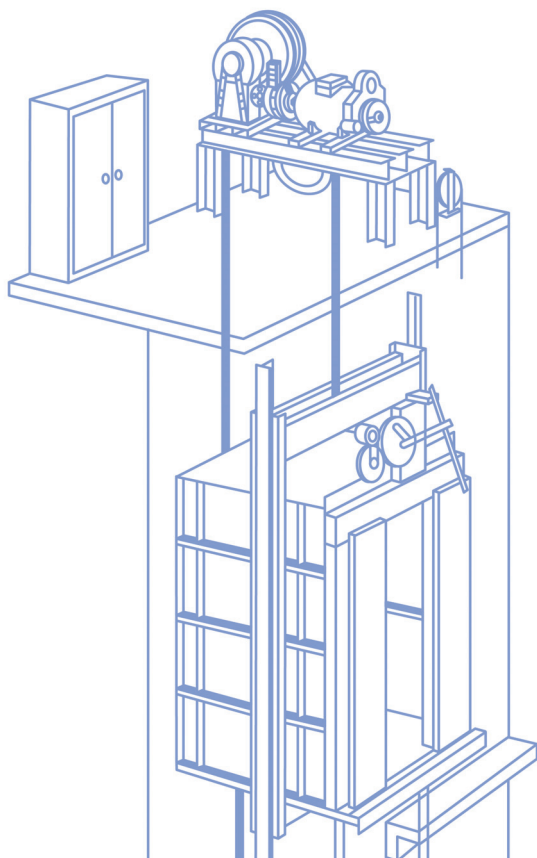




## Guidelines

on the supplementary tests of in-service lifts



The Safety Assessment Federation - SAFed - represents the interests of companies engaged in independent inspection and safety assessment of engineering and manufacturing plant, systems and machinery.

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## FOREWORD

These revised Guidelines have been prepared by the Safety Assessment Federation in consultation with the Health and Safety Executive, and other interested parties within the lift industry. This publication should not be regarded as an authoritative interpretation of the law; however, if the guidance provided is followed, it will normally be regarded as sufficient to comply with health and safety law in respect of supplementary testing in support of thorough examinations.

The Health and Safety Executive believes that the contents of this publication represent good practice in the lift industry and commends its use.

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# Section 1

## Introduction



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## INTRODUCTION

These revised Guidelines for the supplementary tests of in-service lifts, which have been formulated by a Review Committee comprising owners, users, lift manufacturers, lift maintenance companies, inspection bodies, lift consultants, enforcement authorities and other professional bodies, chaired by the Health and Safety Executive, supersede the existing document 'Lifts Guidelines (LG 1): Guidelines on the thorough examination and testing of lifts, Volumes 1 and 2', published by SAFed in December 1998, which is now withdrawn.

A list of organisations represented on the Review Committee can be found at **Annex C**.

### 1.1 Terms

For the purpose of these Guidelines the following terms apply.

#### 1.1.1 Competent person

A competent person is someone who... *'has such appropriate practical and theoretical knowledge and experience of the lifting equipment to be thoroughly examined as will enable them to detect defects or weaknesses and to assess their importance in relation to the safety and continued use of the lifting equipment'*.<sup>1</sup>

Further HSE guidance states:

*'It is essential that the competent person is sufficiently independent and impartial to allow objective decisions to be made'*.<sup>2</sup>

Further HSE simple guidance for lift owners states:

*'For this reason, it is not advisable for the same person who performs routine maintenance to carry out the thorough examination, as they are then responsible for assessing their own work'*.<sup>3</sup>

1 ACOP paragraph 294 - HSE L113: Safe Use of Lifting Equipment - Lifting Operations and Lifting Equipment Regulations 1998 - ACOP and Guidance

2 Guidance paragraph 295 - HSE L113: Safe Use of Lifting Equipment - Lifting Operations and Lifting Equipment Regulations 1998 - ACOP and Guidance

3 INDG339: Thorough examination and testing of lifts - Simple guidance for lift owners - Selecting a competent person

### 1.1.2 Thorough examination

Lifting Operations and Lifting Equipment Regulations 1998, Regulation 2(1)

Interpretation:

*'thorough examination' in relation to a thorough examination under paragraph (1), (2) or (3) of regulation 9 -*

- (a) means a thorough examination by a competent person;*
- (b) where it is appropriate to carry out testing for the purpose described in the paragraph, includes such testing by a competent person as is appropriate for the purpose,*

*and 'thoroughly examined' shall be construed accordingly'.<sup>4</sup>*

Note: Regulation 9(3)(a) applies to the periodic thorough examination of in-service lifts and is relevant to these Guidelines.

Further HSE guidance states:

*'A thorough examination is a systematic and detailed examination of the lift and all its associated equipment by a competent person. Its aim is to detect any defects which are, or might become, dangerous, and for the competent person to report them to the dutyholder and, if appropriate, the enforcing authority (the Health and Safety Executive or Local Authority) so that appropriate remedial action can be taken'.<sup>5</sup>*

### 1.1.3 Functional test

Normally undertaken by the competent person at the time of the thorough examination to prove that the device is in efficient working order.

### 1.1.4 Supplementary tests

Appropriate tests and/or examinations called for by the competent person where concerns regarding the condition of equipment arise from the thorough examination.

*'The competent person should decide whether a test is necessary. The nature of the test method will be a matter for the competent person: they should determine the most appropriate method for carrying it out'.<sup>6</sup>*

4 Regulation 2 (1) HSE L113: Safe Use of Lifting Equipment - Lifting Operations and Lifting Equipment Regulations 1998 - ACOP and Guidance

5 INDG 339: Thorough examination and testing of lifts - Simple guidance for lift owners - What is a thorough examination

6 Guidance paragraph 301 - HSE L113: Safe Use of Lifting Equipment - Lifting Operations and Lifting Equipment Regulations 1998 - ACOP and Guidance

## 1.2 Purpose of supplementary tests

The purpose of the supplementary tests is to support the thorough examination in order to establish the equipment's suitability for continued safe use. Such supplementary tests, which should only be called for by the competent person, will need to be undertaken and documented in order to enable the subsequent thorough examination to be completed. Failure to complete the supplementary tests may preclude the completion of the subsequent thorough examination. In some circumstances the competent person may require to witness the 'supplementary tests'.

The supplementary tests themselves are not part of a servicing or maintenance regime and should not be initiated by engineers engaged in servicing or maintenance. They are solely to support the thorough examination. Where concerns regarding the condition of the equipment arise from a thorough examination it is ultimately the decision of the competent person carrying out that thorough examination as to what supplementary tests are required and when.

## 1.3 Aim of guidance on supplementary tests

The Guidelines are primarily intended for competent persons undertaking thorough examinations and represent a consensus of practical experience. The overall aim of these Guidelines is to clarify the scope and reasons for supplementary tests, called for by the competent person in support of the thorough examination, and to achieve consistency of reporting the test results. Where such supplementary tests are called for they should be based on an assessment of the condition of the equipment at the time of the thorough examination.

## 1.4 Status of guidance

This document has no legal status. Where called for in support of the thorough examination, compliance with these Guidelines would normally satisfy the requirements of The Provision and Use of Work Equipment Regulations 1998 (PUWER) and The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER). Should competent persons not follow these guidelines they should take other action to ensure compliance with Health and Safety law. A legal commentary, including the legal requirements for the maintenance of lifts, is contained in Chapter 2.

### **1.5 Relationship between the thorough examination and 'maintenance requirements and the development of new technology'**

As noted in paragraph 1.2 the contents of these Guidelines should not be confused with servicing and maintenance and neither replaces any aspect of the maintenance requirements for lifts nor does it preclude the introduction and use of new technologies or test techniques. The suitability of any new supplementary test techniques supporting the thorough examination proposed either by the manufacturer or his agent should be agreed by the competent person, the owner and such relevant parties prior to their application.

# Section 2

## Legal Commentary

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## LEGAL COMMENTARY

### 2.1 Introduction

The law places duties on persons concerned with lifts, both those who provide or make available lifts for use and those involved with work on lifts. This Chapter outlines those legal duties and points the reader towards further relevant guidance material.

### 2.2 The law outlined

Legislation relating to the use of lifts at work includes the:

- Health & Safety at Work etc Act 1974
- Management of Health & Safety at Work Regulations 1999/3242
- Workplace (Health, Safety & Welfare) Regulations 1992/3004
- Provision & Use of Work Equipment Regulations 1998/2306
- Lifting Operations & Lifting Equipment Regulations 1998/2307

#### 2.2.1 Health & Safety at Work etc Act 1974 (HSWA)

HSWA places a duty on employers to ensure the health and safety of employees and others who may be affected by their work activities. Similar duties are placed on the self-employed and persons in control of premises. Employees, managers and directors also have responsibilities. The HSWA also places a duty on lift owners and other duty holders, where their work activity involves lifts being used by the general public.

#### 2.2.2 Management of Health & Safety at Work Regulations 1999 (MHSWR)

Under MHSWR, employers and self-employed people are required to assess risks to health and safety from their undertaking. This includes risks from the use, repair and examination of lifts in their building, including the operation of the lift machinery. The risk assessment should identify what measures are needed to comply with health and safety requirements. The duty holder should then put in place the organisation and arrangements to ensure that those measures are properly implemented.

#### 2.2.3 The Workplace (Health, Safety & Welfare) Regulations 1992 (WPR)

WPR places duties on employers to ensure, as far as is reasonably practicable, that their work places are safe and without risks to health. The WPR cover matters such as ventilation, temperature, lighting, electromagnetic radiation and cleanliness of the workplace as well as certain basic welfare provisions.

