

BS 941 : 1970

SPECIFICATION FOR

FILAMENT LAMPS

FOR ROAD VEHICLES

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BRITISH STANDARDS INSTITUTION

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The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 5000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook, which may be purchased from BSI Sales Department. It may also be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

BS 52. Bayonet lamp caps, lampholders and B.C. adaptors (lampholder plugs) for voltages not exceeding 250 volts.

BS 98. Dimensions of screw lamp caps and lampholders (Edison type).

BS 1164. Dimensions of prefocus lamp caps and lampholders (for voltages not exceeding 250 volts).

BS 1298. Lamp caps and holders for festoon lamps (for voltages not exceeding 50 volts).

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this standard:
Committee reference LGE/6/3 Draft for comment 67/227

CO-OPERATING ORGANIZATIONS

The Illumination Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

- | | |
|--|---|
| *Association of Public Lighting Engineers | *Institution of Electrical Engineers |
| Board of Trade | Institution of Municipal Engineers |
| British Electrical and Allied Association | *Lighting Industry Federation Limited |
| British Glass Industry Research | *London Transport Executive |
| *British Railways Board | *Ministry of Defence, Navy Department |
| Council of British Manufacturers of Petroleum Equipment | *Department of the Environment—Public Building & Works |
| Department of Employment & Productivity (H.M. Factory Inspectorate) | Department of the Environment—Building Research Station |
| Engineering Equipment Users' Association | *Department of the Environment—Ministry of Transport |
| Electricity Council, the Central Electricity Generating Board and Area Boards in England and Wales | National Physical Laboratory (Department of Trade and Industry) |
| Gas Council | Royal Institute of British Architects |
| *Glass Manufacturers' Federation | Society of British Gas Industries |
| *Illuminating Engineering Society | *Society of Glass Technology |

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following were directly represented on the committee entrusted with the preparation of this standard:

- | | |
|--|--|
| British Cycle & Motor Industries Association Limited | Ministry of Technology |
| Electrical Contractors' Association | Municipal Passenger Transport Association (Incorporated) |
| Greater London Council | Public Transport Association (Incorporated) |
| Independent Lamp Manufacturers' Export Group | Society of Motor Manufacturers and Traders Limited |

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BRITISH STANDARD SPECIFICATION FOR FILAMENT LAMPS FOR ROAD VEHICLES

FOREWORD

This British Standard has been prepared under the authority of the Illumination Industry Standards Committee and is based upon a draft proposed by the Lighting Industry Federation Ltd. and the Society of Motor Manufacturers and Traders Ltd.

The main features of this revision of BS 941 are the inclusion of a wider range of lamps, the addition of the wedge base lamp, and changes in lamp characteristics to ensure interchangeability with agreed European standards. Lamps have been separated into sections of preferred and non-preferred types. Preferred lamps are those which should be used for new equipment designs. An impact test is not included, but is being actively studied and it is intended to include such a test in an amendment to the standard.

The general principles involved in the designations of the lamps covered by this standard are as follows: The lamps are divided into groups and each group has a reference number which forms the second two digit group following the number of the standard, for example:

941-01 = Prefocus single filament lamps.

The number after the second hyphen is the issue of the standard sheet:

941-01-1 = First issue of standard sheet 941-01.

941-06-2 = Second issue of standard sheet 941-06.

In cases where the group of lamps require more than one standard sheet, the sheets are numbered:

941-01-1 Sheet 2 = Second sheet of the group 941-01.

Statistical basis. It is impracticable and uneconomic to test every lamp in a batch but, by the use of statistical sampling theory, it is possible to design tests on small samples which will determine whether the quality of a batch complies with the requirements of this standard.

Accordingly, test quantities, quality limits and compliance numbers have been so specified that if, by testing the whole of a batch, the quality level for any requirement would have been found to be that given below, then, if the batch were tested by sampling in accordance with this specification, there would be a 0.975 (39/40) probability that it would meet the conditions of compliance for that requirement.

- (1) 99% of the lamps satisfy each single requirement specified in 2.4 and 2.5.
- (2) 98% of the lamps satisfy each single requirement specified in 2.2, 2.3 and 2.6.
- (3) 96% of the lamps satisfy all the requirements specified in 2.2 to 2.6.
- (4) The average values satisfy the requirements for initial electrical and luminous characteristics.
- (5) The average life is equal to the specified life.

SECTION 1

GENERAL REQUIREMENTS AND METHODS OF TEST

A batch of lamps complies with this standard if, when a sample is tested according to the specification, in all the test quantities the number of lamps which fail to satisfy the specified test requirements (such lamps are not necessarily faulty lamps) is not greater than the related compliance number and the average life is not less than the related compliance life. Individual lamps belonging to a batch which complies with the standard are in compliance with the standard by virtue of belonging thereto.

SPECIFICATION

1. GENERAL

1.1 SCOPE

This British Standard applies to filament lamps for use in road vehicles with nominal 6, 12 and 24 volts electrical equipment and to cycle filament lamps of nominal voltage not exceeding 6 volts.

It states the technical requirements which ensure quality and interchangeability. The specific requirements of each type of lamp are given in the relevant standard sheet.

It describes the methods of test to be used and the conditions of compliance to be applied to the test results to decide whether a batch of lamps complies with the requirements of this standard.

1.2 DEFINITIONS

For the purposes of this British Standard the following definitions apply:

Rated voltage. The nominal voltage of the supply on which the lamp is designed to operate.

Rated wattage (or amperage). The nominal wattage (or amperage) marked on the lamp.

Type. Lamps of the same general construction, dimensions and cap, having the same rated voltage and wattage.

Batch. All the lamps of one type put forward at one time for acceptance.

Inspection test. The test for visual, mechanical and physical characteristics.

