Amusement Device Safety Council

Safety of Amusement Devices: Pre-use inspection

This page is intentionally blank

Amusement Device Safety Council

Safety of Amusement Devices: Pre-use inspection

ADIPS Ltd.
North East BIC
Enterprise Park East
Wearfield
Sunderland
SR5 2TA
UK

First edition published 2014

ISSUE STATUS AND REVISIONS

Issue	Date	Pages
01	December 2014	New Document
02	September 2015	9 + 10 (Paragraphs 42 - 48)
03	September 2017	6 (Remove MRA reference in Paragraph 21a)

Proposed revisions should be notified to the ADIPS General Manager

Table of Contents

Revision Status i
Contents
Amusement Device Safety Council (ADSC) iv
Introduction v
Scope and approach vi
Aim vi
Scope vi
Layout vi
Chapter 1 Pre-use inspection process 1
Pre-use inspection process flowchart 3
Chapter 2 Pre-inspection 4
Define the scope of inspection 4
Chapter 3 Design Review 5
Introduction 5
Conduct initial assessment to define detail of review and identify version of device 6
Check the Design Risk Assessment (DRA) 7
Detailed Design Review 8
Check design assumptions 8
Check the control measures 8
Check the calculations and design information 9
Review operations and maintenance documentation 10
Review commissioning and Initial Test schedules 10
Document Assessment of Conformity to Design and Initial Test requirements 11
Reach Design Review conclusion 11
Produce the Design Review report 12
Chapter 4 Assessment of Conformity to Design (ACD) 14
Introduction 14
Check QA documentation 14
Carry out physical inspection and comparison measurements 15
Review non-conformances 16
Produce the ACD report 16
Chapter 5 Initial Test (IT) 17
Introduction 17

Witness Initial Test 17
Check operations and maintenance documentation 19
Review non-conformances 19
Produce the Initial Test report 19
Issue the Declaration of Operational Compliance (DOC) 19

Amusement Device Safety Council (ADSC)

This document is published by the Amusement Device Safety Council (ADSC), which comprises the following industry Trade Associations as its members:

The Amusement Catering Equipment Society (ACES);

The Association of Independent Showmen (AIS);

The Amusement and Leisure Equipment Suppliers of the UK (ALES-UK);

The British Amusement Catering Trades Association (BACTA);

The British Association of Leisure Parks Piers and Attractions (BALPPA);

The National Association For Leisure Industry Certification (NAFLIC);

The Showmen's Guild of Great Britain (SGGB);

The Society of Independent Roundabout Proprietors (SIRPS).

The ADSC encourages, promotes and develops safe practice within the fairground and amusement park industry through rules, procedures and guidance for Inspection Bodies (IB's) and those working in the fairground and amusement park industry throughout the UK.

ADSC members are self-regulating through the adoption of industry rules, procedures and guidance as appropriate. They commit to act as responsible members through the adoption of the *HSE Guidance: HSG 175 – Fairgrounds and amusement parks – Guidance on safe practice,* which was developed with the full cooperation of the industry and the Health and Safety Executive (HSE).

Introduction

Pre-use inspection is an integral part of the Amusement Device Inspection Procedures Scheme (ADIPS). It is in place to ensure that all amusement devices are independently checked for safety before they are first used in the UK.

Whilst the emphasis of pre-use inspection is on a process being initiated during the design process, it is recognised that, in practice, it may be necessary to initiate pre-use inspection of an amusement device during manufacture, installation, modification or operation.

Given its wide application, pre-use-inspection requires a systematic analysis of an amusement device's systems to the level of detail required to demonstrate a device has achieved a satisfactory level of safety. Therefore, this guidance adopts the principles of a risk-based approach rather than prescriptive details, such as specific levels of verification and inspection activity that should be applied for each and every amusement device.

This guidance does not make any significant changes to existing guidance, but aims to provide a generic method for determining verification and inspection requirements during the pre-use inspection process and aims to present this in a simple, clear and practical way.

Finally, it should be remembered that the process is not in itself sufficient to ensure a meaningful pre-use inspection. It requires competent and diligent application of sound engineering practice at all stages of the process. Proper co-ordination of pre-use inspection with appropriate input from inspectors skilled in the application of pre-use inspection and fully conversant with the amusement device's design and operation of its systems at all stages, is deemed essential to ensure delivery of a suitable pre-use inspection process.

Scope and approach

Aim

The aim of this guidance is to describe appropriate measures for an Inspection Body (IB) to undertake when carrying out pre-use inspection of amusement devices to comply with the requirements of *HSG 175: Fairgrounds and amusement parks – Guidance on safe practice*.

