

BS 6797 : 1986

IEC 810 : 1986

UDC 629.1.066 : 621.32 : 628.9 : 535.249.2

British Standard Specification for Performance requirements for lamps for road vehicles

[IEC title: Lamps for road vehicles — Performance requirements]

Prescriptions de performances des lampes pour véhicules routiers—Spécifications

Funktionsanforderungen für Glühlampen an Straßenfahrzeugen

National foreword

This British Standard has been prepared under the direction of the Electrical Illumination Standards Committee. It is identical with IEC 810 : 1986 'Lamps for road vehicles—Performance requirements' published by the International Electrotechnical Commission (IEC).

BS 6797 is one of a series of three new British Standards that will ultimately supersede BS 941 : 1970 'Specification for filament lamps for road vehicles'. The other two British Standards in the series will cover dimensional, electrical and luminous requirements for lamps for road vehicles and filament lamps for cycles.

Attention is drawn to the fact that it is a condition of compliance with this standard that lamps comply with IEC Publication 809 (see 2.1). The British Standard identical with IEC Publication 809 is given in the cross-references below.

This standard is supplied in the form of separate standard sheets within a loose-leaf folder. Amendments containing new or revised standard sheets will be issued in the future to ensure that this standard is kept up to date.

Attention is drawn to the fact that the numbering for the standard sheets is derived from the IEC publication number.

NOTE. For ease of reproduction the French text in the standard sheets has been retained.

Terminology and conventions. The text of the international standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Wherever page numbers are quoted they are IEC page numbers.

Cross-references

International standard	Corresponding British Standard
IEC 68-2-6 : 1982	BS 2011 Basic environmental testing procedures Part 2.1Fc : 1983 Vibration (sinusoidal) (Identical)
IEC 68-2-47 : 1982	Section 4.1 : 1983 Specification for mounting of components, equipment and other articles for dynamic tests (Identical)
IEC 809 : 1985	BS 6737 : 1986 Specification for dimensional, electrical and luminous requirements for lamps for road vehicles (Identical)

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

Amendment No. 1
published and effective from 15 March 1994
to BS 6797 : 1986

Specification for performance requirements
for lamps for road vehicles

NOTE. This amendment is being published to effect the implementation of CENELEC HD 503 S2.

Revised text

Front cover

Underneath the title, insert the following.

'(Implementation of CENELEC HD 503 S2)'

AMD 8123/March 1994

National foreword

Delete paragraphs 1 and 2 and substitute the following new paragraph 1.

'This British Standard has been prepared under the direction of the Electrical Illumination Standards Policy Committee. It is identical with IEC 810 : 1986 as amended by Amendment No. 2 : 1992, 'Lamps for road vehicles – Performance requirements' published by the International Electrotechnical Commission (IEC) and implements harmonization document HD 503 S2 : 1993 published by the European Committee for Electrotechnical Standardization (CENELEC).'

AMD 8123/March 1994

HD title page and foreword

Immediately after the national foreword insert the attached HD title page and foreword.

AMD 8123/March 1994

Contents page

After the entry for 'appendix B', insert the following.

'APPENDIX C – Glass bulb strength test . . . '

After the entry for 'figure', insert the following.

'ANNEX ZA (normative) Other International publications
quoted in this standard with the
references of the relevant European
publications...'

AMD 8123/March 1994

Section one. General

Delete the existing page 3 and substitute the attached new page 3.

AMD 8123/March 1994

Section two. Requirements and test conditions

Delete the existing page 4 and substitute the attached new pages 4 and 4a.

AMD 8123/March 1994

Appendix B. Vibration tests

Delete the existing pages 9 and 10 and substitute the attached new pages 9, 10 and 10a.

AMD 8123/March 1994

New appendix C. Glass bulb strength test

Insert the attached new appendix C after appendix B.

AMD 8123/March 1994

New annex ZA

Insert the attached new annex ZA after figure 1.