Rating test. The test for initial wattage and luminous efficacy.

Life test. The test for duration of life and maintenance of luminous efficacy.

Test quantity. The sample of lamps from a batch required to be tested according to this standard.

Light centre. The geometrical centre of the filament.

Light centre length. The distance from the light centre to a specified position on the lamp cap or base, as shown in the appropriate figure.

Axial error. The perpendicular distance of the light centre from the axis of the cap.

Luminous efficacy. The ratio of the luminous output to the input of power expressed in lumens per watt.

Range. The difference between the lowest and the highest luminous efficacies of the lamps of the rating test quantity.

Life. The number of hours that a lamp operates to burn out under the test procedure of this standard.

Luminous efficacy maintenance. The ratio of the luminous efficacy of an individual lamp at the specified time of measurement during life test to that in the rating test.

2. REQUIREMENTS

2.1 TYPES

The lamp shall be any filament lamp with a nominal voltage of 6, 12 or 24 volts, intended for road vehicle use

or with a nominal voltage of 6 volts intended for cycle use.

Table 1 gives preferred types of lamp.

TABLE 1. PREFERRED TYPES OF LAMPS

Lamp description	Cap	Rated volts	Rated watts (or amperes)	Lamp reference no.	Standard sheet no.	European reference
Prefocus single filament	P36s/21 × 22	6	36	172	941-01	—
	P36s/21 × 22	6	36	173		F1
	P36s/21 × 22	12	48	185		—
	P36s/21 × 22	12	48	323		F1
	P36d/21 × 22	24	44	331		—
	P36d/21 × 22	24	44	330		F1
Stop and rear double filament	BAY15d/19	6	5	384	941-03	P25-2
	BAY15d/19	12	21	380		P25-2
			5			
Stop and direction indicator single filament	BA15s/19	6	21	317	941-04	P25-1
	BA15d/19	12	21	335		P25-1
	BA15s/19	12	21	382		P25-1
	BA15d/19	24	21	346		P25-1
	BA15d/19	24	21	348		—
	BA15s/19	24	21	349		—
Wedge base, side, rear and number plate	W2-1 × 9-5d	12	5	501	941-05	W10/5
	W2-1 × 9-5d	24	5	502		W10/5

TABLE 1. PREFERRED TYPES OF LAMPS (Contd)

Lamp description	Cap	Rated volts	Rated watts (or amperes)	Lamp reference no.	Standard sheet no.	European reference
Side and rear and number plate	BA15d/19	24	5	150	941-06	R19/5
	BA9s/14	12	4	233		T8/4
	BA9s/14	24	4	249		T8/4
Festoon	S8-5	12	6	254*	941-07	—
	S8-5	12	10	272		—
	S8-5	12	21	273		—
	S8-5	24	6	653*		—
	S8-5	24	10	274		—
Indicator panel	E10/13	6	3	990	941-08	—
	E10/13	12	2.2	987		—
	E10/13	24	2.8	650		—
	E5/8	12	1.5	280		—
	BA7s/11	12	2	281		—
	W2.1 × 9.5d	12	3	504		W10/3
	W2.1 × 9.5d	24	3	505		W10/3
	W2 × 4.6d	12	1.2	286		W5/1.2
	W2.1 × 9.5d	12	2	288		W10/2
	W2.1 × 9.5d	24	2	289		W10/2
Cycle lamps	P13-5s	2.5	0.15A	957	941-10	—
	P13-5s	2.5	0.2A	958		—
	P13-5s	3.7	0.15A	959		—
	E10/13	6	0.1A	998		—
	W2.1 × 9.5d	6	0.1	275		—
	P13-5s	6	0.1	276		—
	E10/13	2.5	0.3	277		—
	P13-5s	2.5	0.3	278		—
	W2.1 × 9.5d	2.5	0.3	279		—
	E10/13	2.5	0.2A	970		—
	E10/13	3.5	0.15A	974		—
	E10/13	3.5	0.3A	977		—
Rotating beacon lamps	P36s/21 × 22	6	36	172†	941-11	—
	P36s/21 × 22	12	36	162		—
	P36s/21 × 22	12	48	185†		—
	P36s/21 × 22	24	36	178		—
	P36s/21 × 22	24	44	456		—

* These two lamps are mechanically interchangeable with European reference C-11, but have higher wattage and greater luminous flux.

† These lamps also appear on standard sheet 941-01-1.

2.2 MARKING

The lamp shall be legibly and durably marked with the following information:

- (1) Rated voltage.
- (2) Rated wattage (or amperage).
- (3) Trade mark (except where otherwise indicated in the relevant standard sheet).

NOTE. To comply with the Road Vehicle Lighting Regulations, certain lamps should have the rated wattage durably marked on the glass or cap.

2.3 BULBS

The bulb shall be free from defects detrimental to service.

2.4 DIMENSIONS AND FILAMENT POSITION

The lamp dimensions shall be in accordance with those of the relevant standard sheet. Where appropriate the position

of the lamp filament, when tested in accordance with one of the projection tests described in the following appendices, shall comply with the requirements specified in the relevant appendix.

Appendix A. Screen projection requirements for pre-focus lamps: single filament.

Appendix B. Screen projection requirements for pre-focus lamps: double filament with and without shield.

Appendix C. Screen projection requirements for stop and rear lamps.

Appendix E. Screen projection requirements for heavy duty stop and direction indicator lamps.

2.5 CAPS AND AUTOMOBILE WEDGE BASES

The cap or base on the finished lamp shall comply with the

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appropriate British Standard as given in Table 2, and shall be so constructed and attached to the bulb that it withstands the torque specified in Table 2. The torque shall be applied using the special lampholder specified in the appropriate British Standard; it shall not be applied suddenly but shall be increased continuously from zero to the amount specified.

