device Inspection Procedure Scheme (ADIPS) of the Bungee Trampoline
- 5.1 The Client and manufacturer have offered their full co-operation in the verification process, and where possible have supplied or obtained requested information from others whenever required to do so.
- 5.2 The recommendations and requirements made throughout the body of this Report must be addressed; failure to do so will invalidate this Design Review.

Table 5

Compliance with HSG 175 has been verified

Area	Satisfactory
This is one of a series of Bungee Trampolines	✓
Design Calculations -	NA
Design Documents –	Not seen
Fatigue Life – no fatigue life calculations have been prepared. TMA have therefore specified a stringent NDT schedule	NA
Design and Operation of control systems – reviewed by TMA	✓
An assessment of structural/mechanical safety –	NA
Suitability of the containment system and restraint –	NA
Operating instructions – specified in the operating manual,	✓
Inspection and maintenance schedules – specified in the operating manual and the Design Review	✓

Conclusion

This was a Design Review of
Electrical areas of the Bungee Trampoline.

At the time of this inspection, subject to the recommendations of this report being implemented, it was considered that the Electrical Design was acceptable.

Signed Date...29.3.17.....



Amusement Device Inspection
Procedures Scheme

Report of Design Review

of an Amusement Device as required by:
Paras. 83-84 & 85-103 HSG 175: fairgrounds and amusement
parks
– Guidance on safe practice

Client	Airmax Inflatables Ltd	Report No.	AM.BT.DR.E
Address	Unit 1 Kilkieran House	Expiry Date	NA
	Kilkieran	Inspection Body's	AM.BT.DR.E
	Co Kilkenny	Reference No	NA
Name of device	Bungee Trampoline	Association	NA
	Bungee Trampoline	Machine Serial No	Airmax
Generic Name	Bungee Trampoline	Designer	Airmax
Description	4 in 1 mobile Bungee	Manufacturer	NA
	Trampoline	Manufacturers	NA
Date	7.5.17	Serial No	7
		No of pages in this report	NA
Scope of report	Only of the electrical and control system		

The report of design review includes the following reports			
Name of Inspection Body	Discipline	Report Ref No or state NA	Expiry Date
TMA	Electrical	AM.BT.17.E	NA

I confirm that the prelisted documents are complete and subject to the information provided therein, it is my view that the design concept is sound and the calculations are satisfactory

Signed

Print

Name A R Mogford C Eng MICE

Date 7.5.2007

Report issued by and on behalf of
Tony Mogford Associates Ltd
42 Old Coach Road
Playing Place
Truro
TR3 6ET

ADIPS registration number - 171501-1