### 2.2.4 The Provision & Use of Work Equipment Regulations 1998 (PUWER)

PUWER is concerned with such matters as safeguarding of dangerous parts of machinery, provision of appropriate controls and lighting of work equipment.

PUWER places duties on any person who has control to any extent of:

- work equipment;
- a person at work who uses, supervises or manages the use of work equipment; or
- the way in which work equipment is used at work.

PUWER applies to employers in respect of work equipment provided for, or used by, their employees, self-employed persons in respect of work equipment they use and other persons, e.g. visitors. Work equipment covers lifts used at work.

### 2.2.5 The Lifting Operations & Lifting Equipment Regulations 1998 (LOLER)

LOLER deals with the specific risks arising from the use of work equipment to lift loads. It builds upon PUWER and applies to the same groups of people. LOLER introduces particular requirements for lifting equipment which is used to lift people, and a requirement for the periodic thorough examination of lifts.

Persons in control of non-domestic premises who provide a lift or lifts which are used by other people at work are required to comply with their duties under LOLER.

*'LOLER only applies to work activities. It does not apply, for example, to persons who provide lifting equipment principally for use by members of the public such as lifts provided for use by the public in a shopping centre'.<sup>7</sup>*

In such circumstances owners will have to satisfy the requirements of the HSWA, principally sections 3 and 4, but if they use the requirements of LOLER as a guide they will probably satisfy these legal duties.

<sup>7</sup> Guidance paragraph 40 - HSE L113: Safe Use of Lifting Equipment - Lifting Operations and Lifting Equipment Regulations 1998 - ACOP and Guidance

## 2.3 Duties on lift owners

### 2.3.1 HSWA particular requirements

Owners and managers of buildings in which lifts are installed have duties under HSWA s4. This section relates to 'persons who have, to any extent, control of non-domestic premises used by persons who are not their employees, as a place of work or as a place where they may use plant'.

Note: 'Plant' includes equipment.

### 2.3.2 Lift owners responsibilities under HSWA s4

HSWA s4 deals with general duties of controllers of premises. In buildings in which there are lifts, it is generally clear who has responsibility for providing the lift and for ensuring its continuing safe use. These may be different people, for example the person who is 'in control' of the lift may be the owner of the premises in which the lift is installed, a facilities manager or the occupier of those premises. The individuals or companies who have 'control' under s4 are described in these Guidelines as the 'lift owner' or 'duty holder'. Lift owners are expected to take reasonably practicable measures to ensure that the premises, as well as all means of access, egress, working environment and any plant or substances provided for use there, are safe and without risk to health.

### 2.3.3 PUWER Regulation 5: Requirements for lift maintenance

PUWER Regulation 5 requires that work equipment is maintained in an efficient state, in efficient working order and in good repair. Where any machinery has a maintenance log, this should be kept up-to-date. There should be regular maintenance and a simple record should be kept that such maintenance has been carried out.

### 2.3.4 Lift owners responsibilities for keeping records of supplementary tests carried out

A thorough examination may include some testing, if the competent person considers it to be necessary. The competent person should determine what tests are required. Where supplementary tests have been called for in support of the thorough examination, it is the lift owner's responsibility to ensure that such supplementary tests are undertaken by those competent to carry out and certify such tests. In all cases the records of the supplementary tests should be made available to the competent person, by the lift owner.

## 2.4 Duties of competent persons

### 2.4.1 Thorough examinations

LOLER Regulation 9 requires that thorough examinations are undertaken by a competent person. It is essential that the competent person is sufficiently independent and impartial to allow objective decisions to be made. The competent person is responsible for notifying the lift owner immediately if there is any dangerous, or potentially dangerous, defect. In certain cases it may also be necessary to send a copy of the report to the relevant enforcing authority (Local Authority or Health and Safety Executive).

The competent person undertaking the thorough examination should identify any requirement for supplementary tests to be carried out in order to complete a thorough examination or prior to a subsequent thorough examination. Should the competent person wish to witness the supplementary tests then he should inform the lift owner of this requirement at the time of the thorough examination.

### 2.4.2 Report of thorough examination

In all cases following a thorough examination, the competent person should make a report of thorough examination in writing containing the information specified in LOLER Schedule 1. This report should be sent to the lift owner or their chosen representative commissioning the thorough examination. Where supplementary tests have been called for in support of the thorough examination, the type and extent of the test(s) as determined by the process of assessment and the reason for the request should be clearly documented on the report. Requests for supplementary tests should only be submitted by the competent person carrying out the thorough examination and normally submitted on the report to the lift owner.

### 2.4.3 Safety at work

#### 2.4.3.1 Employers' duties HSWA s2

The law requires thorough examinations and any supplementary tests to be carried out in a safe manner. Employers of a competent person and of those who carry out supplementary tests have duties under HSWA s2 to ensure, so far as is reasonably practicable, their safety at work. This duty extends to the provision and maintenance of safe work equipment, providing such information, instruction, training and supervision as is necessary to ensure safety.

Employers should ensure safe working arrangements for solitary workers. Particular hazards should be identified by carrying out the risk assessment and planning of the work.

Note: Some of the issues are outlined in the HSE guidance booklet 'Working Alone in Safety - Controlling the risks of solitary work' IND (G) 73 (L).

#### *2.4.3.2 Employers' duties HSWA s3*

Employers also have duties under HSWA s3 to conduct their undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in their employment who might be affected, are not exposed to risks to their health and safety.

#### *2.4.3.3 Self Employed persons' duties HSWA s3*

Self-employed persons have the same duties as employers (see 2.4.3.2 above) under HSWA s3 to ensure, so far as is reasonably practicable, that their work is conducted in such a way that does not expose other persons or themselves to risks.

#### *2.4.3.4 Duties of persons concerned with premises HSWA s4*

Persons who have to any extent control of premises should, so far as is reasonably practicable, ensure that such premises, including access to and egress from, or of any plant or substance in the premises are safe and without risk to health. These responsibilities are held by persons who have control of the premises in connection with a trade, business or undertaking.

#### *2.4.3.5 Employees' duties HSWA s7*

Employees have general duties under HSWA s7 to take reasonable care for the health and safety of themselves and of other persons who may be affected by their acts or omissions at work; and to co-operate with their employer in the fulfilment of their duties.

#### **2.4.4 Persons working in another employer's undertaking**

Under MHSWR Regulation 12 it is the responsibility of an employer or self employed person to provide the employer of any employees from an outside undertaking with information on any health and safety risks arising, and on measures taken to comply with the relevant legislation. An example would be a third party competent person witnessing a supplementary test carried out by a third party testing organisation at the undertaking where the lift is located. The employer of the undertaking is responsible for providing information to the employer of the third parties.

# Section 3

## Practical Considerations

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## PRACTICAL CONSIDERATIONS

### 3.1 Scope

The purpose of these Guidelines is to inform competent persons undertaking thorough examinations of examples of supplementary tests which they could call for as part of their thorough examinations.

These Guidelines do not define the scope of a thorough examination. That is the responsibility of the competent person undertaking the thorough examination. The supplementary tests alone do not constitute the scope of a thorough examination.

An assessment by a competent person, based on reasoned engineering judgement together with the potential hazards and risks, should establish the type and extent of such supplementary tests. A conclusion of such an assessment could be that such supplementary tests are not required.

The Guidelines also inform those third party organisations competent to undertake such supplementary tests, when called for by the competent person following a thorough examination.

### 3.2 Types of installation

These Guidelines are applicable to the thorough examination and testing of the following types of lift, irrespective of drive system:

Passenger; Passenger/goods; Goods only; Service; Domestic and Lifting platform.

In the absence of alternative specific guidance, the general principles may additionally be applied to other types of lifting equipment.

### 3.3 Process of assessment

The process of assessment should include consideration of:

- design
- condition
- usage of the lift
- known problems with the particular equipment
- relevant component manufacturers' recommendations
- integrity of the building and installation

The results of the process of assessment may necessitate variations to the extent and nature of the supplementary tests described later in this section



of the document and to the frequency with which they are performed and where such variations are identified these should be communicated to the lift owner. The process of assessment leading to the engineering judgement should be justified and recorded, a notebook is deemed as being sufficient.

### **3.4 Programmable electronic system in safety related applications for lifts (PESSRAL)**

Where a functional test of a PESSRAL cannot be carried out without proprietary test equipment and specialist training, the competent person should call for evidence to confirm the functionality of the system.

# Section 4

## Supplementary Tests

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## SUPPLEMENTARY TESTS

The following outlines a series of recommended supplementary tests of key components and areas to be determined by the competent person through a process of assessment.

The results of any supplementary tests and subsequent maintenance and repair if required should be recorded on the Examination and Test Report(s). These are contained within **Annex A** and are to be annotated in the covering Certificate (Page 5.1).

The Examination and Test Certificate and Report(s) contained at **Annex A** are available in electronic format on the SAFed website [www.safed.co.uk](http://www.safed.co.uk). They are guidance on a recommended format for reporting the results of supplementary tests and are intended for use by companies and persons competent to carry out the designated supplementary tests and who are bona fide holders of this document. Such companies or persons may adjust or otherwise alter these reports for their own use and to allow for company identity and any special particulars relating to the lift, the test, the site and the company carrying out the test. However in all cases the reports must contain the data required to identify the actual lift, the site, the date and details of the test(s) carried out and the company or person carrying out the supplementary test(s). Responsibility for and ownership of the Certificate of Examination and Test(s) and of completed Report(s) lies wholly with the company or person issuing the Certificate and Report(s) and not with the Safety Assessment Federation or its agents.