2.6 SOLDER

The solder shall be evenly applied in such quantity as to allow proper engagement of the cap, and to ensure satisfactory electrical contact, in the appropriate standard lampholder.

NOTE. It is not a requirement of this standard that the surface of the contact plate(s) be completely covered with the solder.

TABLE 2. CAPS

Designation	Specification	Torque
		N m
B22d/21 × 26	BS 52	3.00
P36s/21 × 22	BS 1164	1.15
P36d/21 × 22	BS 1164	1.15
BA15s/17	BS 52	1.15
BA15d/17	BS 52	1.15
BA15s/19	BS 52	1.15
BA15d/19	BS 52	1.15
BA15d/19	BS 52	1.15
BA9s/14	BS 52	0.23
BA7s/11	BS 52	under consideration
P13-5s		
P45		
S7	BS 1298	not applicable
S8-6	BS 1298	not applicable
E10/13	BS 98	0.23
E5/8	BS 98	—
Wedge bases	BS 941,	—
W2.1 × 9.6d	Appendix D	
W2 × 4.6d	Appendix F	

3. TESTING

3.1 GENERAL

The selection of the test quantities of lamps from a batch, the individual lamp characteristics to be investigated and the sequence and methods of test which shall be applied to each lamp of the test quantities shall be as specified in 3.2 to 3.5.

The compliance of the batch is assessed, as outlined in 4.1 to 4.4, from the results of the tests.

3.2 TEST QUANTITIES

3.2.1 Inspection test quantity (ITQ). The ITQ shall be 50 lamps. Should a retest be necessary as specified in 4.2, a further ITQ shall be selected. In order to ensure proper representation of the batch, the ITQ shall be selected as follows:

3.2.1.1 A batch of 1000 lamps or less

(1) *A batch packed in 10 or less containers.* Lamps shall be selected from every container.

(2) *A batch packed in more than 10 containers.* Lamps shall be selected from at least one half of the total number of containers, with a minimum of 10.

3.2.1.2 A batch of more than 1000 lamps. Lamps shall be selected as far as possible from one third of the total number of containers, with a minimum of 10.

3.2.2 Rating test quantity (RTQ). The RTQ shall be 10 lamps selected at random from lamps of the ITQ which satisfy the individual lamp requirements of the inspection test. Should a retest be necessary as specified in 4.3, a further RTQ shall be selected. In the case of double

filament lamps, duplicate rating test quantities shall be selected to provide for separate tests on each filament. Should a retest be necessary as specified in 4.3, in respect of either or both filaments, a further RTQ shall be selected.

3.2.3 Life test quantity (LTQ). The LTQ shall be the lamps of the RTQ. In the case of double filament lamps, separate life tests shall be made on each filament using the lamps from the appropriate RTQ.

3.2.4 Accidentally broken lamps. Lamps which are accidentally broken during a test shall, when necessary, be replaced to ensure that the required number of lamps complete the test. The results obtained with the replacement lamps shall be substituted for those of the broken lamp.

NOTE. In order to avoid unnecessary delay, it is therefore recommended that spare lamps be carried through the tests.

3.3 INSPECTION TEST: VISUAL, MECHANICAL AND PHYSICAL REQUIREMENTS

The lamps shall be inspected for compliance with the requirements of the following clauses:

2.2 Marking.

2.3 Bulbs.

2.4 Dimensions and filament position.

2.5 Caps and automobile wedge bases.

2.6 Solder.

3.4 RATING TEST: INITIAL WATTAGE AND LUMINOUS EFFICACY REQUIREMENTS

3.4.1 Operating position. Lamps other than 'festoon lamps' shall be operated in the vertical position, cap up or base up. Festoon lamps shall be operated in the horizontal position.

3.4.2 Test voltage. The test voltage shall be the appropriate voltage specified in the relevant standard sheet.

3.4.3 Ageing. Before the measurements are taken, the lamp shall be aged at the appropriate life test voltage for the period specified in the relevant standard sheet.

3.4.4 Photometry. A suitable integrating photometer shall be used.

3.4.5 Initial electrical and luminous characteristics. After the ageing period, the lamp shall be tested for wattage and luminous flux. The average watts and the average range of luminous efficacy shall be checked for compliance with the requirements specified in the relevant standard sheet.

3.5 LIFE TEST: LUMINOUS EFFICACY MAINTENANCE AND LIFE REQUIREMENTS

3.5.1 Operating position. For the life test the lamps shall be operated horizontally. In the case of headlamps, the longitudinal axis of the main beam filament shall also be horizontal. In the case of double filament headlamps, BS 941-02, the dipped beam filament shall be uppermost. For lamps covered by BS 941-03, BS 941-103 and BS 941-104, the low wattage filament shall be uppermost.

For photometry during the life test lamps other than festoon shall be operated in the vertical position. Festoon lamps shall be operated in the horizontal position.

3.5.2 Test voltages. For the life test, the lamps shall be operated at the life test voltage given in the relevant standard sheet.

For photometry during the life test the lamps shall be operated at the rating test voltage.

3.5.3 Electricity supply and control. The electricity supply for the life test shall be alternating current with a nominal frequency between 40 Hz and 60 Hz. The test voltage throughout the life test shall not depart from the value specified in the relevant standard sheet by more than 1 % and the average value throughout the life test period shall not differ significantly from the specified value.

3.5.4 Life test procedure. Each lamp of the LTQ shall be operated on the electricity supply specified in the relevant standard sheet until the end of its life. It shall be switched off twice during every 24 h of operation for periods of not less than 15 min each, such periods not being considered as part of the life of the lamp. In the case of lamps where the specified life is 25 h or less, the lamps shall not be switched off for any period.