This guidance also provides an outline framework for managing the pre-use inspection process. Each IB should consider this guidance and use it to develop appropriate inspection methods and procedures.

Scope

This guidance covers:

a. independent pre-use inspection of the safety-critical aspects of amusement devices for use in the UK;

b. appropriate measures for an IB to undertake when carrying out pre-use inspection of an amusement device;

c. a guide to the process involved in order to comply with HSG 175: *Fairgrounds and amusement parks - Guidance on safe practice;*

d. inspection processes which enable an IB to confirm that sufficient steps have been taken to identify all the significant risks, and that appropriate control measures have been implemented during design, manufacture and installation.

The technical requirements of design and manufacture are beyond the scope of this guidance.

Layout

The structure of this guidance is based upon the pre-use inspection process flowchart (page 3). The sections of the guidance reflect each of the pre-use inspection types.

This document is written as though a single IB is co-ordinating the whole pre-use inspection process.

In practice, however, there may be a number of IBs involved. In such cases, the person(s) commissioning the pre-use inspection will need to ensure that the overall co-ordination of the process achieves best practice as set out in this guidance and each IB is aware of its role in the process.

Chapter 1 Pre-use inspection process

1 The pre-use inspection process should be carried out before an amusement device is used for the first time in the UK, or after any safety-critical modification. The pre-use inspections are:

a. Design Review (DR - Chapter 3);

b. Assessment of Conformity to Design (ACD - Chapter 4);

c. Initial Test (IT - Chapter 5).

2 There are many important aspects to pre-use inspection, but the following are fundamental:

a. pre-use inspection may be organised by the controller, amusement device designer, manufacturer, supplier or importer (client);

b. the controller should not put the device into operation unless the required pre-use inspections have been carried out by competent persons;

c. the inspectors involved in pre-use inspection shall be independent of the ownership, design, manufacture, supply, importation, use or maintenance of the items they are inspecting;

d. the inspectors involved shall work within the scope of their competence and only carry out pre-use inspection work for the inspections and disciplines for which they are registered with ADIPS, and authorised by the IB to undertake;

e. each pre-use inspection shall cover the complete amusement device, which should include individual, but not necessarily separate, inspections and reports of each system, and the interfaces between the various systems. The systems should include, but might not be limited to the following, where present:

i. control systems;

ii. civil;

iii. electrical;

iv. ergonomics;

v. hydraulics;

vi. machine dynamics;

vii. mechanical;

viii. pneumatics;

ix. structural;

f. each pre-use inspection type should be co-ordinated by an IB who is responsible for confirming the reports for all relevant systems have been satisfactorily completed;