The list of key components specifically mentioned in this chapter is by no means exhaustive. Whilst every effort has been made to include as many key components as practicable, competent persons should be aware that particular lift designs may include additional key components not featured here.

### 4.1 Earth continuity

It should be established that adequate earthing of all metal work, such as the car, landing doorframes, machine, controller and guides is provided.

Where it is not possible to verify the earth continuity of the installation during the thorough examination, consideration should be given by the competent person to calling for a supplementary test.

The earthing of the most remote landing lock contact should allow operation of the lock circuit protection device without undue delay. Where no evidence exists verifying the correct operation of the lock circuit protection device, consideration should be given by the competent person to calling for such a supplementary test.

Thereafter, consideration should be given to calling for such a supplementary test at 5 yearly intervals unless it can be demonstrated that a more or less frequent test will be adequate to ensure safety.

The earth continuity should not exceed  $0.5\Omega$

See **Annex A.1** for report format of examination and test.

## 4.2 Electric safety devices

In order to verify that electrical safety devices are in efficient working order, a functional test of each of these devices should be undertaken at every thorough examination by the competent person.

Where the functional test of a safety device cannot be carried out by the competent person then that person should call for a functional test to be made of the specific device(s).

Where the competent person considers that in addition a supplementary test is required then this should be clearly identified.

See **Annex A.2** for report format of examination and test.

See **Annex B.1** for a non exhaustive list of electric safety devices.

## 4.3 Terminal speed reduction systems

It is common for lifts with a rated speed of 2.5m/s or greater to be provided with buffers that are not intended to arrest the car or counterweight at such speeds (reduced stroke buffers). In such circumstances the control system should have been provided with a terminal speed reduction system to ensure the car or counterweight cannot impact the buffer at speeds above that for which they are designed.

Where no documented evidence exists verifying the satisfactory operation of the system, consideration should be given by the competent person to calling for a supplementary test. Thereafter, consideration should be given to calling for such a supplementary test at 5 yearly intervals unless it can be demonstrated that a more or less frequent test will be adequate to ensure safety.

Before conducting any supplementary test it should first be determined that a terminal speed reduction system is applicable and in place.

Before commencing any dynamic test it should be determined that the control system functions correctly and any limit switches or associated parts are correctly positioned.

The normal slowing signals for the lift should be made inoperative and the car driven at rated speed towards the terminal floor. It should be determined that the lift slows down automatically to a speed not greater than the buffer design impact speed.

See **Annex A.3** for report format of examination and test.

#### 4.4 Landing door interlocks

In order to verify that landing door interlocks are in efficient working order, a functional test of each of these devices should be undertaken at every thorough examination.

Where the condition of any landing door lock cannot be verified by the competent person, that person should call for a supplementary test of the device. Any such supplementary test should ensure that the lock prevents the door from opening when the lift is outside of the unlocking zone. It should also be ensured that the lift will stop if the lock circuit is opened outside of the unlocking zone. All parts of the lock should be clean, not excessively worn, without signs of burning and undamaged in any way.

See **Annex A.4** for report format of examination and test.

#### 4.5 Lift machine

If as a result of the thorough examination there is reason to believe there may be a problem or if due to the design of the unit it is not possible to make a reasonable judgement as to the integrity of the critical components, the competent person should consider if a more detailed supplementary test is required.

In determining the need for and degree of any supplementary test which may be required, the competent person should make an assessment that takes into account some or all of the following:

- a) The age of the components
- b) The results of any previous inspection
- c) Signs of unusual or excessive vibration
- d) Presence of unusual noise
- e) Excessive backlash or thrust float
- f) Condition of the lubricant (metal particles in the oil)
- g) Excessive temperature or hot spots
- h) Known problem with the particular type of machine
- i) Ratio of the maximum allowable duty to the actual duty rating where known

- j) Accessibility of hidden critical components
- k) Evidence of excessive wear with major load path components
- l) Condition and security of shaft keys

As a result of the assessment above, a supplementary test (type 'A' or type 'B') may be required. The thorough examination report should indicate which type of supplementary test is required, type A (investigatory) or type B (comprehensive).

See also **Annex B.3** Machine system components.

Note 1: It is considered unlikely that a gearless traction machine would need to be subject to supplementary tests because of their design and accessibility of critical components.

Note 2: Some designs of gearbox may require external checking and measurement of certain key parameters or return to the manufacturer e.g. measurement of backlash before the gearbox is dismantled.

#### 4.5.1 Investigatory test (type 'A')

An investigatory supplementary test can be called for where it is not possible to make a reasonable assessment of condition at the time of the thorough examination and where the assessment indicates that a supplementary test is advisable. This may be the case in certain designs of machine where critical components such as load nuts, load chains, anchor pins, worm-wheel teeth and rim bolts cannot be seen.

The machine should be free of excessive or unusual noise, vibration, excessive temperature or hot spots.

The machine should operate throughout its travel cycle without excessive thrust float or backlash.

Gear wheel teeth marking should be even and approximately central of the teeth. The teeth should be free of steps, pitting or ridges (smooth faced) and oil should appear clean and most importantly, show no sign of metal particles. Worm wheel rim/bolts should be secure.

Shafts and bearings should not run hot or show signs of vibration or noise.

Load nut wear and chain extension should be within acceptable limits.

See **Annex A.5** for report format of an investigatory test (type A).

#### 4.5.2 Comprehensive test (type 'B')

Where a Thorough Examination or an investigatory test indicates there is serious cause for concern over the condition of a critical load path item, a comprehensive test of the parts should be undertaken.

Such a supplementary test should include the measurement and recording of important dimensions such as the wear, extension, thrust float, backlash and bearing clearances. Detailed inspection should be made of worm and wheel for wear, signs of excessive heating, cracking, pitting etc.

Suitable non-destructive testing or examination of areas subject to high stress loading (e.g. shouldered shafts and keyways) and alignment checks (e.g. out-rigger bearing), should also be considered if deemed necessary.

Non-destructive testing techniques and oil analysis may be used to supplement the examination process.

The findings should be set out in a detailed report as indicated in **Annex A.6**.

Comprehensive tests (type B) are only to be called for where there is clear evidence that something serious is wrong or about to occur.

See **Annex A.6** for report format of a comprehensive test (type B).

### 4.6 Safety gear system (governor, safety gear, suspension failure device)

Where no documented evidence exists verifying the satisfactory operation of the system, consideration should be given by the competent person to calling for such a supplementary test. Thereafter, consideration should be given to calling for such a supplementary test of the safety gear (car/counterweight), together with any overspeed governor and torpedo release device (if fitted). This could be at 5 yearly intervals unless it can be demonstrated that a more or less frequent test will be adequate to ensure safety.

Appropriate supplementary tests are described in the following sections.

#### 4.6.1 Overspeed governors

Overspeed governors should be subject to supplementary testing to ensure correct electrical and mechanical operation at the appropriate tripping speeds (including sufficient gripping force on the rope to activate the safety gear).

Such supplementary testing should be carried out as mentioned above and on every occasion that an overspeed governor has been subject to repairs or renewal of the governor rope.

See **Annex A.7** for report format of examination and test.

#### **4.6.2 Governor operated safety gear instantaneous type**

Where documented evidence exists (signed test document) that the safety gear system met the requirements current at the time of installation, modification, replacement or refurbishment, a rated speed empty car test should be conducted for car and any counterweight safety gear. The object of the test is to ensure the correct operation of the safety gear system and to ensure fittings within the car remain secure, ropes do not leave sheaves and filler weights in counterweight frames do not become displaced.

Where there is no documented evidence of a previous successful test (with a rated load for car, empty car for counterweight) a test should be performed to prove the system operates in accordance with the requirements specified in the standard applicable at the time of installation. When conducting the test the method should ensure the lift is stopped by the safety gear without the assistance of the brake or some other device. The aim of this test is to check the correct mounting, correct setting and the soundness of the complete assembly, comprising car, safety gear, guide rails and their fixing to the building. The test should also ensure that the safety gear and car frame are capable of absorbing the loads imposed on them. See **Annex B - Table 2** for guidance.

After any such supplementary test, it should be ascertained that no deterioration, which could adversely affect the normal use of the lift, has occurred. If necessary, friction components should be replaced.

See **Annex A.8** for report format of examination and test.

#### **4.6.3 Governor operated safety gear progressive type**

Where documented evidence exists (signed test document) that the safety gear system has been tested and met the requirements current at the time of installation, modification, replacement or refurbishment, a reduced speed (approximately 1m/s) empty car test should be conducted for car and any counterweight safety gear. When conducting the test the method should ensure the lift is stopped by the safety gear without the assistance of the brake or some other device. The object of the test is to ensure the correct operation of the safety gear system and to ensure fittings within the car remain secure, ropes



do not leave sheaves and filler weights in counterweight frames do not become displaced.

Where there is no documented evidence of a previous successful test (in accordance with requirements current at the time of installation) a test should be performed to prove the system operates in accordance with the standard applicable at the time of installation. The aim of this test is to check the correct mounting, correct setting and the soundness of the complete assembly, comprising car, safety gear, guide rails and their fixing to the building. The test should also ensure that the safety gear and car frame are capable of absorbing the loads imposed on them.

See **Annex B - Table 2** for guidance.

After the test, it should be ascertained that no deterioration which could adversely affect the normal use of the lift has occurred. If necessary, friction components may be replaced.

See **Annex A.9** for report format of examination and test.

See **Annex B.4** for further information on safety gear tests.

