

Cinematography —

Part 2: 16 mm film —

Section 2.7 Projection —

Subsection 2.7.2 Specification for the performance of 16 mm sound-film projectors

UDC 778.5.068.25:778.554.4

Confirmed December 2009

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

BSI
Documents

AVA

Document Sharing Hub

Cooperating organizations

The Cinematograph Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

- Association of Cinematograph Television and Allied Technicians*
- Association of Film Laboratory Employers
- British Broadcasting Corporation*
- British Film Institute*
- British Kinematograph, Sound and Television Society*
- British Photographic Association
- Chartered Institution of Building Services*
- Cinematograph Exhibitors' Association of Great Britain and Ireland*
- Film Production Association of Great Britain
- Independent Broadcasting Authority
- Independent Television Companies' Association*
- Royal Photographic Society*

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

- Association of Independent Cinemas
- Association of Supervisory and Executive Engineers
- British Amateur Cinematographers' Central Council
- Council for Educational Technology for the United Kingdom
- Electronic Engineering Association
- Institute of Amateur Cinematographers
- Lighting Industry Federation Limited
- National Association of Theatrical, Television and Kine Employees
- National Audio-visual Aids Centre and Library
- National Illumination Committee of Great Britain
- Services Kinema Corporation

This British Standard, having been prepared under the direction of the Cinematograph Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 July 1982

© BSI 10-1999

The following BSI references relate to the work on this standard:
Committee reference CMM/27
Draft for comment 79/65557 DC

ISBN 0 580 12471 1

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Cooperating organizations	Inside front cover
Foreword	iii
Section 1. General	
1 Scope	1
2 References	1
3 Definitions	1
4 Instruction manual and marking	1
Section 2. Design and construction	
5 Design	1
6 Speed of projection	1
7 Projector lens assembly	2
8 Accessibility of optical and other parts for cleaning	2
9 Picture aperture	2
10 Framing and tilt	2
11 Picture-sound separation	2
12 Electrical and safety requirements	2
13 Light source	2
14 Lamphouse ventilation	3
15 Optional facilities	3
Section 3. Picture performance	
16 General	3
17 Preliminary setting up	3
18 Light output	4
19 Distribution of screen illumination	5
20 Colour bands in the image	5
21 Picture steadiness	6
22 Travel-ghost	6
23 Image resolution	6
24 Alignment and position of film plane	6
25 Flicker	6
Section 4. Sound performance	
26 General	6
27 Projectors with photographic sound systems	6
28 Projectors with magnetic sound systems	7
29 Amplifier	7
Section 5. Mechanical tests with film	
30 Test requirements	8
31 Test film	9
32 Loop tests	9
33 Fast winding without unthreading tests	9
34 Feed, reverse, still-picture, take-up and rewind tests	9
35 Loop reformer test	10
Appendix A Requirements specific to projectors with discharge lamps	12
Appendix B Alternative picture unsteadiness test film	12
Appendix C Weighting network for measurement of amplifier noise with projector not running	12
Appendix D Measurement of photographic sound system noise	12
Appendix E Test of erasure efficiency	12

	Page
Appendix F Test of the total system signal-to-noise ratio	13
Appendix G Warning symbol	13
Figure 1 — Light output	4
Figure 2 — Distribution of screen illumination	5
Figure 3 — Warning symbol	13
Figure 4 — Weighting curve A	14
Figure 5 — Cut-outs for loop reformer test	15
Table 1 — Signal-to-noise ratios for projectors with magnetic sound systems	7
Table 2 — Amplifier characteristics	8
Table 3 — Take-up and rewinding	10
Table 4 — Reverse take-up	10
Table 5 — Perforation strain	11
Table 6 — Perforation strain, reverse take-up	11
Table 7 — Change of direction while running test	11
Publications referred to	Inside back cover

Foreword

This British Standard has been prepared under the direction of the Cinematograph Standards Committee and forms a revision of BS 3675:1963 which has been withdrawn. The first edition of this standard was restricted to sound-film projectors of the fully portable type, but there is no such restriction in the present edition. Minimum performance requirements are specified for portable, transportable and installed projectors, which will assist users to evaluate all the main types of machine.

A number of test films are referred to in this standard. For information on the availability of such test films, apply to Central Enquiries Section, British Standards Institution, 2 Park Street, London W1A 2BS, enclosing a stamped addressed envelope for reply.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 16, 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.

Section 1. General

1 Scope

This British Standard specifies requirements for 16 mm sound-film projectors both for normal picture projection and in telecine channels. This standard does not apply to film mechanisms specifically designed for telecine operation.

It specifies requirements intended to ensure a satisfactory picture and sound performance, safety and film life. It does not deal with the details of the mechanical and electrical design and construction of projectors except in so far as such details may affect performance, safety or convenience in use.

2 References

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

3 Definitions

For the purposes of this standard the following definitions apply. Definitions of other cinematograph terms are to be found in BS 5550-8.1.