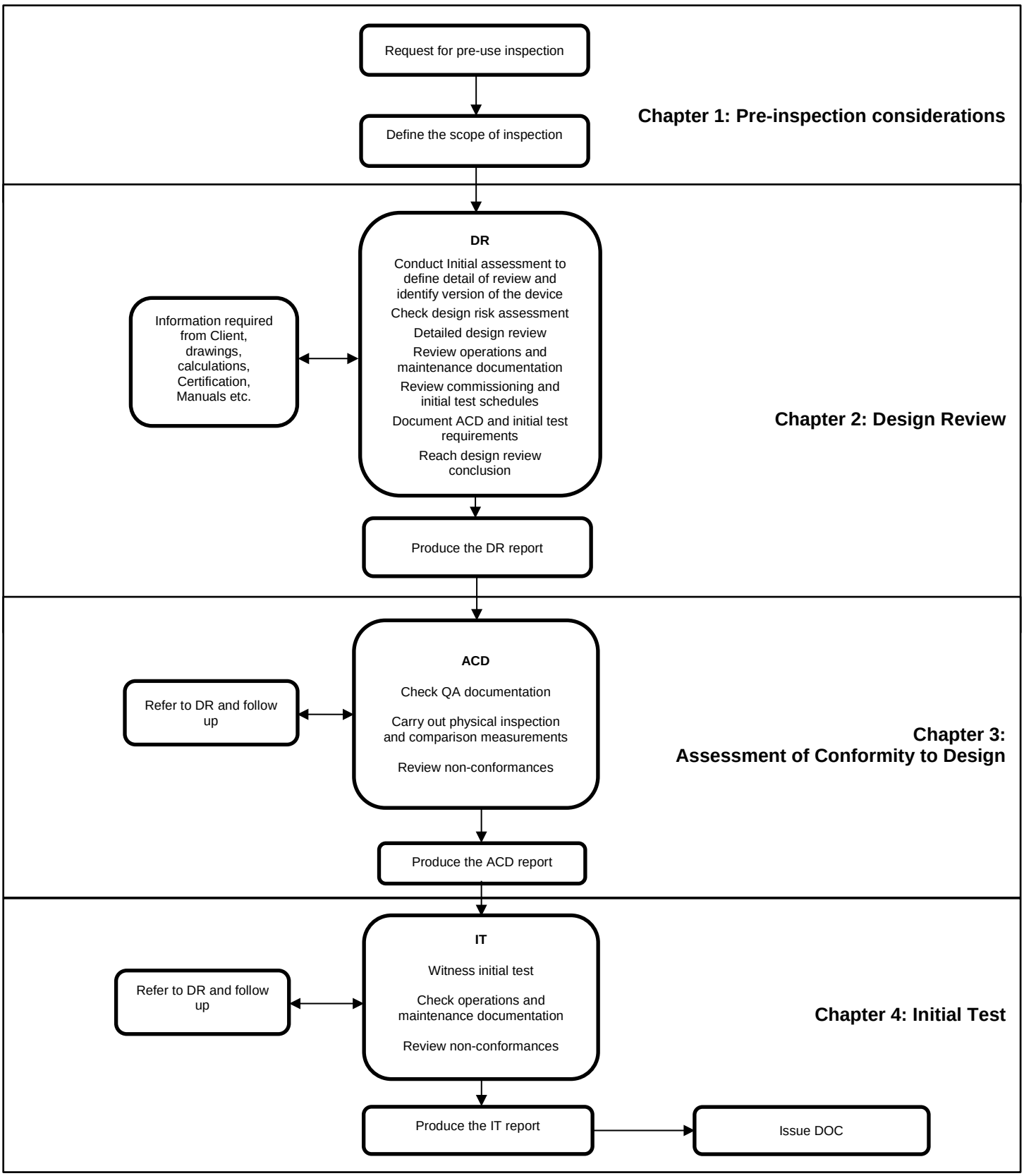
g. the co-ordinating IB should ensure any necessary analysis of the interfaces between the various systems has been carried out;

h. once the co-ordinating IB for each pre-use inspection has confirmed with the Appointed Inspection Body (AIB) that each inspection has been satisfactorily completed, the AIB may then issue the Declaration of Operational Compliance (DOC);

i. in practice, clients often appoint a single IB to take overall responsibility for co-ordination of the pre-use inspection process and issue of the DOC where necessary.

Pre-use inspection process flowchart

The following flowchart provides the structure for the document (NB. Although this is represented as a linear process, it is recognised that the inspection types may be concurrent).



Chapter 2 Pre-inspection

Define the scope of inspection

3 The scope of pre-use inspection work to be undertaken should be clearly defined and agreed with the client.

a. A DR may be for a single device, a series of identical devices or for a safety-critical modification.

b. If an IB is engaged to reissue a DR prepared for a previous model of a device; the scope may be limited to the provision of an existing report. In such circumstances, the IB should ensure that the DR is valid for the new device and that there have been no changes to the original design. Any changes should be subjected to the appropriate DR process.

c. An ACD and IT is required for all individual devices and for all safety-critical modifications.

4 The operational and environmental conditions in which the amusement device is to operate should be identified. This may include, but might not be limited to the following:

a. whether or not the device is static or transportable;

b. where a device might be operated so that correct wind loadings and environmental conditions may be assessed;

c. where a device might be intended for persons of a smaller or larger stature, such as devices intended solely for small children or adults only.

5 Where the device has been designed for a specific life cycle, this should be clearly identified within the scope and any subsequent report.

6 The pre-use inspection process should consider all parts of the amusement device that could affect the safety of passengers, onlookers, passers-by operators and maintenance personnel. This may include safety critical parts of theming, queue lines etc. Such items may not always be designed by the same designer but are intended to be used in conjunction with the device.

Chapter 3 Design Review (DR)

Introduction

7 DR is the first of the inspection procedures that form the ADIPS pre-use inspection process. Its purpose is for an independent and competent IB to systematically assess the design of a device, and conclude whether the designer has adequately addressed all issues that may affect the engineering integrity or operational safety of the device throughout its working life.

8 The objectives of a DR are to check that:

a. the designer has adequately identified and reduced, to as low as reasonably practicable (ALARP), any risks that may be presented by the device during its working life;

b. the detail of the design is free from errors and omissions that may affect safety;

c. sufficient information has been provided in order for the device to be operated and maintained in a safe manner.