#### 4.6.4 Safety gear operated by other means

Some types of safety gears operate only on failure of the main suspension system. Where there is no documented evidence of a previous successful test, consideration should be given by the competent person to call for a supplementary test which demonstrates that the device operates in accordance with requirements current at the time of installation. When determining the frequency for such supplementary testing, an assessment should be made taking account of the following:

- a) any evidence or record of:
  - modifications
  - previous test
  - lack of periodic maintenance
- b) effects of a hostile environment
- c) the condition and correct operation of all linkages
- d) method of operation

The test should be made by some suitable means to cause the safety gear to operate.

See **Annex A.10** for report format of examination and test.

#### 4.7 Devices to prevent overspeed of the ascending lift car

Where a mechanical device has been installed to prevent overspeed of the ascending lift car its operation should be tested. As part of the supplementary test, all moving parts of the device should be checked for free and effective operation, and for any signs of excessive deterioration and wear.

Where the device is a rope or sheave brake a supplementary dynamic test should be carried out. Where the rated speed of the lift is 1 m/s or less the device should be tested at rated speed with an empty car. Where the rated speed exceeds 1 m/s the test should be made in accordance with the manufacturer's recommendations or at not less than 1 m/s with an empty car. Where there is no documented evidence of a previous successful test, consideration should be given by the competent person to calling for a supplementary test which proves the system operates in accordance with requirements current at the time of installation. Thereafter, consideration should be given to calling for such a supplementary test at 5 yearly intervals unless it can be demonstrated that a more or less frequent test will be adequate to ensure safety.

Where the device is a safety gear operated by a governor it should be tested as defined in the relevant section (4.6) titled 'Safety gear system (governor, safety gear, suspension failure device)'.

See **Annex A.11** for report format of examination and test.

#### 4.8 Energy dissipation buffers

To ensure that the piston returns to its fully extended position after the buffer has been compressed, energy dissipation buffers, whose effective operation cannot be verified and which do not have a buffer return switch, should be subject to a slow speed, empty car supplementary test. Thereafter, consideration should be given to calling for such a supplementary test at 12 monthly intervals unless it can be demonstrated that a more or less frequent test will be adequate to ensure safety.

Consideration should be given to the supplementary testing of all energy dissipation buffers (including those fitted with a buffer return switch) at 5 yearly intervals unless it can be demonstrated that a more or less frequent test will be adequate to ensure safety. The supplementary test should determine that all such energy dissipation buffers can be fully compressed and that they then return to their extended position.

See **Annex A.12** for report format of examination and test.

## 4.9 Suspension system

Suspension ropes, belts and chains, should be examined for wear at every thorough examination of the lift. An automatic monitoring device may be used to supplement these inspections where the internal condition of the suspension system is not visible.

New means of suspension and materials are being introduced into lift designs. Where unconventional methods of suspension are used the manufacturer's guidelines should be followed to determine the method and frequency of supplementary testing.

See **Annex A.13** for report format of examination and test.

## 4.10 Car overload detection warning devices

Where such a device has been fitted as required by the Lift Regulations 1997, or there is excessive car floor area in relation to rated load, or where an overload detection warning device incorporating a visual display is fitted then calibration of the device should be in accordance with the manufacturers recommendations.

Where there is documentation to demonstrate that the design is such that it degrades to a safe condition a supplementary test should not be required.

Where the satisfactory operation of the device cannot be verified the competent person may call for a supplementary test which may be repeated at one yearly intervals unless it can be demonstrated that a more or less frequent test will be adequate to ensure safety.

*Devices that measure load to provide information to the lift drive and other systems are not overload warning detection devices.*

See **Annex A.14** for report format of examination and test.

## 4.11 Hydraulic system

The integrity of the hydraulic system (cylinder, pipes, valve block) should be verified.

Where no documented evidence exists verifying the satisfactory operation of the system, consideration should be given by the competent person to calling for a supplementary test.

Thereafter, consideration should be given to calling for supplementary tests at 5 yearly intervals unless it can be demonstrated that a more or less frequent test will be adequate to ensure safety.

The test should consist of applying 200% full load static pressure for a period of 15 minutes to the hydraulic system between and including the non-return valve and the jack. The piston should be fully extended and brought up to test pressure and allowed to rest for 10 minutes. The pressure should then be observed for a further 5 minutes. For such a test to be considered successful there should be no loss of pressure greater than 10% during the final 5 minute period.

Note: In exceptional circumstances following assessment, the competent person may set a lower pressure provided it adequately assesses the integrity of the system.

See **Annex A.15** for report format of examination and test.

#### **4.11.1 Hydraulic cylinders in boreholes or similar locations**

If, by virtue of its position, it is not possible to ascertain the integrity of the cylinder by either direct or indirect examination, it should be subjected to a supplementary test. The necessity and/or frequency of the test should depend on the presence or absence of corrosion protection to the cylinder, signs of water in the pit or borehole, age of cylinder, any unusual sinking of the car or unexplained loss of fluid and the existence of other safety arresting devices such as a piston clamp.

In the event that the cylinder fails the pressure test and the cause of the failure cannot be determined, the cylinder should be examined to ascertain the cause of the problem. This may involve the removal of the cylinder from its bore hole.

See **Annex A.16** for report format of examination and test.

#### **4.11.2 Hydraulic rupture/restrictor valves**

The correct operation of rupture/restrictor valves should be verified by performing an appropriate test. Where no evidence exists verifying the satisfactory operation of the valves, consideration should be given by the competent person to calling for such a supplementary test. Thereafter, consideration should be given to calling for such supplementary tests at 5 yearly intervals unless it can be demonstrated that a more or less frequent test will be adequate to ensure safety.

As far as is possible, the verification test procedure should replicate the rupture of a hydraulic pipe.

See **Annex A.17** for report format of examination and test.

## 4.12 Anti-creep devices

### 4.12.1 Electrical anti-creep device

In order to verify that electrical anti-creep devices are in working order, a functional test of each of the devices should be undertaken at every thorough examination. Where this is not possible a supplementary test should be called for by the competent person.

See **Annex A.18** for report format of examination and test.

### 4.12.2 Mechanical anti-creep device (Pawl or clamping device)

Linkages and all moving parts of any mechanical device should be checked at every thorough examination for free and effective operation and for any signs of deterioration and wear. A rated load test of the device should be carried out at intervals to be determined by the competent person.

See **Annex A.19** for report format of examination and test.

## 4.13 Low pressure detection devices (Switch or valve)

### Low pressure switch

Any low pressure switch should be checked for satisfactory operation at every thorough examination, where this is not possible a supplementary test should be called for by the competent person.

### Low pressure valve

Any low pressure valve should be checked for satisfactory operation at every thorough examination, where this is not possible a supplementary test of the low pressure valve should be carried out to ascertain satisfactory operation. Consideration should be given to calling for such a supplementary test at one yearly intervals unless it can be demonstrated that a more or less frequent test will be adequate to ensure safety, or there is evidence to show that such tests have been carried out during routine maintenance.

See **Annex A.20** for report format of examination and test.

## 4.14 Traction, brake and levelling

If traction, brake or levelling performance is unsatisfactory then the competent person should call for supplementary tests to establish the cause.

Where the gripping components of a brake are not visible for examination and following assessment concern exists regarding performance and there is

no other means of ascertaining their condition, the parts should be exposed for examination at intervals to be determined by the competent person.

See **Annex A.21** for report format of examination and test.

#### **4.15 Car/Counterweight balance**

Where the competent person has reason to believe that the mass of the lift car has significantly changed (reline of car etc) and no documentary evidence exists verifying the continued integrity of the lift, then the competent person should call for a supplementary test of the car balance to check the integrity of the rated load safety gear, buffers, sheave shaft loading etc.

See **Annex A.22** for report format of examination and test.

# Section 5

## Annex A

The Examination and Test Certificate and Report(s) contained at **Annex A** are available in electronic format on the SAFed website [www.safed.co.uk](http://www.safed.co.uk). They are guidance on a recommended format for reporting the results of supplementary tests and are intended for use by companies and persons competent to carry out the designated supplementary tests and who are bona fide holders of this document. Such companies or persons may adjust or otherwise alter these reports for their own use and to allow for company identity and any special particulars relating to the lift, the test, the site and the company carrying out the test. However in all cases the reports must contain the data required to identify the actual lift, the site, the date and details of the test(s) carried out and the company or person carrying out the supplementary test(s). Responsibility for and ownership of the Certificate of Examination and Test(s) and of completed Report(s) lies wholly with the company or person issuing the Certificate and Report(s) and not with the Safety Assessment Federation or its agents.

Periodicities detailed within this document are for guidance only and all supplementary tests are to be carried out at the request and discretion of the competent person. The report formats address the most common lift arrangements. Where non-standard arrangements have been adopted, all examination(s) and test(s) appropriate to the equipment installed and any other test(s) instructed and detailed by the competent person should be carried out and documented.

## Annex A - COVERING CERTIFICATE AND REPORT(S) OF SUPPLEMENTARY TEST(S)

Unique report reference ID	
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### Report of examination and test(s) - Principle

The competent person should specify by reference to the specific number of the clause(s) of these Guidelines on the report of thorough examination issued to the owner of any supplementary test(s) required to determine that the lift is safe.

In cases where tests other than those specified in this document are required, the competent person should detail exactly what is required and how the test(s) should be conducted.

### Covering Certificate of examination and test(s)

Owner/Occupier of premises

---

Address

---



---

Type of lift(s) and description

---



---

Owner's Identification Number(s)

---

Manufacturer's Serial Number(s) (If known)

---

Location of lift(s)

---

*To be completed by the person or corporate body carrying out the supplementary test.*

Signed

Position

---

Print Name

---

Lift I.D. / Ref

Date

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### Reports of supplementary test(s)

The following suggested forms provide the information to be contained for the results of supplementary test(s) that have been conducted following a Thorough Examination of a Lift. Periodicities detailed within this document are for guidance only and all supplementary tests are to be carried out at the request and discretion of the competent person.