AMD 8123/March 1994

UDC 621.326:629.11

Descriptors: Road vehicle, electrical equipment, signalling lamp, incandescent lamp, characteristic

English version

Lamps for road vehicles – Performance requirements

(IEC 810 : 1986 + A2 : 1992)

Lampes pour véhicules routiers
Prescriptions de performances
(CEI 810 : 1986 + A2 : 1992)

Lampen für Straßenfahrzeuge
Anforderungen bezüglich des Betriebsverhaltens
(IEC 810 : 1986 + A2 : 1992)

This Harmonization Document was approved by CENELEC on 1993-09-22. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

Up-to-date lists and bibliographical references concerning such national implementation may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 810 : 1986 and its amendment 2 : 1992 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as Harmonization Document.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as HD 503 S2 on 22 September 1993.

The following dates were fixed:

- latest date of announcement
of the HD at national level (doa) 1994-02-01
- latest date of publication of
a harmonized national
standard (dop) 1994-08-01
- latest date of withdrawal of
conflicting national
standards (dow) 1994-08-01

For products which have complied with HD 503 S1 : 1988 before 1994-08-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1999-08-01.

Appendices and annexes designated 'normative' are part of the body of the standard.

In this standard, appendices A, B and C and annex ZA are normative.

Annex ZA (normative)**Other international publications quoted in this standard with the references of the relevant European publications**

This Harmonization document incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Harmonization document only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

NOTE. When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

IEC Publication	Date	Title	EN/HD	Date
68-2-6	1982	Environmental testing Part 2: Tests – Test Fc and guidance: Vibration (sinusoidal)	HD 323.2.6 S2*	1988
68-2-47	1982	Mounting of components, equipment and other articles for dynamic tests including shock (Ea), bump (Eb), vibration (Fc and Fd) and steady- state acceleration (Ga) and guidance	EN 60068-2-47	1993
809 (mod)	1985	Lamps for road vehicles – Dimensional, electrical and luminous requirements	HD 494 S3*	1993

* HD 323.2.6 S2 includes A1 : 1983 + A2 : 1985 to IEC 68-2-6
HD 494 S2 includes A1 : 1987 + A2 : 1992 to IEC 809

1.2.4 *Life to X% failures*

Time during which X% of the lamps of the same type have reached the end of their individual lamp lives.

1.2.5 *Rated life to X% failures*

The life of X% failures indicated by this standard or declared by the manufacturer or responsible vendor.

1.2.6 *Lumen maintenance*

The ratio between the luminous flux after 75% of rated average life and the initial luminous flux of a lamp expressed as a percentage.

1.2.7 *Solder temperature limit*

The maximum admissible solder temperature to ensure satisfactory lamp performance in service.

1.2.8 *Pinch temperature limit*

The maximum admissible pinch temperature to ensure satisfactory lamp performance in service.

1.2.9 *Maximum lamp outline*

Contour limiting space to be reserved for the lamp in the relevant equipment.

1.2.10 *Heavy-duty lamps*

Lamps declared as such by the manufacturer or responsible vendor and which shall comply with the heavy-duty test conditions specified in table B2 of the standard.

SECTION TWO – REQUIREMENTS AND TEST CONDITIONS

2.1 Basic function and interchangeability

Lamps shall comply with IEC Publication 809.

2.2 Torsion strength

The cap shall be strong and firmly secured to the bulb.

Compliance is checked by submitting the lamp to the torque specified on the individual lamp data sheet before and after the life test. The torque shall not be applied suddenly, but shall be increased progressively from zero to the specified amount.

Values are based on an acceptable non-conformity level of 1% *.

2.3 Life

The average life measured on a test quantity of 20 lamps shall be at least 96% of the rated average life.

Compliance is checked by life tests as prescribed in Appendix A.

2.4 Life to 3% failures

The life to 3% failures shall be not less than the rated life to 3% failures indicated in the individual lamp data sheet.

Conditions of compliance:

When subjected to the life test according to Appendix A, the number of lamps failing before the required time shall not exceed the values in table I.

Table I

Number of lamps tested	Acceptance number
23 to 35	2
36 to 48	3
49 to 60	4
61 to 74	5
75 to 92	6

2.5 Lumen maintenance

The lumen maintenance shall be not less than the value indicated on the individual lamp data sheet. This value is based on an acceptable non-conformity level of 10%.

2.6 Resistance to vibration and shock

In the event of service life being influenced by vibration or shock, the test methods and schedules detailed in Appendix B should be used to assess the performance.