3.5.5. Measurement during life test. Where a luminous efficacy maintenance requirement is specified, each lamp shall be tested at 50 ± 5 % of the specified life for wattage and luminous flux.

4. CONDITIONS OF COMPLIANCE

4.1 GENERAL

This subsection states the conditions of compliance for a batch of lamps. These conditions are applied to the results of the tests in Subsection 3.

A batch of lamps shall be deemed to comply with the standard if the requirements specified in 4.2, 4.3 and 4.4, are satisfied. If the requirements of any of these clauses are not satisfied, the batch shall be deemed not to comply with the standard.

4.2 INSPECTION TEST

If in the ITQ the numbers of lamps not satisfying the requirements do not exceed the compliance numbers shown in Table 3, the batch shall be deemed to comply with the standard. If the number of lamps not satisfying the requirements is more than the retest numbers shown in Table 3, the batch shall be deemed not to comply with the standard.

TABLE 3. COMPLIANCE NUMBERS, INSPECTION TEST

For any one clause		For all clauses 2.2 to 2.6 inclusive	
Clauses 2.4 or 2.5	Clauses 2.2, 2.3 or 2.6		
Compliance number	1	2	3
Retest number	2	3	5

If any of the compliance numbers are exceeded but none of the retest numbers are exceeded, the ITQ shall be discarded and a second ITQ selected and tested. If in the second ITQ the number of lamps not satisfying the requirements do not exceed the compliance numbers, the batch shall be deemed to comply with the standard. If the number of lamps not satisfying the requirements is greater than the compliance numbers the batch shall be deemed not to comply with the standard.

4.3 RATING TEST

The average wattage of the RTQ shall not fall outside the minimum and maximum values in the relevant standard sheet.

If in the RTQ the average luminous efficacy is not less than the minimum for compliance, and the luminous efficacy range is not greater than the maximum for compliance, the batch shall be deemed to comply with the standard. If in the RTQ, either or both the average and the range are outside the limits for retest the batch shall be deemed not to comply with the standard.

If either or both the average and range are outside the limits for compliance, but neither are outside the limits for retest, the RTQ shall be discarded and a second RTQ selected and tested. If in the second RTQ the average and range are within the limits for compliance, the batch shall be deemed to comply with the standard.

If in the second RTQ either or both the average and range are outside the limits for compliance, the batch shall be deemed not to comply with the standard.

4.4 LIFE TEST

4.4.1 The luminous efficacy maintenance of the LTQ where specified shall not be less than the minimum value specified in the relevant standard sheet.

4.4.2 The minimum average life of the LTQ shall not be less than the minimum life in the relevant standard sheet.

NOTE. These figures are lower than the specified life in order to cover the statistical uncertainty involved in testing small samples.

4.4.3 The number of lamps of the LTQ having lives less than 60 % of the specified life shall not exceed the compliance number given in the relevant standard sheet.

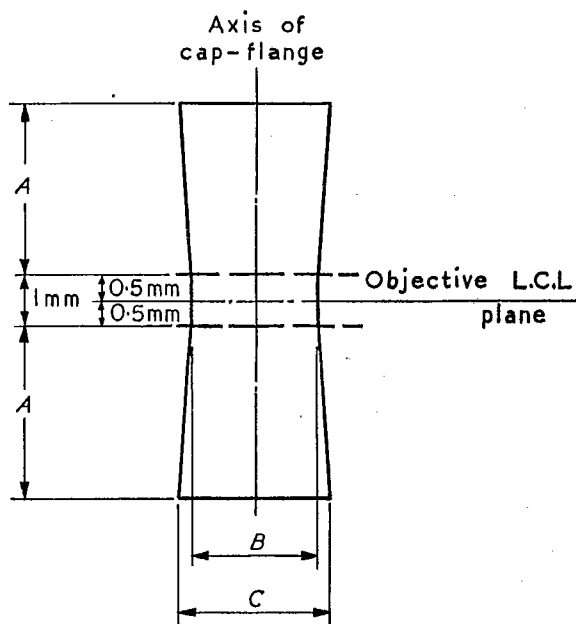
APPENDIX A

SCREEN PROJECTION REQUIREMENTS FOR PREFOCUS LAMPS: SINGLE FILAMENT

This test is used to determine whether a lamp complies with the requirements of 2.4 by checking whether the filament is correctly positioned relative to the major axis of the cap flange and the light centre length is within the specified limits.

A.1 Test screens

Magnified targets are drawn with the proportions of the permitted tolerances given in Figs. 1 and 2 on test screens which are disposed about the axes and planes as indicated.

**A.2 Test procedure**

Images of the filament with the same degree of magnification are projected on to the test screens.

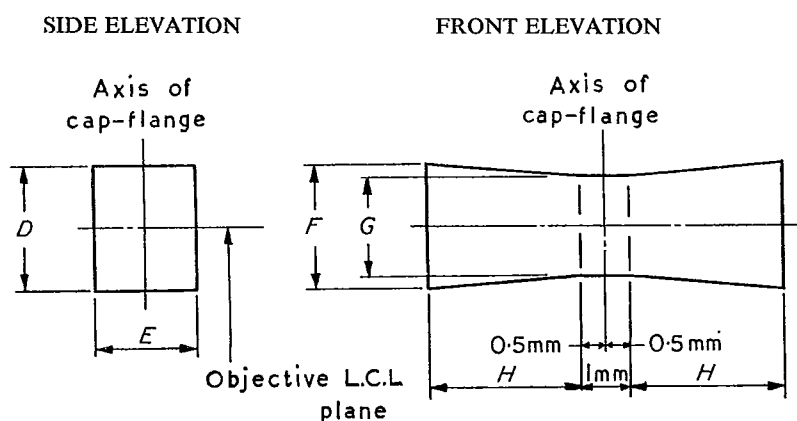
A.3 Requirements

A.3.1 Axial filaments. The images of the filament in two planes normal to each other shall fall entirely in the target areas.

