

Lifts and service lifts —

Part 10: Specification for the testing and inspection of electric and hydraulic lifts

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Foreword

This Part of BS 5655, prepared under the direction of the Mechanical Handling Standards Committee, revises and replaces BS 2655-7:1970 which has been rendered obsolescent.

This Part of BS 5655 was originally applicable to the commissioning tests for, and periodic examination of, new and modified electric and hydraulic lifts covered by BS 5655-1, BS 5655-2 and BS 5655-11. A major revision of Part 10 has been initiated to progressively replace elements of this edition, which will eventually be withdrawn. This edition is now applicable only to:

- a) the commissioning tests for modified electric and hydraulic lifts covered by BS 5655-11 and BS 5655-12; and
- b) the periodic examination of electric and hydraulic lifts covered by BS 5655-1 and BS 5655-2.

The applicable standards for the commissioning tests for new electric and hydraulic lifts covered by BS 5655-1 and BS 5655-2 are BS 5655-10.1.1:1995 and BS 5655-10.2.1:1995. The complete standard will consist of the following Parts.

- *Part 1: Safety rules for the construction and installation of electric lifts¹⁾*;
- *Part 2: Specification for hydraulic lifts*;
- *Part 3¹⁾*
- *Part 4¹⁾*
- *Part 5: Specification for dimensions of standard electric lift arrangements*;
- *Part 6: Code of practice for selection and installation*;
- *Part 7: Specification for manual control devices, indicators and additional fittings*;
- *Part 8: Specification for eyebolts for lift suspension*;
- *Part 9: Specification for guide rails*;
- *Part 10: Specification for the testing and inspection of electric and hydraulic lifts*;
- *Part 11: Specification for modernization and re-construction²⁾*.

Further Parts are anticipated.

This Part is applicable to electric and hydraulic lifts manufactured and installed in accordance with BS 5655-1, BS 5655-2 and BS 5655-11²⁾. Lifts manufactured in accordance with BS 2655 should continue to be tested and inspected in accordance with obsolescent standard BS 2655-7:1970.

Copyright is waived by BSI in respect of Table 1, Table 2, Table 3, Table 4 and Table 7. Enquiries concerning bulk printed supplies of the forms in these tables should be addressed to BSI Sales Department, Linford Wood, Milton Keynes, MK14 6LO.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 42, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ Reserved for future publications

²⁾ In preparation.

1 Scope

This part of BS 5665 specifies requirements for:

- a) the commissioning tests for modified equipment covered by BS 5655-11 and BS 5655-12; and
- b) the periodic examination of equipment covered by BS 5655-1 and BS 5655-2.

It also supplements the requirements of Appendix D of BS 5655-1:1986, which are identified by *italic type*.

The types of certificate showing compliance with BS 5655 are included, and cover construction, certain aspects of performance, and contract data. Evidence of test certificates relating to certain components of the equipment is also specified.

Additional recommendations for the testing of progressive safety gears which have not been type tested in accordance with BS 5655-1 are given in Appendix D and Appendix E.

NOTE 1 Guidance on testing and inspection is given in section 2 of BS 5655-6.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Test and examination

NOTE All test weights, test equipment, instruments and personnel needed to complete the testing and inspection after installation should be provided by the lift contractor. A power supply at the declared voltage and frequency, for test and adjustment purposes, should be provided by the purchaser.

2.1 Test and examination after installation

2.1.1 The performance of certain tests, as required to complete the appropriate test and examination certificate (see **2.1.2**), shall be undertaken for every installation before it is put into normal service, i.e. at the time of commissioning. The installation shall be tested in accordance with the requirements of clauses 4 and 5. In addition, a thorough inspection of the entire equipment shall be undertaken at this stage, and the appropriate certificate shall be completed in all respects.

2.1.2 The form of the appropriate test and examination certificate referred to in **2.1.1** shall be as follows.

- a) Electric lifts
for passengers and goods Appendix A, Table 1.
- b) Hydraulic lifts
for passengers and goods Appendix B, Table 3.

2.2 Periodic examination

2.2.1 Every installation shall be examined within six months of commissioning, and thereafter at intervals not exceeding six months, the examinations being adequate to complete the appropriate certificate (see **2.2.2**) in all respects.