9 The end result of the process is a report of DR, clearly stating the conclusion of the review (see paragraph 55).

10 Ideally, the DR should commence at as early a stage in the design process as possible, and run in parallel with the design phase. This enables significant issues found to be rectified before manufacture or installation.

11 As soon as a safety issue is discovered, the designer should be required to consider the issue and propose suitable clarification or means to reduce the risk to ALARP.

a. It is preferable at this stage for the IB to communicate directly with the designer/s;

b. IB's must remain independent of the design process;

c. IB's should not provide solutions to the issue raised.

12 It is understood that for some already constructed devices, the original designer might not be available. In such cases the IB will need to consider carefully how much assistance it should give, and when a separate designer should be engaged.

13 Should the device be intended for static use, the IB should review any restrictions provided by the designer regarding relocation and any necessity for additional inspection requirements. Restrictions may be required because:

a. the device has been designed to satisfy specific wind loading calculations, or other environmental considerations that may differ according to location;

b. the design might, without modification, be suitable for installation within a range of ground conditions; however, the parameters of such a range should be clearly identified;

c. in some instances the foundations may differ considerably, or need to be re-designed, which may require further DR as a safety critical modification.

Conduct initial assessment to define detail of review and identify version of device

14 The first stage of a DR is to identify the exact model and/or version of the device being reviewed and to compile and assemble a list of the relevant drawings, manuals, calculations and material certification, where available. The IB should then assess the overall design, in order to determine the level of work which must be undertaken to prove, to the IB's satisfaction, that the design will not present a significant risk to, passengers, onlookers, passers-by, inspectors, operators and maintenance personnel.

15 This part of the process is similar to risk assessment but is not intended to replace or duplicate the designer's risk assessment.

16 The end result should be an identification of the safety critical parts of the device, systems and documentation that should be reviewed, and the level of review required to demonstrate that the design is safe.

17 Once this assessment has been completed, there will be an understanding of the disciplines involved, and the competencies of the inspectors required to complete the DR.

18 Information will be obtained from many sources:

a. the drawings and diagrams;

b. technical information and descriptions;

c. physical assessment of the device;

d. experience of similar devices or devices with similar systems.

19 The designer's and/or the manufacturer's own risk assessments will also be a useful source of information. However, the IB should be aware that these assessments may not, at this stage, be complete or satisfactory, in themselves.

20 The above process is an essential first step in the DR as it will define the work to be undertaken. Some devices may present a low number of significant risks with a small number of areas that might need detailed review, with a simple report. Complex devices will need a great deal more work, possibly involving many areas of expertise, with a more detailed report.

21 This risk based approach will also provide a framework to follow, should for example parts of the calculations or documentation not be present, or unavailable. This might be the case with some older devices that are being returned to service after a dormant period, but would not normally apply to newly designed devices.

a. Any device that is operating in the UK for the first time, or is being brought back into service without original pre-use inspection documentation (DR, ACD and IT), should follow the pre-use inspection process outlined in this document.

b. The assessment might demonstrate the need for additional drawings or calculations, or might allow in some cases for empirical evidence, tests and measurements to assist in proving the design is sound.

c. Should empirical or historical documentation, tests and measurements be insufficient to allow the IB to form an opinion that the design is safe, then drawings and calculations shall be commissioned, reviewed and documented within the DR report.

22 Where calculations and design information cannot adequately demonstrate that the design has achieved a satisfactory level of safety, a supplementary programme of tests and measurements may need to be formulated. The results should be reviewed and documented in the DR report.

23 When required documentation is incomplete and cannot be obtained from the client or designer, equivalent documentation should be developed. This may include drawings, design calculations etc.

24 The process remains similar where the DR is for a safety-critical modification. However, the analysis that identifies parts that need to be reviewed will also need to consider where the modification might have an effect on the integrity of other parts of the device. In this case, the IB should also consult the original pre-use inspection documentation.

a. The assessment might demonstrate that a modification has no detrimental effect on the safe operation of the device. In such cases the IB should confirm that:

   i. any new material, component or procedure used provides at least an equivalent level of safety to the original; and

   ii. no new risks have been introduced; and

   iii. it does not affect the control measures present in the original design.

b. The IB should document the findings of their assessment for inclusion in the ride's operations manual.

Check the Design Risk Assessment (DRA)

25 The DRA should be reviewed in detail to confirm that:

a. all significant risks have been identified and documented;

b. the control measures are adequate to ensure that the identified and residual risks are ALARP and whether additional measures may be required.

26 The IB should ensure that omissions from the DRA have not led to errors in the design that might affect safety.

27 Should errors or omissions be found in the DRA, or if a DRA is not available, then the designer should be consulted, via the client if necessary.