The report formats address the most common lift arrangements. Where non-standard arrangements have been adopted, all examination(s) and test(s) appropriate to the equipment installed and any other test(s) instructed and detailed by the competent person should be carried out and documented.

Reports attached: (e.g. A1, A4, A8)	
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Page 1 of (e.g. 4)	
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## Annex A.1 - EARTH CONTINUITY

### Reference clause 4.1

<b>Unique report reference ID</b>	
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*Circle as applicable*

• Is the maximum continuity resistance to the earth 0.5Ω or less?	Yes	No
• Does the earthing of the most remote landing lock contact operate a fuse or trip circuit breaker (circuit disconnect) without undue delay?	Yes	No

**If No, explain below:**

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*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
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**If Yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.2 - ELECTRIC SAFETY DEVICES

**Reference clause 4.2, but see also Annex B.1 for a non exhaustive list of safety switches**

**Unique report reference ID**

Description and location of safety device(s) being inspected/tested:

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*Circle as applicable*

• Does the switch operate satisfactorily?	Yes	No
• Is all wiring, including earth wires, properly terminated and in good condition?	Yes	No
• Can it be determined that all parts are clean, secure and free of excessive wear with no signs of burning, or physical damage?	Yes	No

**If No, explain below:**

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*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
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**If yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed

Position

Print Name

Lift I.D. / Ref

Date

## Annex A.3 - TERMINAL SPEED REDUCTION SYSTEMS

### Reference clause 4.3

<b>Unique report reference ID</b>	
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*Circle as applicable*

<ul style="list-style-type: none"><li>Does the terminal speed reduction system ensure that the lift slows down automatically to a speed not greater than the buffer design impact speed?</li></ul>	Yes	No
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**If No, explain below:**

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*Circle as applicable*

<ul style="list-style-type: none"><li>Does the result of the supplementary test(s) indicate further remedial work is necessary?</li></ul>	Yes	No
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**If Yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.4 - LANDING DOOR INTERLOCKS

### Reference clause 4.4

Unique report reference ID

*Circle as applicable*

• Do the electrical interlocks operate satisfactorily?	Yes	No
• Does the mechanical locking operate satisfactory?	Yes	No
• Is all wiring, including earth wires, properly terminated and in good condition?	Yes	No
• Are all parts clean, secure and free of excessive wear with no signs of burning or physical damage?	Yes	No

**If No, explain below:**

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*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
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**If Yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.5 - LIFT MACHINE - INVESTIGATORY TEST (TYPE A)

### Reference clause 4.5 and 4.5.1 and Annex B.3

<b>Unique report reference ID</b>	
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### Investigatory examination

Gearbox Type/Model: \_\_\_\_\_

Manufacturer: \_\_\_\_\_

Year of Manufacture: (if known) \_\_\_\_\_

Identification Number: (if known) \_\_\_\_\_

*Circle as applicable*

• Does the machine run without excessive or unexpected noise, vibration or heat?	Yes	No
• Does the machine run without excessive backlash and end float?	Yes	No
• Are gear wheel teeth markings even and approximately central of the teeth?	Yes	No
• Are gear teeth free of steps, pitting or ridges?	Yes	No
• Is gear oil clean and free of any metal particles?	Yes	No
• Are all rim bolts and shaft keys present and secure?	Yes	No
• Are all bearings and shafts running without signs of excessive or unexpected heat, noise or vibration?	Yes	No
• For screw and nut drives is the wear on the load nut and any chain extension within acceptable limits?	Yes	No
• Is the gearbox in a satisfactory condition? (If no, then detailed reasons to be given)	Yes	No

### If No, explain below:

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(See A.5 Continuation sheet)

**Annex A.5 - CONTINUATION SHEET**

Unique report reference ID

*Circle as applicable*

• Is there any reason why a more detailed examination 'type B' is required?	Yes	No
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**If Yes, explain below:**


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*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
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**If Yes, state your recommendation(s) for further action required:**


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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed

Position

Print Name

Lift I.D. / Ref

Date

## Annex A.6 - LIFT MACHINE - COMPREHENSIVE TEST (TYPE B)

### Reference clause 4.5 and 4.5.2 and Annex B.3

<b>Unique report reference ID</b>	
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### Comprehensive examination

Gearbox Type/Model: \_\_\_\_\_

Manufacturer: \_\_\_\_\_

Year of Manufacture: (if known) \_\_\_\_\_

Identification Number: (if known) \_\_\_\_\_

*Circle as applicable*

• Does the machine run free from excessive or unexpected noise, vibration or heat?	Yes	No
• Are gear wheel teeth markings even and approximately central of the teeth?	Yes	No
• Are gear teeth free of steps, pitting or ridges?	Yes	No
• Is gear oil clean and free of any metal particles?	Yes	No
• Are all rim bolts and shaft keys present and secure?	Yes	No
• Are all bearings and shafts running with no signs of excessive or unexpected heat, noise or vibration?	Yes	No
• Is the gearbox in satisfactory condition?	Yes	No

### If No, explain below:

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(See A.6 Continuation sheet)

## Annex A.6 - CONTINUATION SHEET - 1

Unique report reference ID

The following dimensions are to be measured and recorded:

### Crown wheel and worm

*Complete as appropriate*

*Circle as applicable*

• Backlash: Measured	mm	Satisfactory?	Yes	No
• Backlash: Measured	mm	Satisfactory?	Yes	No

*State your comments and observations on Continuation Sheet - 2*

### Gearbox, plain shafts & bearings

Shaft/Bearing Location:

Bearing running clearance mm:


- Provide details of any non destructive testing

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- Details and result of any oil analysis

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- Details of any other tests performed

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*(See A.6 Continuation sheet)*



## Annex A.6 - CONTINUATION SHEET - 2

Unique report reference ID	
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### Comments and observations:

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*Circle as applicable*

<ul style="list-style-type: none"><li>Does the result of the supplementary test(s) indicate further remedial work is necessary?</li></ul>	Yes	No
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### If Yes, state your recommendation(s) for further action required:

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.7 - OVERSPEED GOVERNORS

### Reference clause 4.6 and 4.6.1

Unique report reference ID

Date of last recorded dynamic test if known: \_\_\_\_\_

*Tick as appropriate*

Indicate Car or Counterweight

Car	<input type="checkbox"/>
-----	--------------------------

Counterweight	<input type="checkbox"/>
---------------	--------------------------

Governor type: \_\_\_\_\_

Serial number: \_\_\_\_\_

*Circle as applicable*

• Does the overspeed governor have a permanent label indicating the tripping speeds?	Yes	No
• Is the overspeed governor calibration correct for the contract speed of the lift and safety gear?	Yes	No
• Does the pull through force of the governor effectively engage the safety gear against the guide rails?	Yes	No

**If No, explain below:**

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*Complete as appropriate*

	Tripping speed		
	Marked	Measured	
		Car up	Car down
<b>Electrical 1:</b>		m/s	m/s
<b>Electrical 2:</b>		m/s	m/s
<b>Mechanical:</b>	m/s		m/s

**Comments and observations:**

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(See A.7 Continuation sheet)

## Annex A.7 - CONTINUATION SHEET

Unique report reference ID	
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*Circle as applicable*

<ul style="list-style-type: none"><li>Does the result of the supplementary test(s) indicate further remedial work is necessary?</li></ul>	Yes	No
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**If Yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.8 - GOVERNOR OPERATED SAFETY GEAR INSTANTANEOUS TYPE

### Reference clause 4.6 and 4.6.2

Unique report reference ID

*Tick as appropriate*

Indicate Car or Counterweight

Car	<input type="checkbox"/>
-----	--------------------------

Counterweight	<input type="checkbox"/>
---------------	--------------------------

Safety gear type and/or reference:

---

*Circle as applicable*

• Are all linkages and moving parts free of any defects, deterioration or wear that may prevent their free and effective operation?	Yes	No
• Are the surfaces of any friction elements free of any abnormal or excessive wear that may prevent free and effective operation of the safety gear system?	Yes	No
• Does the safety gear mechanism move freely and engage the guide rails satisfactorily?	Yes	No

**If No, explain below:**

---



---

### Dynamic test conditions (where appropriate)

*Complete as appropriate*

• Load in car?	kg
• Speed at activation?	m/s

**Comments and observations:**

---



---

*Circle as applicable*

• Did the safety gear operate and stop the car as required?	Yes	No
---	-----	----

**If No, explain below:**

---



---

(See A.8 Continuation sheet)

## Annex A.8 - GOVERNOR OPERATED SAFETY GEAR INSTANTANEOUS TYPE (CONTINUED)

### Reference clause 4.6 and 4.6.2

<b>Unique report reference ID</b>	
-----------------------------------	--

*Circle as applicable*

<ul style="list-style-type: none"><li>Does the result of the supplementary test(s) indicate further remedial work is necessary?</li></ul>	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

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---

*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.9 - GOVERNOR OPERATED SAFETY GEAR PROGRESSIVE TYPE

### Reference clause 4.6, 4.6.3 and Annex B.4

Unique report reference ID

*Tick as appropriate*

Indicate Car or Counterweight

Car

Counterweight

Safety gear type and/or reference:

*Circle as applicable*

• Are all linkages and moving parts free of any defects, deterioration or wear that may prevent their free and effective operation?	Yes	No
• Are the surfaces of any friction elements free of any abnormal or excessive wear that may prevent free and effective operation of the safety gear system?	Yes	No
• Does the safety gear mechanism move freely and engage the guide rails satisfactorily?	Yes	No

**If No, explain below:**

---



---



---

### Dynamic test conditions (where appropriate)

*Complete as appropriate*

• Load in car?	kg
• Speed at activation?	m/s

*Circle as applicable*

• Did the safety gear operate and stop the car as required?	Yes	No
---	-----	----

**If No, explain below:**

---



---



---

*Complete as appropriate*

• What was the slide distance of the safety gear?	mm
---	----

(See A.9 Continuation sheet)

## Annex A.9 - CONTINUATION SHEET

<b>Unique report reference ID</b>	
-----------------------------------	--

*Circle as applicable*

<ul style="list-style-type: none"><li>• Does the result of the supplementary test(s) indicate further remedial work is necessary?</li></ul>	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

---

---

---

---

*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.10 - SAFETY GEAR OPERATED BY OTHER MEANS

### Reference clause 4.6 and 4.6.4

Unique report reference ID

*Tick as appropriate*

Indicate Car or Counterweight

Car

Counterweight

Safety gear type and/or reference:

*Circle as applicable*

• Are all linkages and moving parts free of any defects, deterioration or wear that may prevent their free and effective operation?	Yes	No
• Are the surfaces of any friction elements free of any abnormal or excessive wear that may prevent free and effective operation of the safety gear system?	Yes	No
• Does the safety gear mechanism move freely and engage the guide rails satisfactorily?	Yes	No

If No, explain below:

---



---

### Dynamic test conditions (where appropriate)

*Complete as appropriate*

• Load in car?	kg
• Speed at activation?	m/s

How was the safety gear activated?

---



---

(See A.10 Continuation sheet)



## Annex A.10 - CONTINUATION SHEET

<b>Unique report reference ID</b>	
-----------------------------------	--

*Complete as appropriate*

• State the stopping distance (Progressive types only)	mm
--	----

*Circle as applicable*

• Does the safety gear stop the car or counterweight in the downward direction during dynamic testing?	Yes	N/A*	No
• Was the floor of the lift car sloping less than 5° to the horizontal after the safety gear has activated and before it is released?	Yes	N/A*	No
• After the test, confirm that no deterioration has occurred that could adversely affect the safety of the lift and correct operation of the safety gear system.	Yes	N/A*	No

\* Some safety gear systems (slack rope type) may not be possible to operate. In such circumstances indicate above that a dynamic test has not been made and describe below in detail what has been inspected, the condition of the device, the probability of successful operation and why it could not be operated.

**If No, explain below:**

---



---

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.11 - DEVICES TO PREVENT OVERSPEED OF THE ASCENDING LIFT CAR

### Reference clause 4.7

Unique report reference ID

Date of last recorded dynamic test: (If known)

Device type and/or reference:

*Circle as applicable*

• Are all linkages and moving parts free of any defects, deterioration or wear that may prevent their free and effective operation?	Yes	No
• Are the surfaces of any friction elements free of any abnormal or excessive wear that may prevent free and effective operation of the braking device?	Yes	No
• Does the device mechanism move freely and engage the ropes or pulley etc. satisfactorily?	Yes	No
• Does the device operate satisfactorily during dynamic testing?	Yes	No
• After the test, confirm that no deterioration has occurred that could adversely affect the safety of the lift and correct operation of the system.	Yes	No

**If No, explain below:**

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*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed

Position

Print Name

Lift I.D. / Ref

Date

## Annex A.12 - ENERGY DISSIPATION BUFFERS

### Reference clause 4.8

<b>Unique report reference ID</b>	
-----------------------------------	--

#### For buffers without return switch

*Circle as applicable*

• After compression does the piston return to its fully extended position within 15 minutes?	Yes	No
--	-----	----

#### For all buffers

*Circle as applicable*

• Does the buffer compress when the car is moved down onto it?	Yes	No
• After compression does the piston return to its fully extended position?	Yes	No

#### If No, explain below:

---



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---

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

#### If Yes, state your recommendation(s) for further action required:

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.13 - SUSPENSION SYSTEM

### Reference clause 4.9

<b>Unique report reference ID</b>	
-----------------------------------	--

- Describe suspension means (synthetic ropes, flat belts etc.)

---



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---

- State your observations from visual inspection of suspension means and anchorages

---



---



---

*Circle as applicable*

- |   |     |    |
|---|-----|----|
| <ul style="list-style-type: none"> <li>• Are all suspension ropes/chains/belts free from signs of wear or damage that may prevent their continued use until the next Thorough Examination?</li> </ul> | Yes | No |
|---|-----|----|

**If No, explain below:**

---



---



---

*Circle as applicable*

- |   |     |    |
|---|-----|----|
| <ul style="list-style-type: none"> <li>• Does the result of the supplementary test(s) indicate further remedial work is necessary?</li> </ul> | Yes | No |
|---|-----|----|

**If Yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_

Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_

Date \_\_\_\_\_

## Annex A.14 - CAR OVERLOAD DETECTION WARNING DEVICES

### Reference clause 4.10

Unique report reference ID	
----------------------------	--

Date of last recorded test: (If known) \_\_\_\_\_

State method of test

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Circle as applicable*

• Does the over load device and its car indicator operate correctly to prevent use of the lift?	Yes	No
• Is the load at which it is set or calibrated satisfactory to prevent overloading?	Yes	No

#### If No, explain below:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

#### If Yes, state your recommendation(s) for further action required:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.15 - HYDRAULIC SYSTEM

### Reference clause 4.11

<b>Unique report reference ID</b>	
-----------------------------------	--

*Complete as appropriate or circle as applicable*

• State the full load static pressure. Measured or calculated	Bar	
• Is the pressure test as described in 4.11 satisfactory?	Yes	No
• State pressure drop (if applicable)	Bar	
• Is this pressure drop acceptable?	Yes	No
• After the above test, is the integrity of the hydraulic system maintained?	Yes	No
• Does the pressure relief valve operate satisfactorily?	Yes	No

**If No, explain below:**

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---

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed

Position

Print Name

Lift I.D. / Ref

Date

## Annex A.16 - HYDRAULIC CYLINDERS IN BOREHOLES OR SIMILAR LOCATIONS

### Reference clause 4.11.1

<b>Unique report reference ID</b>	
-----------------------------------	--

*Complete as appropriate or circle as applicable*

• State the full load static pressure. Measured or calculated	Bar	
• Is there evidence of any significant pressure drop or leakage?	Yes	No

**If Yes, explain below:**

---



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---

*Complete as appropriate or circle as applicable*

• State pressure drop (if applicable)	Bar	
• Is this pressure drop acceptable?	Yes	No
• After the above test, is the integrity of the hydraulic system maintained?	Yes	No

**If No, explain below:**

---



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---

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.17 - HYDRAULIC RUPTURE/ RESTRICTOR VALVES

### Reference clause 4.11.2

Unique report reference ID	
----------------------------	--

State method of test

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*Circle as applicable*

• Does the rupture/restrictor valve operate correctly?	Yes	No
--	-----	----

Note: A restrictor valve should lower the car at a speed not exceeding 0.3m/s

**If No, explain below:**

---



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---

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

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*To be completed by the person or corporate body carrying out the supplementary test.*

Signed

Position

Print Name

Lift I.D. / Ref

Date



## Annex A.18 - ELECTRICAL ANTI-CREEP DEVICE

### Reference clause 4.12 and 4.12.1

<b>Unique report reference ID</b>	
-----------------------------------	--

State method of test

---



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*Circle as applicable*

• Does the anti-creep device operate satisfactorily within the unlocking zone at each floor?	Yes	No
• Does the anti-creep device operate both when the car and landing doors are open and when they are closed at each floor?	Yes	No

**If No, explain below:**

---



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---

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

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---

*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.19 - MECHANICAL ANTI-CREEP DEVICE (PAWL OR CLAMPING DEVICE)

### Reference clause 4.12 and 4.12.2

Unique report reference ID	
----------------------------	--

State method of test

---



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*Circle as applicable*

• Are all linkages and moving parts free of any defects, deterioration or wear that may prevent their free and effective operation?	Yes	No
• Are the surfaces of any friction elements free of any abnormal or excessive wear that may prevent free and effective operation of the braking device?	Yes	No
• Are the contact surfaces of any engaging components correctly aligned, in good condition and free of any abnormal or excessive wear that may prevent free and effective engagement?	Yes	No
• Does the device mechanism move freely and engage satisfactorily with full load in the lift car?	Yes	No

**If No, explain below:**

---



---

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

---



---

*To be completed by the person or corporate body carrying out the supplementary test.*

Signed

Position

Print Name

Lift I.D. / Ref

Date

## Annex A.20 - LOW PRESSURE DETECTION DEVICES (SWITCH OR VALVE)

### Reference clause 4.13

Unique report reference ID	
----------------------------	--

State method of test

---

---

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*Circle as applicable*

• Does the low pressure detection operate satisfactorily?	Yes	No
---	-----	----

**If No, explain below:**

---

---

---

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

---

---

---

*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

## Annex A.21 - TRACTION, BRAKE AND LEVELLING

### Reference clause 4.14

Unique report reference ID

Date of last recorded test: (If known)

*Circle as applicable*

• Are all gripping components within the brake in a satisfactory condition?	Yes	No
• Does the brake stop the empty lift car travelling in the upward direction, without loss of traction or excessive slide in the upper part of the lift well?	Yes	No

**If No, explain below:**

---



---



---

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

**If Yes, state your recommendation(s) for further action required:**

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---

*To be completed by the person or corporate body carrying out the supplementary test.*

Signed

Position

Print Name

Lift I.D. / Ref

Date

## Annex A.22 - CAR/COUNTERWEIGHT BALANCE

### Reference clause 4.15

Unique report reference ID	
----------------------------	--

Date of last recorded test: (If known) \_\_\_\_\_

*Complete as applicable*

• State the overbalance percentage as found		%
---	--	---

### State the method of determining the overbalance.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*Circle as applicable*

• Is the mass of the counterweight correct in relation to the weight of the car?	Yes	No
--	-----	----

### If No, explain below:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*Circle as applicable*

• Does the result of the supplementary test(s) indicate further remedial work is necessary?	Yes	No
---	-----	----

### If Yes, state your recommendation(s) for further action required:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*To be completed by the person or corporate body carrying out the supplementary test.*

Signed \_\_\_\_\_ Position \_\_\_\_\_

Print Name \_\_\_\_\_

Lift I.D. / Ref \_\_\_\_\_ Date \_\_\_\_\_

# Section 6

## Annex B

SAFed

## ANNEX B (INFORMATIVE) - TECHNICAL INFORMATION

Annex B is intended to provide the competent person with additional technical information in the assessment of the need for supplementary tests.