A.3.2 Transverse filaments. The images of the filament viewed in both side and front elevations shall fall entirely in the target areas.

Lamp number	Rating	Dimensions (mm)		
		A	B	C
172	6 V 36 W	3.0	2.0	2.5
162	12 V 36 W	2.9	2.75	3.25
185	12 V 48 W	3.8	2.25	2.75
178	24 V 36 W	3.6	2.3	2.8
331 456	24 V 44 W	3.4	2.5	3.0

Fig. 1. Test screen: Axial filament



Lamp number	Rating	Dimension (mm)				
		D	E	F	G	H
173	6 V 36 W	2.5	2.0	2.5	2.0	3.0
323	12 V 48 W	2.75	2.25	2.75	2.25	3.8
330	24 V 44 W	3.0	2.5	3.0	2.5	3.4
325* 326*	12 V 38 W	2.5	2.0	2.5	2.0	3.4

* Non-preferred

Fig. 2. Test screen: Transverse filament

APPENDIX B

SCREEN PROJECTION REQUIREMENTS FOR PREFOCUS LAMPS: DOUBLE FILAMENT WITH AND WITHOUT SHIELD

This test is used to determine whether a lamp complies with the requirements of 2.4 by checking whether the main beam filament is

(1) correctly positioned relative to the major axis of the cap flange and

(2) has a light centre length within the specified limits, whether the dipped beam filament is correctly located relative to the main beam filament and whether the shield is correctly located relative to the dipped beam filament.

B.1 Test screens

Magnified targets are drawn with the proportions of the permitted tolerances given in Figs. 3, 4 and 5 on test screens which are divided into two parts:

- (1) A fixed screen on to which the side and front elevations of the main beam filament assembly are projected.
- (2) A screen, used to check the position of the dipped beam filament relative to the light centre of the main beam filament, which is movable normally to

the main axis of the cap flange and is superimposed on the fixed screen.

B.2 Test procedure

Images of the filaments with the same degree of magnification are projected on to the test screens.

B.3 Requirements

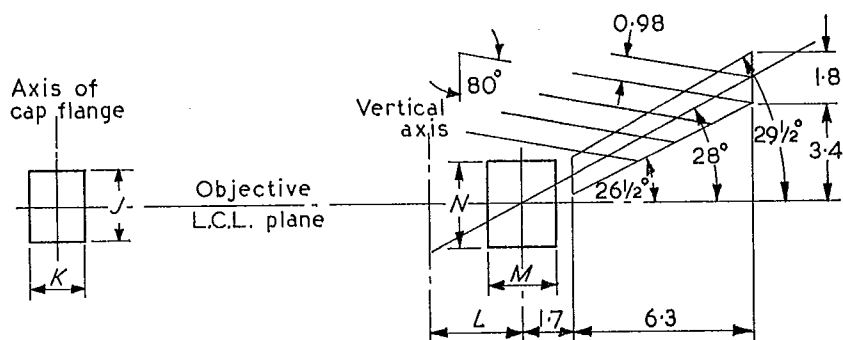
B.3.1 Side elevation

(1) All lamps. The image of the main beam filament shall fall completely within the target area of the fixed screen. The movable screen is then adjusted so that the vertical axis bisects the image of the main beam filament. The image of the dipped beam filament shall fall within the target area.

(2) Lamps with shields. The moving screen is adjusted so that the 28° line bisects the image of the dipped filament. The lower end of the shield image shall then fall within the target area, and the flat portion of the shield must be totally enclosed within any adjacent pair of 80° lines.

FIXED SCREEN

MOVING SCREEN



Lamp number	Rating	Dimension (mm)				
		J	K	L	M	N
312	6 V 30/24 W	2.2	1.9	3.25	2.4	2.7
356	6.4 V 45/35 W	2.5	2.0	3.25	2.5	3.0
414	12 V 50/40 W	2.6	2.6	3.0	2.5	3.0
436	12 V 54/44 W	2.85	2.35	3.25	2.85	3.55
437	24 V 54/44 W	3.25	2.75	3.75	3.25	3.75