2.2.2 For both types of equipment the form of the appropriate examination certificate referred to in **2.2.1** shall be as shown in Appendix C.

2.3 Component testing

Copies of test certificates relating to particular components shall be available prior to, or during, commissioning tests. These test certificates shall relate to individual or type tests carried out by the component manufacturer, the lift contractor, or an independent body.

2.4 Availability of certificates

Copies of certificates appropriate to the type of equipment, as referred to in **2.1.2** and **2.2.2**, shall be available for inspection in accordance with **16.2.2** of BS 5655-1:1986.

3 Technical data

When required by the purchaser, pertinent technical data shall be recorded in the manner shown in Appendix A, Table 2 or Appendix B, Table 4, as appropriate.

This technical data shall be appended to the test certificates specified in **2.1.2**.

4 High voltage test (at manufacturers' works)

The dielectric of electrical apparatus (excluding motors, generators, transformers, electronic apparatus and instruments, which should be tested in accordance with the appropriate British Standard), shall withstand a test voltage of 10 times the working voltage, with a maximum of 2 000 V, when applied as follows:

- a) between the live parts and the case or the frame with all circuits completed;
- b) between main terminals or equivalent parts with all circuits open;
- c) between any live parts of independent circuits.

The test voltage shall be alternating of approximately sine wave form with a frequency of approximately 50 Hz and shall be applied for 1 min.

NOTE Owing to the impracticability of applying the foregoing tests b) and c) on controllers and similar apparatus after controller wiring has been completed, these tests should be made at convenient stages of manufacture. A test certificate to this effect issued by the manufacturer is acceptable.

5 Electrical tests (after installation)

Electrical installations, excluding electronic equipment, shall be subjected to tests, by instruments, as follows:

- a) *Apply d.c. test voltage which is not less than twice the r.m.s. value of the a.c. supply voltage or not greater than 500 V d.c. for low voltage circuits, to prove that the insulation resistance to earth is not less than 0.5 M Ω .*

NOTE If dampness in a new building prevents a reading of 0.5 M Ω from being obtained, an insulation resistance of 0.25 M Ω is provisionally acceptable provided a retest figure of 0.5 M Ω is obtained when conditions in the building improve.

- b) *Determine that the earthing of all conduit, trunking, switchcases, and similar metal work is continuous and does not exceed 0.5 Ω impedance.*

NOTE A lift installation is considered to be a self-contained piece of equipment and as such is not required to conform in all respects with the 15th edition of the IEE Regulations for Electrical Installations, in particular regard to the earthing of all apparatus, e.g. guides, door panels, etc.

Appendix A Forms for electric passenger and goods lifts

NOTE In the following tables italic type denotes a requirement contained within Appendix D of BS 5655-1:1986.

Table 1 — Certificate of test and examination for electric passenger and goods lifts

Notes for the completion of this certificate. NOTE 1 The references quoted below in association with a Part number refer to clauses, figures, tables or appendices of that Part of BS 5655. Other clause numbers relate to this Part of BS 5655.		NOTE 2 Statements and replies to all relevant questions should be anoted in the appropriate boxes. Where multiple questions are posed only one of the alternative boxes should be ticked.	
A.1 Description of installation			
Location:		Vendor:	
Length of travel:	m	Vendor's identification no.:	
No. of levels served:	front rear	Technical data:	
Rated load:	kg	Technical data appended as Table 2? Yes ☐ No ☐	
Rated speed:	m/s		
Machine room location:	above well below well at side	Have the correct fuses been fitted (see Table 2)? Yes ☐ No ☐	
Machine room temperature at the start of the dynamic tests:	°C	Power supply at time of test:	
Reeving ratio:	:	V Ph Hz Wire	permanent ☐ temporary ☐

Table 1 — Certificate of test and examination for electric passenger and goods lifts