- Electrical safety devices
- Guide to reduced stroke buffering
- Machine system components
- Developments in British Standards for the requirements of safety gear tests
- Suspension systems
- Suspension chains
- Hydraulic systems

### B.1 Electrical safety devices

Electrical safety devices include:

- Main isolator circuit breaker control switch
- Removable hand-winding wheel switch
- Overspeed governor switch
- Overspeed governor re-set switch
- Ascending car overspeed switch
- Slack rope/chain switch (positive drive lift)
- Stop switch in pulley room
- Landing door locks
- Slave door contacts
- Inspection and/or emergency door interlocks
- Car door contact switch
- Car door lock
- Car docking operation stop switch
- Car emergency door/trap door interlock
- Stop switch(es) on car top
- Suspension rope/chain tension equalising device switch
- Safety gear switch
- Stop switch in pit
- Switch on compensating sheave
- Switch on anti-rebound device
- Overspeed governor rope tension switch
- Buffer return switch (energy dissipation type)
- Reduced stroke buffer switch
- Final limit switches
- Proving device for slowdown
- Levelling/re-levelling limit switches
- Docking operation limit switch
- Car overload detection warning

## B.2 Guide to reduced stroke buffering

Some lifts with speeds of 2.5m/s or greater have buffers provided where the stroke is less than that normally required to stop the lifts at a rate of deceleration of less than  $1g_n$  (9.81m/s<sup>2</sup>). Where these reduced stroke buffers are provided the lift should also have a feature that ensures it can not impact the buffer at a speed greater than that for which it is designed. This feature may be referred to as Terminal Speed Reduction or Reduced Stroke Buffering.

It is not always evident that this feature is provided but if the overspeed governor contract speed is greater than the maximum impact speed of the buffer or the impact length of the buffer stroke is less than **Table 1**, such a feature should have been provided and its operation should therefore be checked.

Table 1 - LENGTH OF BUFFER STROKE	
Lift speed (m/s)	Stroke (mm)
2.5	≥420
3.0	≥606
3.5	≥825
4.0	≥1078
4.5	≥1360
5.0	≥1680
6.0	≥2420

## B.3 Machine system components

### B.3.1 Shafts and bearings

The objective to be met when inspecting plain shafts and bearings of any age is to determine if a critical failure is likely to occur in the foreseeable future.

The dismantling of shafts and bearings is not to be undertaken lightly as such intrusive inspections can create more problems and risks than they resolve. It may however be necessary in cases where other less intrusive inspections indicate there is cause for concern. In such cases a more detailed inspection is essential.



### **B.3.2 Roller, ball and needle bearings**

Exposure of these types of bearing for examination should be undertaken only when evidence obtained from other methods of examination indicates that a more detailed assessment is required. If the above examinations indicate problems may exist a further more detailed examination should be carried out by a specialist.

The results of the investigatory examination should be documented as shown at **Annex A.5**. The report should also advise if and when a similar investigatory examination should be repeated or whether a comprehensive examination is required, as shown in **Annex A.6** and the reasons for it.

### **B.3.3 Traction sheaves, bearings and pulleys**

It may be considered appropriate at the time of the supplementary test of the gearbox to carry out checks on the condition of pulleys, bearings, traction sheaves, diverter and suspension pulleys whilst the load has been removed from the drive system.

Suitable non-destructive testing or examination of areas subject to high stress loadings (e.g. shouldered shafts and keyways) should be undertaken; alignment checks may also be necessary.

## B.4 Developments in British Standards of the requirements for safety gear tests

Table 2 - DEVELOPMENTS IN BRITISH STANDARDS OF THE REQUIREMENTS FOR SAFETY GEAR TESTS			
Standard	Summary of design	Summary of test	Comment
<b>BS 2655-1 1958</b>	Safety gear to stop and hold car with 100% load at governor tripping speed or at failure of suspension	<ul style="list-style-type: none"> <li>• Test at site with full load at governor tripping speed</li> <li>• All electrical switches except governor switch operating</li> <li>• Check guide slide marks</li> </ul>	<ul style="list-style-type: none"> <li>• Instantaneous type safety gears used up to 160 fpm</li> <li>• Governor trip speed not to exceed 200 fpm</li> <li>• Governor trip speeds and safety gear slide distance defined in graphs</li> </ul>
<b>BS 2655-1 1970</b>	Safety gear to stop and hold car with 100% load at governor tripping speed or at failure of suspension	<ul style="list-style-type: none"> <li>• Testing not defined in BS2655 part 1 but in BS2655 part 7 Testing</li> <li>• Test at site with full load at contract speed</li> </ul>	<ul style="list-style-type: none"> <li>• Instantaneous type safety gears up to 150 fpm</li> <li>• Governor trip speed not to exceed 200 fpm</li> </ul>
<b>BS 5655-1 1979</b>	Safety gear to stop and hold car with 100% load at governor tripping speed or at failure of suspension	<ul style="list-style-type: none"> <li>• Instantaneous type or instantaneous with buffered effect test with full load at rated speed</li> <li>• Progressive types, test with 125% load at levelling speed</li> </ul>	<ul style="list-style-type: none"> <li>• Instantaneous type safety gears up to 0.63m/s</li> <li>• Instantaneous with buffered effect up to 1m/s</li> <li>• Governor trip speed not to exceed 200 fpm</li> </ul>
<b>BS 5655-1 1986</b>	Safety gear to stop and hold car with 100% load at governor tripping speed or at failure of suspension	<ul style="list-style-type: none"> <li>• Instantaneous type or instantaneous with buffered effect test with full load at rated speed</li> <li>• BS5655 part 10 1986 addressed testing and required the following:               <ol style="list-style-type: none"> <li>1 Instantaneous full load at rated speed</li> <li>2 Progressive with type test, 125% load at levelling speed.</li> <li>3 Progressive without type test, full load at governor tripping speed</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>• Instantaneous type safety gears up to 0.63m/s</li> <li>• Instantaneous with buffered effect up to 1m/s</li> </ul>
<b>BS EN 81 1998</b>	Safety gear to stop and hold car with 100% load at governor tripping speed or at failure of suspension	<ul style="list-style-type: none"> <li>• Instantaneous type or instantaneous with buffered effect test with full load at rated speed</li> <li>• Progressive types test with 125% load at rated speed or at levelling speed</li> <li>• British Standard PAS 32 addresses testing and requires the following:               <ol style="list-style-type: none"> <li>1 Instantaneous full load at rated speed</li> <li>2 Progressive with type test, 125% load at levelling speed</li> </ol> </li> </ul>	

## B.5 Suspension system data

### B.5.1 Suspension ropes

All factors affecting rope condition should be taken into account and the competent person should decide the degree of wear that can be tolerated and the stage at which replacement becomes necessary.

Typical factors creating visible change in any suspension rope condition include:

- the number of broken wires and their position
- surface wear
- inequality in rope tension
- excessive stretching<sup>8</sup>
- inequality in diameter
- external evidence of internal conditions e.g. corrosion.

The following concerning the state and replacement of ropes should also be noted:

- Severely corroded ropes cannot be restored to serviceable condition by a belated application of lubricant.
- When replacement of a suspension rope is necessary, all the suspension ropes of that lift must be renewed together.
- The latest date for replacement should be specified on any report of thorough examination.

In the absence of any national regulations or instruction from the original equipment manufacturer, the following is a general guide to discard.

In the case of ropes operating in sheaves other than cast iron or steel, the competent person should be aware of the possibility of more advanced internal deterioration occurring than that which might be visually obvious from the outside.

<sup>8</sup> An indication of excessive rope stretch can be gained from suitable monitoring of counterweight bottom over-run dimensions

**B.5.1.1 Broken wires**

Broken wires are normally the result of progressive deterioration due to fatigue and wear.

**Table 3** indicates the number of visible broken wires in the worst section of a single layer rope with a fibre core within the set at which replacement or next examination should take place within a specified period and at which replacement should take place immediately. The values apply to suspension ropes, governor ropes and compensating ropes.

For other types of ropes, guidance on the number of allowable visible broken wires should be provided by the rope manufacturer.