Fig. 3. Test screen: Double filament with and without shield

FIXED SCREEN

MOVING SCREEN

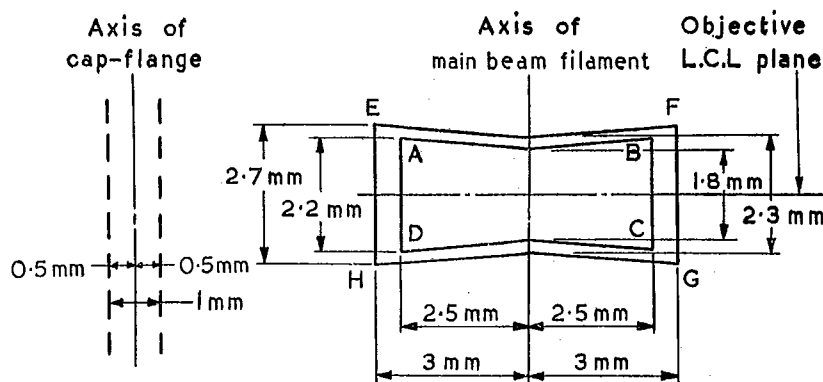


Fig. 4. Test screen: 6 V 30/24 W lamps vertical dip

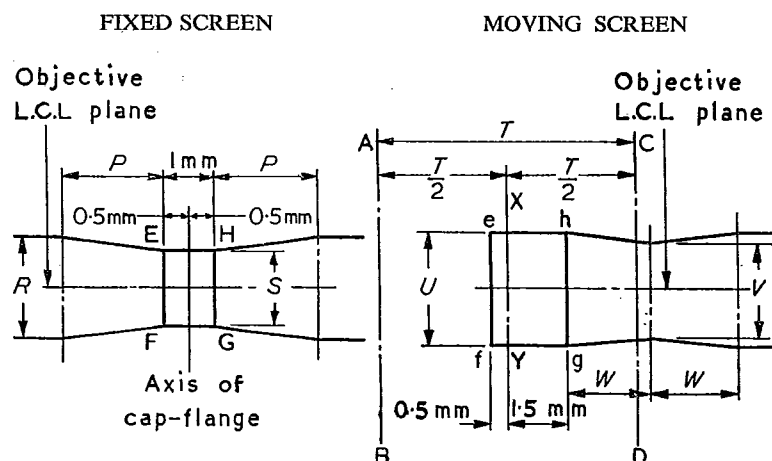
B.3.2 Front elevation

(1) 6 V 30/24 W (vertical dip) (Lamp no. 312) (see Fig. 4). The movable screen is adjusted so that the image of the main beam filament falls symmetrically within the area ABCD. The axis of the main beam filament shall fall within the limits on the fixed screen and the image of the dipped beam filament shall fall within the area EFGH.

(2) All other ratings (right hand drive, left dip) (see Fig. 5). The image of the main beam filament shall fall

completely within the upper and lower limiting lines on the fixed screen. The movable screen is then adjusted so that the image of the main beam filament falls symmetrically within the limiting lines AB and CD.

The vertical axis XY then bisects the filament image and shall fall within the limiting lines EF and GH on the fixed screen. The image of the dipped beam filament shall fall completely within the target area of the movable screen with the end turn (that nearest the axis of the cap flange) within the area efgH.



Lamp number	Rating	Dimension (mm)						
		P	R	S	T	U	V	W
356	6.4 V 45/35 W	3.0	2.5	2.0	6.75	3.0	2.5	1.62
414	12 V 50/40 W	3.25	2.6	2.1	6.75	3.0	2.5	2.35
436	12 V 54/44 W	3.5	2.85	2.35	7.25	3.35	2.85	2.4
437	24 V 54/44 W	3.25	3.25	2.75	6.75	3.75	3.25	2.25

Fig. 5. Test screen: All other ratings

APPENDIX C

SCREEN PROJECTION REQUIREMENTS FOR STOP AND REAR LAMPS

This test is used to determine whether a lamp complies with the requirements of 2.4 by checking whether the high wattage filament

(1) is correctly positioned relative to the major axis of the cap*,

(2) has an axis normal $\pm 15^\circ$ to the plane through the centres of the pins and the cap axis and,

(3) has a light centre length within the specified limits*, and whether the low wattage filament is correctly located relative to the high wattage filament.

C.1 Test equipment

(1) Test screens

Magnified targets are drawn with the proportions of the permitted tolerances, given in Figs. 6 and 7 on test screens.

* Compliance with the standard is achieved if 90 % of the product meets these requirements.

(2) Test lampholder

This shall be capable of rotation about its axis with either a calibrated scale of angular displacement or fixed stops at angular displacements of $\pm 15^\circ$.

C.2 Test procedure and requirements

C.2.1 Side elevation (Fig. 6). With the lamp cap down, the axis vertical, the plane containing the pin centres and the cap axis parallel to the test screen, and the reference pin to the right, images of the filament with the same degree of magnification as the targets are projected on the test screens.

(1) High wattage filament. With the lamp rotated about the cap axis to any position $\pm 15^\circ$ of that given above the image shall fall completely within the rectangle, a high b wide, centred at the objective position of the light centre.

(2) Low wattage filament. With the lamp in the position given above the image shall fall completely:

- Within the rectangle c wide d high, centered e to the right and f above the objective position of the high wattage filament light centre.
- Above the tangent to the upper edge of the high wattage filament rising from left to right at an angle of 25° .
- To the right of the high wattage projection.

C.2.2 Front elevation (Fig. 7). High wattage filament only. With the lamp cap down, axis vertical, the plane containing the cap pins and the cap axis normal to the test screen, images of the filament with the same degree of magnification as the targets are projected thereon.

- The image of the filament shall fall completely within the rectangle a high h wide centred at the objective position of the light centre.
- The light centre of the filament shall not deviate from the cap axis by more than k .

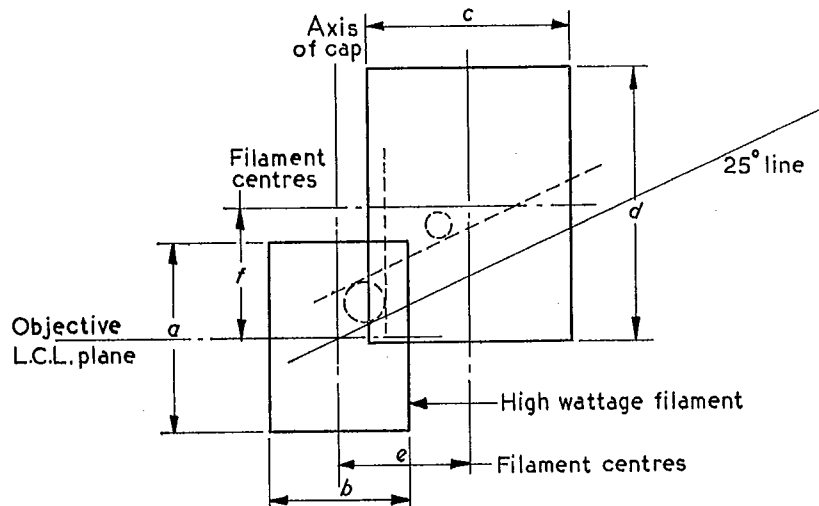


Fig. 6. Test screen: Double filament (side elevation)