28 The IB should confirm that the DRA process has been sufficiently documented, and that the measures to address risks are included in the design.

29 As the DR process continues to its conclusion, the IB might discover additional risks that need to be addressed by the designer.

30 Any errors or omissions discovered during the process should be documented within the DRA by its author.

Detailed Design Review

31 The following steps will form the substance of the DR, but do not attempt to give any guidance on detailed technical requirements.

32 The DR should check for compliance with:

a. applicable design standards and guidance*;*

b. sound engineering principles and best practice;

c. technical guidance issued by the industry or regulators.

33 Where deviations from applicable design standards and guidance are found, or any such deviations have already been justified by the designer, the IB should confirm that risk has been reduced to ALARP.

34 The following steps may not be in chronological order, and it is expected that areas will overlap, such as where the effectiveness of control systems might affect structural or mechanical details, and vice versa.

Check design assumptions

35 Where the designer has made assumptions within the design, these should be checked for their accuracy and relevance.

Check the control measures

36 The term control measures relates to any design feature that has been introduced to minimise risk, and might include parts of the structural design, elements of mechanical systems, interlocks, electrical and control systems, and other areas. There may also be control measures outlined in maintenance and operational documentation.

37 The adequacy of the control measures indicated as necessary by the DRA and any extra necessary measures discovered during the assessment of the DRA should be assessed.

38 There are two stages to this process:

a. ensuring that all necessary control measures have been included in the final design, and;

b. checking control measures to confirm that they have reduced risk to ALARP.

39 The review of the control measures may involve many disciplines, and will overlap with the following steps.

Check the calculations and design information

40 Where the failure of structural, mechanical, electrical, electronic or civil engineering parts have been identified as significant risks, the drawings, specifications, calculations and any assessments used to formulate their design should be reviewed in detail.

41 The following are examples of calculations and assessments that might need to be reviewed, but this list may not be exhaustive:

a. mechanical and structural strength;

b. calculation of fatigue design lives;

c. material specifications and certification;

d. wind loadings;

e. ergonomics, anthropometrics and passenger containment;

f. machine dynamics;

g. hydraulic and pneumatic systems;

h. braking effectiveness;

i. mechanical backup and redundancy;

j. hydraulics (in relation to water flow in relevant devices);

k. control system hardware: programmable devices (such as PLCs) and other control gear;

l. control system software

m. the required Safety Integrity Levels (SIL) or Performance Levels (PL) for safety functions;

n. electrical ratings, capacities of components and switchgear.

42 A DR may rely upon external reports or Certification from organisations not registered with ADIPS. This may include:

a. Specialist reports from external independent experts, and/or;

b. Product, material or design Certification issued by Accredited conformity assessment bodies in other countries to recognised harmonised or industry Standards

43 These external reports or Certification may be:

a. provided as a part of the design information, or;

b. specially commissioned, where specialist expertise is required, or;

c. presented as a full design review, but from an organisation not registered with ADIPS, who may not be in the UK.

44 The findings of such reports or Certification may be used as part, or parts, of a Design Review without repeating the associated work, providing that the IB has confirmed that:

a. the report or Certification is issued by an organisation that is independent of the device (see paragraph 2.c.), and;

b. the organisation can demonstrate competence in the disciplines being covered in the external report or certificate or is independently competency assessed or appointed by a national Accreditation body and;

c. the scope of the external report or Certification e is clearly identified and covers the part or parts of the design review that will be relying upon the external report.

45 The IB shall also confirm that the external report or Certification applies specifically to the device and the design version of the device being reviewed.

46 For any external report or Certification it may be necessary to carry out additional work to achieve the level of review required.

47 Where an external report or Certification is being relied upon as a review of a part or system of a device, the IB who has been engaged to review that system shall be responsible for paragraphs 44 - 46 above.

48 Where the external report or Certification is being relied upon as a full DR, then the co-ordinating IB shall be responsible for paragraphs 44 – 46 above.

Review operations and maintenance documentation

49 The operations and maintenance documentation should be reviewed to confirm that it is suitable and sufficiently detailed including put up and take down information (where applicable), routine maintenance and inspection requirements, parts listing etc.

50 Where it has been decided that mitigation against any risks is to be provided by operational control measures such as by providing additional operating or maintenance instructions, it should be checked that the information is adequate and effective in mitigating the risk.

Review commissioning and Initial Test schedules

51 The IB should review the commissioning and IT schedule provided by the designer for adequacy and recommend any additional tests and procedures required based on the findings of the DR.