A.2 Static examination, mechanical															
A.2.1 Suspension															
a) Suspension ropes:															
1) number	2) nominal diameter mm														
3) lay and construction															
b) Type of rope anchorages:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center; padding: 5px;">Car:</th> <th style="width: 50%; text-align: center; padding: 5px;">Counterweight:</th> </tr> </thead> <tbody> <tr> <td style="height: 50px;"></td> <td></td> </tr> <tr> <td style="height: 50px;"></td> <td></td> </tr> <tr> <td style="padding: 5px;"> 1) state the number fitted per rope: </td> <td></td> </tr> <tr> <td style="padding: 5px;"> 2) are the grips correctly fitted? </td> <td style="padding: 5px;"> Yes ☐ No ☐ </td> </tr> <tr> <td style="padding: 5px;"> d) If socketted anchorages are used state type: </td> <td></td> </tr> <tr> <td style="padding: 5px;"> e) If any other type of anchorage is used, describe it: </td> <td></td> </tr> </tbody> </table>	Car:	Counterweight:					1) state the number fitted per rope:		2) are the grips correctly fitted?	Yes ☐ No ☐	d) If socketted anchorages are used state type:		e) If any other type of anchorage is used, describe it:	
Car:	Counterweight:														
1) state the number fitted per rope:															
2) are the grips correctly fitted?	Yes ☐ No ☐														
d) If socketted anchorages are used state type:															
e) If any other type of anchorage is used, describe it:															
f) Is compensation provided?	Yes ☐ No ☐														
A.2.2 Safety gear															
a) <i>Has the safety gear been certified as complying with F.3 and in accordance with F.3.5 of Part 1?</i>	Yes ☐ No ☐														
NOTE If "yes" refer to A.8.1, A.8.2, A.9.1 and A.9.2 and if "no" refer to Appendix D.															
b) <i>If the foregoing answer is "yes" does the data plate indicate, in positive terms, whether the safety gear complies with the criteria for type test certification?</i>	Yes ☐ No ☐														
c) Is the safety gear sealed?	Yes ☐ No ☐														

Table 1 — Certificate of test and examination for electric passenger and goods lifts

A.2.3 Energy dissipation buffers (e.g. oil)	
a) If fitted, have the buffers been certified as complying with F.5 and in accordance with F.5.4 of Part 1?	Yes ☐ No ☐
b) If the foregoing answer is “yes” do the data plates indicate, in positive terms, whether the buffers comply with the criteria for type test certification?	Yes ☐ No ☐
c) If the foregoing answer is “no” are they suitable for submission to test A.11.1 ?	Yes ☐ No ☐
d) Are they correctly filled and not leaking?	Yes ☐ No ☐
e) Is the stroke of each buffer in accordance with Figure 3 of Part 1?	Yes ☐ No ☐
f) Is there reduced stroke buffering? (see also A.10)	Yes ☐ No ☐
A.2.4 Energy accumulation buffers (e.g. spring)	
If fitted, do the buffers comply with Part 1?	Yes ☐ No ☐
NOTE It is recommended that buffers should have been identified with their spring rate, maximum load and makers name	
A.2.5 Brake	
Does the brake sustain the static car, in the lower part of its travel, with rated load plus 25 %?	Yes ☐ No ☐
A.2.6 Overspeed governor	
a) Has the governor been certified as complying with F.4 and in accordance with F.4.3 of Part 1?	Yes ☐ No ☐
If “no” refer to Appendix A.	
b) Is the data plate in accordance with 15.6 of Part 1?	Yes ☐ No ☐
c) Is the governor sealed?	Yes ☐ No ☐
A.2.7 Overspeed governor rope	
Does the governor rope conform to A.18.2 in Table 2?	Yes ☐ No ☐
A.2.8 Landing doors and surrounds	
Are the fire rated elements of the door assembly correctly fitted?	Yes ☐ No ☐

Table 1 — Certificate of test and examination for electric passenger and goods lifts

A.3 Static examination, electrical			
A.3.1 Insulation resistance to earth (see clause 5)			
a) Lift motor:		MΩ	
b) MG set (if fitted);			
1) motor		MΩ	2) generator MΩ
c) Power systems:		MΩ	d) Safety circuits MΩ
A.3.2 Earthing			
a) Is the maximum continuity resistance to earth less than 0.5 Ω?	Yes ☐	No ☐	
b) Is the car connected to controller earthing terminal by a separate conductor $\geq 0.75 \text{ mm}^2$?	Yes ☐	No ☐	
A.3.3 Protection of conductors			
a) Is the fixed wiring in conduit (or trunking, or fittings which ensure equivalent protection) throughout?	Yes ☐	No ☐	
b) If not, do the cables comply with 13.5.1.2 of Part 1	Yes ☐	No ☐	
A.3.4 Phase failure device			
If fitted, does the phase reversal and phase failure device operate correctly?	Yes ☐	No ☐	
A.4 Dynamic tests			
A.4.1 Safety contacts/circuits			
a) Have the contacts at each landing entrance been proved so that when broken there is no movement of the car?	Yes ☐	No ☐	
b) Have the mechanical locks at each landing entrance been proved for positive locking?	Yes ☐	No ☐	
c) Have the car door/gate contacts been proved so that when broken there is no car movement?	Yes ☐	No ☐	
d) If separate terminal stopping switches are fitted, do they operate satisfactorily?	Yes ☐	No ☐	
e) Do the final limit switches remove the motor supply before the car or counterweight contact the buffers?	Yes ☐	No ☐	