	mm
a	4.0
b	3.0
c	4.3
d	5.8
e	2.8
f	2.8

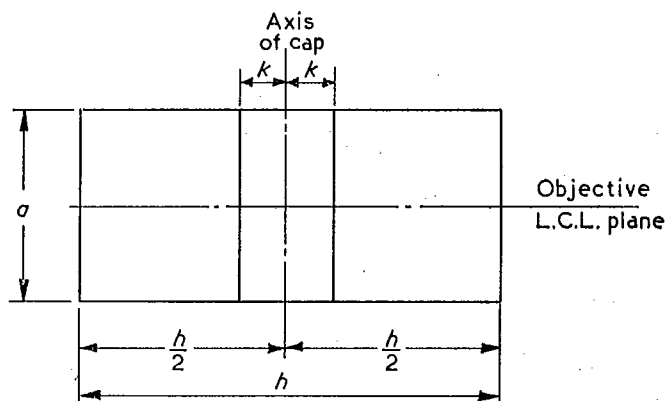


Fig. 7. Test screen: Double filament (front elevation)

	mm
a	4.0
h	9.0
k	1.0

APPENDIX D

LAMP BASE W2.1 × 9.5d

Dimensions in millimetres. The drawing is intended only to indicate the dimensions to be controlled.

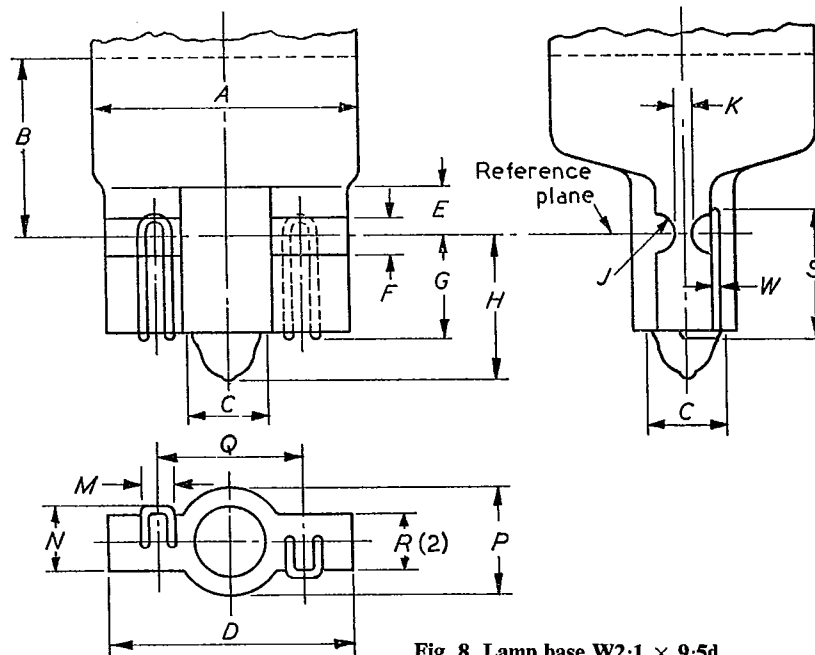


Fig. 8. Lamp base W2.1 × 9.5d

Standard dimensions

Dimension	min	max
A	—	10.29*
B	6.86*	—
C†	—	3.05
D	—	9.50
E	1.65	—
F	1.52 nominal	
G	3.68	4.45
H	—	6.10
J	0.76 nominal	
K	0.76 nominal	
M	1.5 nominal	
N	1.90	2.40
P	—	4.06
Q	Approximately 5.6	
S	4.83	—
W	—	0.36

* These dimensions are solely for holder design.

† Maximum contour of free space for exhaust tip allowing for eccentricity.

(2) Dimension R applies to the thickness of the base and for the purpose of designation has a nominal value of 2.1 mm.

NOTE. Attention is called to the fact that it is claimed that this base is the subject of a patent. Particulars of the conditions under which licences to manufacturers will be granted may be obtained from BSI.

APPENDIX E

SCREEN PROJECTION REQUIREMENTS FOR HEAVY DUTY STOP AND DIRECTION INDICATOR LAMPS

This test is used to determine whether a lamp complies with the requirements of 2.4 by checking whether the filaments are:

- (1) Correctly positioned relative to the major axis of the cap*,
- (2) Has an axis normal $\pm 15^\circ$ to the plane through the centre of the pins and the cap axis and,
- (3) Has a light centre length within the specified limits* and whether the filaments are correctly situated relative to each other.

E.1 Test equipment

- (1) Test screens
Magnified targets are drawn with the proportions of the permitted tolerances given in Figs. 9 and 10 on test screens.
- (2) Test lampholder
This shall be capable of rotation about its axis with either a calibrated scale of angular displacement or fixed stops at angular displacement of $\pm 15^\circ$.

* Compliance with the standard is achieved if 90% of the product meets these requirements.

E.2 Test procedure and requirements

E.2.1 Side elevation (Fig. 9). With lamp cap down, the axis vertical, the plane containing the pin centres and the cap axis parallel to the screen, the images of the filament with the same degree of magnification as the targets are projected onto the test screen.

- (1) With the lamp rotated about the cap axis to any position $\pm 15^\circ$ of that given, the images shall fall completely within the rectangles *ab.cd*, which have been positioned relative to the objective light centre and the cap axis.

E.2.2 Front elevation (Fig. 10). With the lamp cap down, the axis vertical, the plane containing the cap pins and the cap axis normal to the test screen, the images of the filaments with the same degree of magnification as the targets are projected onto the test screen.