52 Should an IT schedule not be available, then one should be formulated before the DR can be considered complete.

Document Assessment of Conformity to Design and Initial Test requirements

53 Should the IB find that additional practical tests or measurements can assist in the DR process or where critical assumptions made within the design, e.g. speeds, forces, critical dimensions etc. should be specifically confirmed, these extra requirements should be documented within the DR report.

a. If such steps are identified, the DR stage may not be considered complete until the latter processes have been carried out and satisfactory results have been obtained.

b. The IB should give clear instructions on any specific tests that are to be carried out and their acceptance criteria.

c. The IB should also denote any further actions to be taken should the results of the tests and measurements not be within the acceptance criteria.

54 If the completion of the DR process does not rely upon practical tests or measurements during ACD or IT, this should be clearly stated in the DR report.

Reach Design Review conclusion

55 The DR should reach one of four conclusions:

i. the device will be safe if built and operated and maintained to the design that has been reviewed; or

ii. 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 (e.g. limitations in operating conditions such as reduced numbers of cars, reduced speed, specified inspections of critical parts etc.); or

iii. 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 DR 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 DR body that all outstanding issues have been satisfactorily resolved; or

iv. the design of the device is deficient to the extent that the device cannot be safely brought into service; in such cases the DR should state the reasons why; this should be communicated to the person who commissioned the DR as soon as possible.

Produce the Design Review report

56 The report of DR may contain recommendations and additional information regarding issues which could arise during operation, so that these issues can be targeted by planned maintenance and during in-service annual inspection.

57 The report(s) of DR should be prefaced by an ADIPS cover sheet, which lists all individual reports that have been provided to assess the relevant systems of the device.

a. If any of the disciplines referenced on the ADIPS cover sheet are not required this should be documented within the DR report and justified by the IB.

58 If the DR is to apply to a series of devices then the IB should clearly state this in the report and on the ADIPS cover sheet, with any additional strictures clearly identified.

59 There is no set maximum and minimum content, but sufficient documentation must be included in the DR report so that the following may be clearly understood:

a. the identification of the device or series of devices, and;

b. the drawings, calculations, operations & maintenance documentation used in the review, clearly listing issue numbers, dates and any amendments, and;

c. the scope of the DR, and the aspects reviewed, and;

d. the results of the DR, and;

e. the ACD and IT requirements, and;

f. the recommendations for ongoing requirements for the lifecycle of the device, and;

g. the DR's conclusion (see paragraph 55).

60 The IB should confirm that a report has been issued for all disciplines in order to complete the DR and that, in the IB's opinion, the design is safe.

61 A provisional report may only be used to allow operation of a device under the following conditions:

a. the IB must be satisfied that for the period that the provisional report is effective, all risks that may affect safety during that period have been resolved and that the device will be safe;

b. there must be an effective process to ensure that the device is not used beyond any time limits;

c. a provisional report of DR should be sufficiently complete to enable a satisfactory ACD and IT to be performed.

i. The report of DR should indicate whether or not a partial or full ACD and IT will be required once the DR issues have been resolved.

62 Other examples of when a provisional report might be satisfactory are:

a. if issues have not been resolved, but these do not affect the immediate safety of the device;

b. design information is not complete, but sufficient detail has been provided to enable satisfactory assessment;

c. there are queries regarding ageing failures e.g. fatigue failure, however, the IB is satisfied that the short term safety, covering the period up to the expiry of the report, has been confirmed.

63 It is not acceptable to issue a provisional report where:

a. any systems prone to early or random failures have not been fully assessed;

b. the documentation which ensures safe operation is not complete and satisfactory;

c. required assessments have not been completed.

Chapter 4 Assessment of Conformity to Design (ACD)

Introduction

64 ACD covers the procedures and investigations necessary for an IB to confirm that a device has been manufactured to their satisfaction in conformity with a particular design specification, which has successfully undergone a DR.

65 The DR may specify additional inspections and checks that should be carried out during the ACD. It is not possible for an IB to complete an ACD without the inspectors being in possession of the relevant sections of the DR report.

66 The primary objectives of ACD are for an IB to:

a. confirm that the device which has been installed is the same as the design that has been reviewed; this is achieved by measurement and visual assessment of the individual design elements and components, covering all relevant disciplines;

b. carry out an assessment of the manufacture or construction, to establish, where necessary, that it is in compliance with applicable codes and standards ;

c. perform any verification requirements included in the DR report concerning the ACD (see paragraph 53).

67 There are two distinct parts of ACD:

a. the assessment of Quality Assurance (QA) documentation provided by the manufacturer, and;

b. physical assessment and measurement.