Table 1 — Certificate of test and examination for electric passenger and goods lifts

A.4.1 (continued)	
f) Have the stopping devices on the cartop, and in the pulley room and pit, been proved so that when broken no movement of the car occurs?	Yes ☐ No ☐
g) Have all other switches/contacts in the safety circuits been proved so that when broken no car movement occurs?	Yes ☐ No ☐
h) Does the earthing of the most remote contact (lock or push button) operate a fuse or trip a circuit breaker without delay?	Yes ☐ No ☐
A.4.2 Car top control station	
a) Speed up: m/s	d) Speed down: m/s
c) Does the design and operation of the car top station comply with 14.2.1.3 of Part 1?	Yes ☐ No ☐
A.4.3 Clearances and runbys	
a) Will the car and counterweight clear all obstacles when driven at slow speed:	
1) with the car and rated load compressing the car buffers?	Yes ☐ No ☐
2) with the counterweight compressing its buffers (car empty)?	Yes ☐ No ☐
b) What is the distance to the first striking point above the car with the counterweight on the compressed buffer?	mm
Does this comply with 5.7.1.1 of Part 1?	Yes ☐ No ☐
NOTE Refer to Figure 3 of Part 1 for dimensions related to speed.	
c) What is the estimated distance to the first striking point above the counterweight with the car on the compressed buffers?	mm
Is this at least 300 mm?	Yes ☐ No ☐
d) With the car on its fully compressed buffers, is there a sufficient space to accommodate the rectangular block specified in 5.7.3.3 of Part 1 and at least 0.5 m between the bottom of the pit and the lowest point of the car?	Yes ☐ No ☐
NOTE The clear distance between the bottom of the pit and the lowest part of the guide shoes or rollers of safety gear blocks, toe guards or parts of vertical sliding doors, should be at least 0.1 m.	

Table 1 — Certificate of test and examination for electric passenger and goods lifts

A.4.4 Entrance clearances		
a) Is the horizontal distance between the sill of the car and sill of all landing doors 35 mm or less?	Yes ☐	No ☐
b) Is the running clearance between door panels and between panels and uprights, lintels or sill 6 mm or less?	Yes ☐	No ☐
c) Has it been established that no recess or projection on the face of the sliding door panels exceed 3 mm?	Yes ☐	No ☐
d) Is the distance between the inner surface of the well and the sill or framework of the car entrance or door 0.15 m or less, or 0.2 m if over a height not exceeding 0.5 m?	Yes ☐	No ☐
e) If the answer to d) is “no”, is the car door mechanically locked when away from the unlocking zone [see A.4.5 m)]?	Yes ☐	No ☐
A.4.5 Door tests		
NOTE Where appropriate the following tests should be carried out with the car and landing doors coupled.		
a) How are the doors operated?	manually ☐	powered ☐
b) Is the measured maximum force to prevent closing, at the mid-point of the travel, 150 N or less?	Yes ☐	No ☐
State the figure recorded:	N	
c) Is the measured kinetic energy 10 J or less?	Yes ☐	No ☐
State the figure recorded:	J	
d) Does the protective device reverse the doors in accordance with 7.5.2.1.1.3 of Part 1?	Yes ☐	No ☐
e) If the protective device is made inoperative:		
1) do the doors remain open?	Yes ☐	No ☐
2) do the doors close with a kinetic energy not exceeding 4 J?	Yes ☐	No ☐
f) Is the unlocking zone less than 0.2 m above and below landing levels (or 0.35 m in the case of simultaneously operated car and landing doors)?	Yes ☐	No ☐
g) Do the landing doors have an automatic mechanical self-closing mechanism?	Yes ☐	No ☐
h) Is each set of the landing doors capable of being unlocked from the outside with an emergency key?	Yes ☐	No ☐