3.1

portable projector

sound-film projector designed to be carried by one person and having a mass not exceeding 20 kg including, if provided, a detachable loudspeaker

3.2

transportable projector

sound-film projector, not specifically designed for installation but which is not a "portable projector", which operates from a single phase power supply and which has an on-load rating not greater than 3 kV A

3.3

installed projector

non-portable sound-film projector designed for permanent installation

3.4

double-headed projector

sound-film projector capable of transporting a separate perforated magnetic film (sepmag) in synchronism with a picture film

3.5

telecine projector

sound-film projector designed or suitably modified to operate as a programme source for a video system

3.6

travel-ghost

blurred effect on the screen during film projection, with vertical tails or streaks of light, which is caused by failure of the projector shutter to cut off the light beam throughout film movement

4 Instruction manual and marking

4.1 Instruction manual. An instruction manual shall be supplied with the projector and shall give all necessary instructions for the correct operation of the projector and for its care and maintenance (see clauses 8 and 12).

4.2 Marking. Projectors meeting the requirements of this standard shall be marked with the number of this standard, i.e. BS 5550-2.7.2¹⁾.

NOTE Specific labelling requirements are made in respect of the lens assembly (see clause 7) and lamps (see clause 13).

Section 2. Design and construction

5 Design

The projector shall be designed for the satisfactory projection of 16 mm motion-picture film complying with the requirements of the relevant Subsections of BS 5550-2.

The projector shall accept spools complying with BS 5550-2.9 of sizes in the range 120 m to 610 m, or in the range 244 m to 1 800 m in the case of an installed projector, or a greater range as specified by the projector manufacturer.

The projector shall be able to transport films having splices to a maximum thickness of 0.48 mm without detriment to the projector or to the film.

The projector shall satisfactorily project film which has shrunk 1.0 % below the minimum width specified in BS 5550-2.1.1.

6 Speed of projection

6.1 The speed of projection for sound-films (except for certain applications) shall be as specified in BS 5550-2.7.1 when the projector is operated at its rated voltage and frequency.

NOTE For telecine and certain other synchronous applications a nominal speed of 25 frames per second may be required.

¹⁾ Marking BS 5550-2.7.2 on or in relation to a product is a claim by the manufacturer that the product has been manufactured in accordance with the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Enquiries as to the availability of third party certification to support such claims should be addressed to the Director, Quality Assurance Division, British Standards Institution, Maylands Avenue, Hemel Hempstead, Herts HP2 4SQ in the case of certification marks administered by BSI or to the appropriate authority for other certification marks.

6.2 If provision is made for the projection of silent films, the speed of projection for such films shall be as specified in BS 5550-2.7.1.

7 Projector lens assembly

The projector lens assembly shall be so designed that there shall be no change in the position of the lens sufficient to cause any impairment of focus, and/or change of image position, while the projector is running after actuation of a locking device, if fitted.

The lens assembly shall be marked with:

- a) relative aperture;
- b) focal length.

8 Accessibility of optical and other parts for cleaning

All the external surfaces of the condenser lenses and of the projector lens assembly shall be accessible for cleaning.

If the condenser lenses have to be removed for cleaning, they shall be so designed as to facilitate their accurate replacement.

The instruction manual shall give the necessary instructions for the cleaning of certain optical parts, e.g. dichroic reflectors, requiring special care.

The picture aperture, and all the surfaces which make contact with the film, shall be easily accessible for cleaning.

9 Picture aperture

The effective picture aperture shall be in accordance with BS 5550-2.2.2 or BS 5550-6.3.

If a variable aperture is provided, it shall alter the projected image area only as a result of a deliberate adjustment.

10 Framing and tilt

A means of framing shall be provided, giving a minimum framing movement of 0.50 mm both above and below the nominal position.

An installed projector shall have a means of framing such that, when the framing control is operated, the position of the illuminated area on the screen is not affected.

NOTE This requirement is also highly desirable in portable and transportable projectors.

Portable and transportable projectors shall have a means of elevating the projected beam through at least 8° from the horizontal.

An installed projector shall have a means of elevating and depressing the projected beam through at least 10° and 20° respectively from the horizontal.

11 Picture-sound separation

The design of the projector shall be such that the film path distance from the centre of the projection aperture to the sound scanning point shall be $26 + 0.5, - 1.0$ frames for photographic sound and $28 + 0.5, - 1.0$ frames for magnetic sound.

12 Electrical and safety requirements

The equipment shall be insulated and protected in such a manner that there shall be no danger from electrical shock or fire.

The projector shall comply with the safety requirements of BS 3456-3.14.

The projector shall comply with the requirements of BS 800 regarding the suppression of radio interference.

The design shall guard against the possibility of interference from external radio frequency transmissions.

Lamphouses shall be designed in such a manner as to prevent the egress of material in the event of the lamp shattering. The instruction manual shall state that the lamp is not to be operated with the lamp shielding removed and shall include advice on the safe installation, running, removal or disposal of a lamp in respect of safety.

A projector equipped with a discharge lamp shall comply with Appendix A.

NOTE Accessories supplied for use with the projector should comply with the applicable safety requirements of the relevant British Standards.

13 Light source

Provision shall be made to ensure that correct positioning of the lamp is maintained in use and after lamp replacement.

The projector shall be marked with the type(s) of lamp(s) for which the projector is designed and the maximum wattage lamp which may be used. In the case of filament lamps the rated voltage of the lamp shall be marked on the projector. In the case of discharge lamps, the maximum rated current of the lamp shall be marked on the projector.

For a discharge lamp, the lamp current shall not exceed the maximum rated current of the lamp when the projector is connected to and suitably adjusted for any of its rated supply voltages.