68 Should the IB be able to satisfy itself that the manufacturer's QA system is reliable; the QA documentation may be used to complete a significant part of the ACD.

69 Sampling of multiple repeated parts or systems may be appropriate providing it is carried out in accordance with relevant standards.

Check QA documentation

70 A significant amount of ACD may be achieved following a careful assessment of the manufacturer's QA documentation.

71 The assessment of the QA documentation will assist in the confirmation that the device under construction is exactly as specified in the drawings and information for all disciplines assessed during the DR.

72 The manufacturer should provide the IB with sufficient QA documentation that will enable the IB to establish:

a. the appropriateness of manufacture and construction;

b. that the correct component parts have been used.

73 Although aspects of this documentation may have already been reviewed during the DR, the assessment of QA documentation should be tailored to the particular device and may include the assessment of:

a. parts and components lists along with their conformity documents;

b. material test and certification reports;

c. weld procedure specifications and procedure qualification records;

d. examination and Non-Destructive Testing (NDT) records;

e. manufacturer's staff qualifications and competence.

74 The IB should check whether the manufacturer's QA documentation is satisfactory. This process might require a visit to the manufacturer, in order to assess its effectiveness, or the IB might be able to rely upon their knowledge of the manufacturer's QA processes and/or external Certification of those processes by a competent body or Accreditation by a national Accreditation body.

a. Where the QA documentation is not able to satisfy the requirements for the ACD, then the IB will need to carry out additional physical inspections and measurements, which may take place during or after manufacture or construction.

b. The IB should decide at what points during the process it is possible to adequately carry out such measurement and inspection, as not all parts may be accessible after manufacture or construction.

Carry out physical inspection and comparison measurements

75 Not all requirements of ACD can be achieved by assessment of the manufacturer's QA documentation and physical inspection and measurement will also need to be carried out.

76 These inspections and measurements may take place during or after manufacture or construction, as determined by the ability to access the parts and components.

77 The IB should assess the device in its final constructed state in order to confirm that the device as a whole corresponds to the design which has been reviewed. This stage should also include any design features that were included in the DR, but that were not available during the original manufacturing or construction process.

78 The DR report may also require specific measurements and tests to be carried out during the ACD. In such cases the inspector(s) should check the DR report for details, carry out such requirements and document the results.

79 Whilst there is no general requirement for independent NDT during manufacture, the IB should decide if the manufacturer's QA system has demonstrated that sufficient NDT has been performed and documented. It is understood that NDT is only one part of quality control and it will not generally substitute for proper manufacturer's control of the welding processes.

Review non-conformances

80 Any non-conformances discovered that relate to requirements specified in the DR should be reviewed in line with the instructions outlined in the DR (see paragraph 53).

81 Any other non-conformances should be assessed and action taken as necessary.

Produce the ACD report

82 The report(s) of ACD should be supplemented by an ADIPS cover sheet, which lists all individual reports that have been provided to assess the relevant systems of the device. If any of the disciplines are not required this should be documented within the ACD report and justified by the IB.

83 There is no set maximum and minimum content, but sufficient documentation must be included in the report to:

a. substantiate the scope of the ACD;

b. list the the location of any inspection or measurements undertaken and the results obtained;

c. identify all documentation used during the ACD clearly listing issue numbers, dates and any amendments;

d. identify any non-conformances and action taken;

e. clearly identify the conclusion of the ACD.

Chapter 5 Initial Test (IT)

Introduction

84 The IT is the procedure used to demonstrate that, at the time and place of test, all the operational functions and safety systems of the device are installed and working correctly and the amusement device is capable of performing to the design specification.

85 The IT is a witnessing of tests and reports of tests carried out by others.

86 The IT should be based on the IT schedule provided by the designer which has been verified during the DR (see paragraph 51).

87 The IT should be used to perform any verification requirements included in the DR report concerning the IT (see paragraph 53).

88 The IT should be used to confirm that the commissioning process has been carried out and has returned satisfactory results.

89 The manufacturer's commissioning process in itself is not a substitute for an adequate IT to be witnessed by the IB. The commissioning process and IT should be seen as separate exercises. However, if the IB can demonstrate that data gathered during the commissioning process is reliable, then it may be used as additional information to assist with the conclusions drawn from the IT.

90 The objectives of the IT are to ensure that:

a. all safety functions of the device are working correctly;

b. where necessary any requirements of the DR are satisfied;

c. control measures for foreseeable failure modes have been implemented and are functioning correctly;

d. performance aspects of the device have been measured and documented;

e. the device meets the performance and integrity requirements detailed within the design specification.