Table 1 — Certificate of test and examination for electric passenger and goods lifts

i) Does the door motor protection system function correctly?	Yes ☐ No ☐
j) State the maximum current to the motor at mid-point of the travel of the doors:	A
k) Form of electrical protection provided for the door motor:	
three phase circuit breaker	☐
overloads in each phase	☐
timing relay	☐
thermistors	☐
other (state)	
State the relevant characteristics:	
time to operate	s
trip current (if applicable)	A
l) If the rated speed of the lift is greater than 1.0 m/s, is the force to open the car doors when outside the unlocking zone 50 N or greater?	Yes ☐ No ☐
m) Do the car doors fulfil the requirements of 8.11.1 of Part 1?	Yes ☐ No ☐
n) Are the car doors locked when the car is outside the unlocking zone in normal operation? [See also A.4.4 d)]	Yes ☐ No ☐
o) If the entrance clearances are not in accordance with A.4.4 d), has it been checked that the car doors are mechanically locked when outside the unlocking zone in normal operation?	Yes ☐ No ☐

A.5 Measurements of the electrical system

a) State power system:

b) Provide the following details of the lift motor (as stated on data plate):

1) Maker:

2) Serial no.:

3) Type:

4) Power rating: kW

5) Current rating: A

6) Speed: r/min

7) Class of insulation:

8) Duty rating:

Table 1 — Certificate of test and examination for electric passenger and goods lifts

c) Measure and record the following operational data when the car is at mid-point of travel:

High speed operation										
Car loading condition		Lift motor speed (see note 3) r/min	Liftspeed (see note 3) m/s	Lift motor input (see note 1)			System input (see note 2)			Levelling deviation (+ or -) (see note 4) mm
				Run		Start	Run		Start	
				V	A	A	V	A	A	
Empty	Up									
	Down									
Balanced	Up									
	Down									
Rated	Up									
	Down									

Low speed operation (if applicable)								
Car loading condition		Lift motor speed (see note 3) r/min	Liftspeed (see note 3) m/s	Lift motor input (see note 1)		System input (see note 2)		Levelling deviation (+ or -) (see note 4) mm
				Running		Running		
				V	A	V	A	
Empty	Up							
	Down							
Balanced	Up							
	Down							
Rated	Up							
	Down							

NOTE 1 Take the motor current readings on conductors adjacent to the motor terminal block, with motor running steadily.

NOTE 2 Energy convertor or equivalent. Measure the system input to the controller from the main supply.

NOTE 3 Complete either column 2 or 3 in its entirety and make one entry only in the alternative column for the "rated up" condition.

NOTE 4 State the maximum deviation in the appropriate box (i.e. one entry only).

d) Quote type of, and the following data on, the associated energy convertor(s) nameplate (if applicable).

1) Type:

2) Serial no.:

3) Input:

	kW	A	V	r/min
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4) Output:

	kW	A	V	r/min
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Table 1 — Certificate of test and examination for electric passenger and goods lifts

A.6 Lift motor overcurrent protective devices**A.6.1 Main windings**

a) Measure and record the following (as appropriate):

Type of device	Manual reset	Automatic reset	Time of operation s	Trip current A
Three phase circuit breaker		—		
Overloads, in each phase		—		
Timing relay		—		Full load
Thermistor				

b) Have these been found to be satisfactory?

Yes ☐ No ☐**A.6.2 Slow speed windings**

a) Measure and record the following (as appropriate):

Type of device	Manual reset	Automatic reset	Time of operation s	Trip current A
Three phase circuit breaker		—		
Overloads, in each phase		—		
Timing relay		—		Full load
Thermistor				

b) Have these been found to be satisfactory?

Yes ☐ No ☐**A.6.3 Converter input**

a) Measure and record the following (as appropriate):

Type of device	Manual reset	Automatic reset	Time of operation s	Trip current A
Three phase circuit breaker		—		
Overloads, in each phase		—		
Timing relay		—		Full load
Thermistor				

b) Have these been found to be satisfactory?

Yes ☐ No ☐