- (1) The images of the filaments shall fall completely within the rectangle *gh*, centred at the objective position of the light centre.
- (2) The light centre of the filaments shall not deviate from the cap axis by more than *k*.

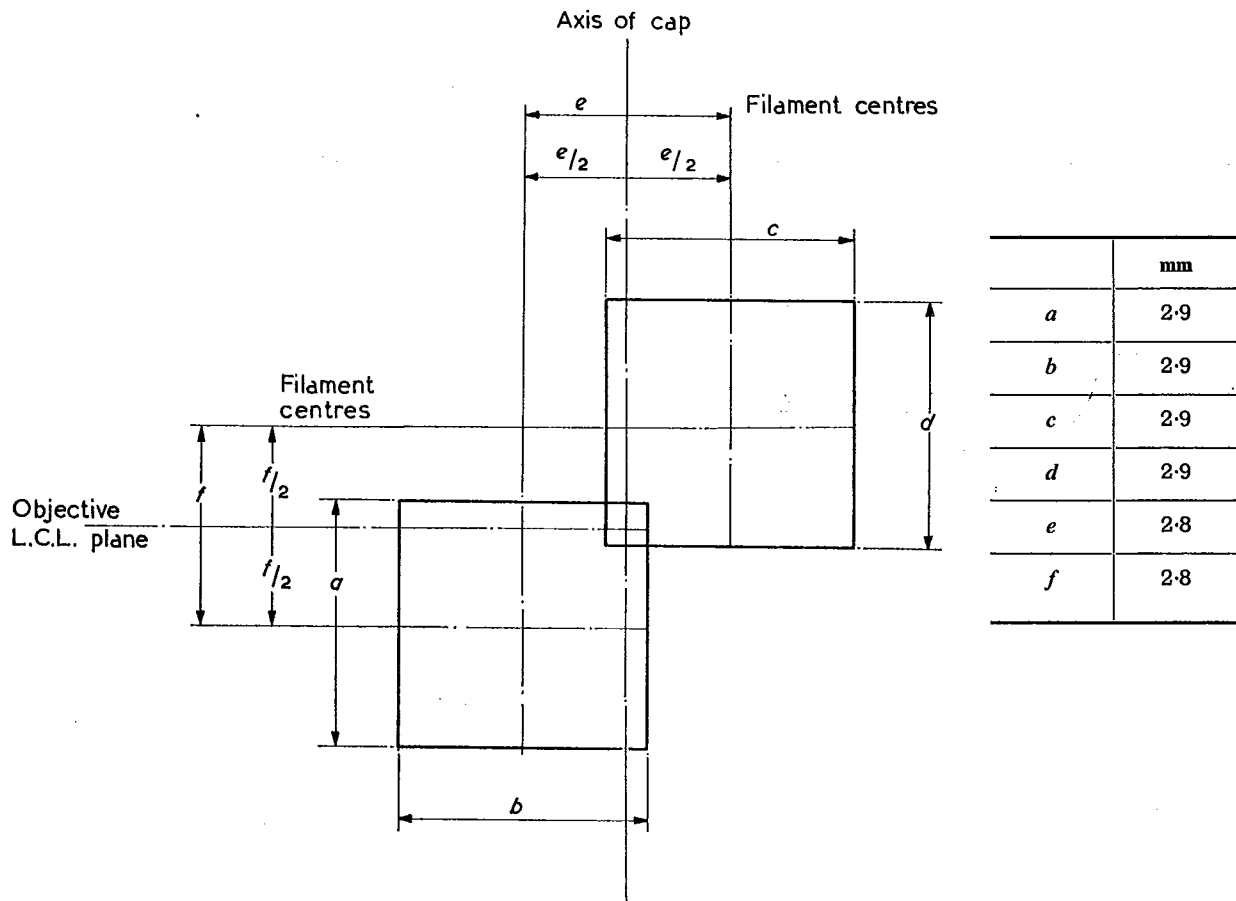


Fig. 9. Test screen (side elevation)

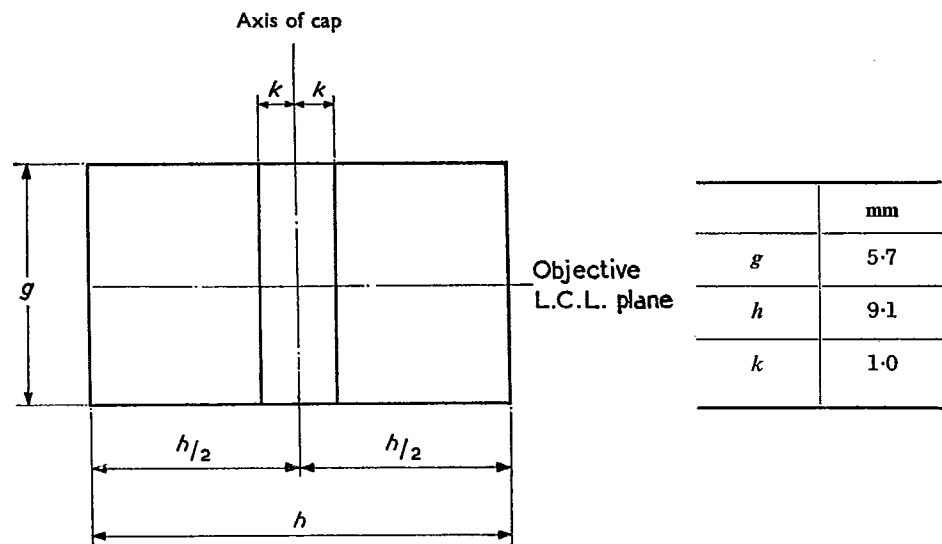


Fig. 10. Test screen (front elevation)