91 It is not possible for an IT to be finalised without the inspectors being in possession of the relevant sections of the DR that might specify inspections and checks that are to be carried out during the IT.

92 The end result of the IT should be that the IB is satisfied that the device is safe for operation and risks have been reduced to ALARP

Witness Initial Test

93 The IB should co-ordinate, oversee and document the IT. This will enable the IB to ensure that all relevant tests have been carried out satisfactorily.

94 During the IT, the manufacturer or controller should operate the device to demonstrate to the IB that the device performs as intended. At all times the final decision on whether it is safe to initiate a test should remain with the person operating the device.

95 The IT schedule should be specific to the particular device and may include, but not be limited to:

a. checking the stability of the ride under the foreseeable load/operational conditions;

b. a function check of all control systems and their normal operational modes;

c. assessing the correct working of control systems under foreseeable failure modes;

d. correct operation under both normal and foreseeable failure modes of safety devices including validation of their integrity requirements; for example:

   i. passenger containment interlocks;

   ii. position detection devices;

   iii. interlocks that prevent structures from moving, or detect inadvertent movement;

   iv. limit switches;

   v. anti-roll back systems and/or other mechanical redundancy;

e. confirming that defined operating speeds are not being exceeded, or are sufficient;

f. assessing the settings of limit and other control devices;

g. confirming the correct settings of fluid pressure system devices;

h. checking that the settings of overload protection are satisfactory (these may be in electrical or fluid systems);

i. checking of clearance envelopes;

j. functionally confirming the effectiveness of braking systems, under all foreseeable conditions, including failure of brake elements where necessary;

k. measurement of accelerations applied to passengers and the structure under normal and abnormal conditions;

l. confirming that statutory electrical installation inspections have been carried out by competent persons and documentation is in place;

m. confirming the effectiveness of and documentation of passenger evacuation and emergency procedures;

n. ensuring that perimeter fencing is stable, secure and complete;

o. carrying out an inspection of theming and other extraneous items where they might affect the safety of the device.

96 The IB should consider if any additional tests, inspections and procedures not mentioned above are required to determine to the IB's satisfaction that the device is operating correctly under all normal modes and any foreseeable failure modes.

97 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 IT. Where previous tests are accepted, functional testing of the device under both normal and foreseeable emergency conditions still needs to be witnessed by the IB.

98 If any of the required tests are not complete or procedures not followed, the IB may consider the IT incomplete and, subsequently, may be unable to issue a DOC.

Check operations and maintenance documentation

99 The presence of all documentation necessary for ongoing maintenance and safe operation should be confirmed.

a. The IB should confirm the documentation is consistent with that checked during the DR and that the correct version(s) have been supplied.

Review non-conformances

100 Any non-conformances discovered that relate to requirements specified in the DR should be reviewed in line with the instructions outlined in the DR (see paragraph 53).

101 Any other non-conformances should be assessed and action taken as necessary. This should include a discussion of the results with the designer and controller to determine any remedial work and further pre-use inspection requirements.

Produce the Initial Test report

102 The report(s) of IT should be supplemented by an ADIPS cover sheet, which lists the tests and reports that have been witnessed in order to assess the performance of the device.

103 There is no set maximum and minimum content, but sufficient documentation must be included in the report to:

a. substantiate the scope of the IT;

b. list the results of all tests carried out; and

c. identify any non-conformances and action taken.

104 The IT report should clearly state the conclusions of the IT and any further requirements for ongoing safe operation.

Issue the Declaration of Operational Compliance (DOC)

105 Following completion of a satisfactory IT, and provided that satisfactory completion of all other ADIPS pre-use inspections is confirmed, the DOC may be issued.

106 The AIB may issue a shorter-term DOC, to coincide with the expiry date of a provisional DR report (see paragraphs 61-63).

107 Once any issues have been satisfactorily resolved the expiry date of the DOC may be extended or a further DOC may be issued supported by additional or amended reports of pre-use inspection where required.

108 When issuing the DOC, the AIB should ensure that:

a. all relevant systems of the device have been covered in the pre-use inspection reports and their findings presented;

b. ACD and IT requirements identified in the DR have been carried out and satisfactory results have been obtained (see paragraph 53);

c. any necessary actions arising from non-conformances discovered during the pre-use inspection process have been completed.

ADIPS Ltd
North East BIC | Enterprise Park East | Wearfield | Sunderland | SR5 2TA | UK
T: +44 (0)191 516 6381 | F: +44 (0)191 516 6382 | E: office@adips.co.uk
Registered in England and Wales No. 04785961