**Table 3 - NUMBER OF VISIBLE BROKEN WIRES - SINGLE LAYER ROPES WITH FIBRE CORES OPERATING IN CAST IRON OR STEEL SHEAVES**

Condition	Replace ropes or examine within a specified period as stated by the competent person		Discard ropes immediately	
	Class 6 x 19 FC	Class 8 x 19 FC	Class 6 x 19 FC	Class 8 x 19 FC
Broken wires randomly distributed among the outer strands	More than 12 per rope lay*	More than 15 per rope lay*	More than 24 per rope lay*	More than 30 per rope lay*
Broken wires predominating in one or two outer strands	More than 6 per rope lay*	More than 8 per rope lay*	More than 8 per rope lay*	More than 10 per rope lay*
Adjacent broken wires in one outer strand	4	4	More than 4	More than 4
Valley breaks	1 per rope lay*	1 per rope lay*	More than 1 per rope lay*	More than 1 per rope lay*
* The length of one rope lay is approximately equivalent to $6 \times d$ (where $d$ is the nominal rope diameter).				

### *B.5.1.2 Wear and age*

Factors to which particular attention should be paid, taking account of site conditions and type of drive, include diametric reduction, rope life and other unusual features indicating the possibility of failure.

#### *B.5.1.2.1 Diametric reduction*

In the case of traction drives with 'U', 'V' or undercut grooves, a reduction of more than 6% on the nominal diameter of the rope is a guide for rejection on the grounds of reduced rope strength.

In other instances, when 6 and 8 strand ropes are working over metal pulleys, a reduction of more than 10% of the nominal diameter of the rope is a guide for rejection.

#### *B.5.1.2.2 Rope life*

Although the life of a suspension rope depends on many factors, in general the greatest factors affecting rope life are:

- the number of bends made by the rope and
- the radius of such bends.

The following factors should also be noted:

- Particular attention is required for ropes on installations having a pulley/rope diameter ratio less than 40:1.
- Uneven wear on traction sheaves may result in rope slip and tension differences in the ropes.
- Any twisting of ropes resulting from poor installation or absence of restraint to twisting of anchorage points, may result in accelerated wear of ropes and/or sheaves.

It should be appreciated that no definitive guide as to the life of a suspension rope can be given, but particular care should be exercised where the ropes are more than ten years old or where the lift has a history of short rope life.

When ropes are replaced, the date of replacement should be recorded and be readily accessible to the competent person.

#### *B.5.1.2.3 Unusual features*

Unusual features, indicating the possibility of failure, may be present; e.g.

- ropes exuding a red dust or rouge
- a local reduction in diameter
- displaced strands
- unstable form
- localised indentation

In such cases replacement should be considered.

### **B.5.2 Lubrication**

Lubricants, applied during rope manufacture to provide corrosion protection, are usually adequate for initial in-use service.

A slightly oily deposit on the rope sheave grooves is a good indication of the correct degree of lubrication; inadequate or excessive lubrication is to be avoided. (The latter may cause slip between rope and traction sheaves to occur).

Factors that can affect rope lubrication include:

- a hostile environment causing 'drying out'
- an inner core that retains corrosive elements and causes internal corrosion (This may be indicated by excessive rope stretch)

Other factors include:

- Where there is evidence of corrosion the original lubricant may prove to be inadequate and it may be necessary to dress the rope with an approved non-acid lubricant to inhibit corrosion.
- Care should be taken where ropes have man-made fibre inner cores as their ability to retain the initial dressing differs from ropes with natural fibre cores.

### **B.5.3 Suspension rope terminations**

Suspension rope terminations or anchorages should be fitted in accordance with the manufacturer's instructions and should comply with an appropriate British, European or other recognised Standard that provides equivalent strength.

At every thorough examination suspension rope terminations should be closely examined for signs of movement, fracturing, deterioration or wear and broken wires.

## B.6 Suspension chains

### B.6.1 Wear and age

Assessment of the wear and age of suspension chains should include the examination of round link chains, plate link chains, sprocket or chain wheels and the identification and measurement of most worn chain section.

#### *B.6.1.1 Round link chains*

It is particularly important to examine round link chains at the points where wear due to contact with the chain wheel may occur i.e.:

- at the point of contact between adjacent links and
- at the crown of the links

#### *B.6.1.2 Plate link chains*

Plate link chains and bushed roller chains should be examined for:

- cracked or missing link plates
- loose or worn pins with damaged heads
- evidence of pitting due to rust or corrosion - particularly on the outer faces of link plates
- pins rotating in the outer plates
- loss of free movement (stiff chain)
- wear on link plate edges i.e. that caused by running over the pulleys. Any reduction due to wear of link plate edge should not exceed 5% of the original dimension. Replacement of mating sprockets and/or pulleys should also be considered when replacing the chains
- anchor pin locking device damaged or missing
- wear and corrosion of the anchor pin and anchor
- wear between pins and plates and/or associated components, or stretching. Before measuring chain extension it is essential that the chain is loaded
- confirmation that no joints are included in the loaded section of the suspension chain

#### *B.6.1.3 Sprocket or chain wheels*

The sprocket or chain wheel should also be examined for wear.

#### *B.6.1.4 Identification and measurements of most worn chain section*

The most worn section of the chain should be identified and measurements made over a minimum of ten pitches in at least three locations. The maximum measured extension over the nominal length, as specified or as measured on an unworn section of the chain, should not exceed the manufacturer's recommended figure. Where no such guidance is given, a figure of up to 3% should be used.

### **B.6.2 Replacement**

When replacement of one chain is necessary, all chains on that lift must be renewed. The maximum allowable face wear in respect of plate link chain is 5%. Replacement of mating sprockets and/or pulleys should also be considered when replacing the chains. Only chains, anchorages and anchorage pins as specified by the original lift manufacturer, or those manufactured to an equivalent specification, should be fitted. If any of the other defects identified above are found, the severity of the defect and the normal conditions in which use is envisaged, will be used by the competent person to determine whether renewal of the chain is required.

### **B.6.3 Lubrication**

At intervals recommended by the lift manufacturer/installer and with the chain in-situ in a slack condition, chains, anchors and pins should be lubricated. It should be confirmed that only lubricants approved by the lift manufacturer/installer are being used. In a hostile environment, special lubricants may be required; these should be agreed with the lift manufacturer/installer and the chain manufacturer.

## **B.7 Hydraulic systems**

The purpose of pressure testing hydraulic buried cylinders at frequent intervals is to establish a history of the cylinder that will enable any change in its performance to be observed. The test may be made by pressurising the cylinder directly at the cylinder or by pressurising the system between the valve block and the cylinder.



## B.8 History of British Standards requirements for pressure testing of hydraulic lift systems

**Table 4** gives the history of British Standards requirements for pressure testing of hydraulic lift systems.

<b>Table 4 - HISTORY OF BRITISH STANDARDS REQUIREMENTS FOR PRESSURE TESTING OF HYDRAULIC LIFT SYSTEMS</b>		
<b>Standard</b>	<b>Summary of requirements for design of cylinder/piston. (design pressure)</b>	<b>Requirements for test</b>
<b>BS 2655 pre 1970</b>	None	None
<b>BS 2655 1970</b>	Cylinders rams, valves and pipes to withstand 2 x max normal operating pressure	No test was defined in the standard as it was assumed that if correctly designed the system would withstand twice the pressure under test
<b>BS 5655-2 1983</b>	Cylinders rams, valves and pipes to withstand 2 x max normal operating pressure	No test was defined in the standard as it was assumed that if correctly designed the system would withstand twice the pressure under test
<b>BS 5655-2 1988</b>	Proof test based on 2.3 x full load pressure with a safety factor of 1.7	Annex D called for 200% full load static pressure test BS 5655 part 10 1986 called for 200% full load static pressure test
<b>BS EN 81-2 1998</b>	Proof test based on 2.3 x full load pressure with a safety factor of 1.7	Annex D called for 200% full load static pressure test PAS 32 calls for 200% full load static pressure test

## B.9 Non-destructive testing

During thorough examination of a hoist's structure and mechanism, it may be appropriate to use certain non-destructive testing (NDT) techniques to assess the integrity of components. These techniques can assist in the detection of cracks or wear that might grow in service and ultimately lead to failure.

NDT techniques should only be carried out by adequately trained and experienced persons who should be briefed on the purpose and extent of the NDT examination required, for example, the typical locations and type of defect anticipated.

Guidance on the qualifications and certification of persons undertaking NDT is given in BS EN 473: 2000: Non-destructive testing - Qualification and certification of NDT personnel - General principles.

The three most common types of NDT used for in-service inspections of hoists are:

- ultrasonic examination
- dye penetrant
- magnetic particle examination.

For further information on these types of NDT, HSE has published:

- Best practice for the procurement and conduct of non-destructive testing
- Part 1 - Manual ultrasonic inspection
- Part 2 - Magnetic particle and dye penetrant inspection

Useful links can be found on the HSE internet site:-

[www.hse.gov.uk](http://www.hse.gov.uk)

# Section 7

## Annex C

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## ANNEX C - REVIEW COMMITTEE

BAA PLC

Carillion PLC

Chartered Institute of Building Service Engineers (CIBSE)

City of Westminster

Health and Safety Executive (HSE)

Independent National Inspection and Testing Association (INITA)

Lift and Escalator Industry Association (LEIA)

Lift Forum

Safety Assessment Federation (SAFed)

Transport for London (London Underground)

The Review Committee would particularly like to recognise the contribution of the late Mr Richard Morgan, Technical Director SAFed 1995 - 2004, under whose direction the first Guidelines document was published in 1998 and who initiated this revision.

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# Section 8

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- (4) L113, Lifting Operations and Lifting Equipment Regulations 1998 - Approved Code of Practice.
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- (6) IND (G) 339, Thorough examination and testing of lifts - Simple guidance for lift owners.

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