* Under consideration.

The lamps shall be deemed to have satisfactorily completed the vibration test if they continue to function during and after the test.

When subjected to the appropriate test schedule in Appendix B, the number of lamps failing the test shall not exceed the values in Table II (values are based on the AQL of 4%).

Table II

Number of lamps tested	Acceptance number
14 – 20	2
21 – 32	3
33 – 41	4
42 – 50	5
51 – 65	6

APPENDIX B

VIBRATION TESTS

B1. General

These tests are designed to ensure that lamps satisfactorily completing this schedule will not be adversely affected by shock and vibration in normal service.

Two levels of test are specified which are referred to as «standard test» and «heavy duty test» and the appropriate level must be selected for the intended vehicle usage.

The acceleration levels and frequency spectra used in these tests are based on extensive investigations into the characteristics experienced at lamp mounting positions on a wide range of vehicles and normal service conditions.

Although the standard test relates to normal vehicle service conditions, investigations have shown that the more arduous conditions given by heavy goods vehicles require lamps of a greater mechanical strength.

Within the constraints of dimensional and photometric specifications, the ultimate strength of an incandescent lamp is limited by the properties of the filament material. These restrict the mechanical stress to which a lamp can be subjected.

Higher vibration levels may impair the performance of filament lamps.

Simulation of service conditions can be achieved accurately by the use of wide-band random vibration generation equipment. However, studies have indicated that a relationship exists between wide-band and narrow-band random (NBR) vibration. Analysis of vibration measurements taken under transient conditions such as door, boot and bonnet closures show compatibility with the significant features of the NBR test programme.

The generally accepted requirements of a fatigue life of 10^7 reversals is encompassed by the schedule (IEC Publication 68-2-6).

Measurements of vibration and shock characteristics in service reveal frequencies of up to 20 000 Hz.

The power spectral density (p.s.d.) levels at frequencies above 1 000 Hz are, however, so low as to be insignificant. As the resonant frequencies of the critical construction features of most automobile lamps fall within the range of 200 - 800 Hz, this together with problems in the design of fixtures suitable for operation at frequencies above this level has led to the adoption of 1 000 Hz as the maximum limit for the test schedules (excluding half bandwidth).

B2. Test conditions

Figure B1, page B-7, details the preferred arrangement of equipment for the testing of lamps of NBR tests.

In order to be assured of reliable and reproducible test results the following procedures should be followed.

B2.1 Mounting

(IEC Publication 68-2-47: Mounting of components, equipment and other articles for dynamic tests including shock (Ea), Bump (Eb), Vibration (Fc and Fd) and steady-state acceleration (Ga) and guidance.)

The lamp caps shall be fastened rigidly to the work holders on the vibration head. This may be achieved by clamping, soldering or embedding. Electrical connection to the lamps shall be made by the use of soldered wires or other means such that electrical connection is ensured during the whole test.

On tests including higher frequencies it is essential that fixtures are designed such that the propagation path (the distance between lamp and moving coil) is always shorter than the one quarter wavelength of the velocity of sound in the fixture material.

B2.2 Measuring points

A measuring point is the position at which measurements are made to ensure that the test requirements are met. The measuring point shall be on the fixture as close as possible to the position at which the lamp is held and the detector shall be rigidly connected to it.

If several lamps are mounted on a single fixture, the measuring point may be related to the fixture generally rather than the lamp fixing points.

The resonant frequency of the fully-loaded fixture shall always be higher than the maximum test frequency.

B2.3 Control point

The signal from the transducer mounted at the measuring point will be used as a means of maintaining the specified vibration characteristics.

B2.4 Conditioning

Lamps shall be aged, before being tested, according to clause 1 of either table B1 or table B2.

B2.5 Axis of vibration

Field measurements on vehicles have shown that automobile lamps are usually subjected to greater stresses in the vertical plane than in either of the horizontal planes. It is therefore recommended that a vertical direction of excitation is used for testing with the principal lamp axis of the lamp and filament(s) horizontal.

B3. Test conditions

Test requirements are given in table B1 for standard service and table B2 for heavy duty service.

Table B1
Vibration test on motor vehicle lamps
Standard test conditions

1) <i>Electrical test conditions</i>	
1.1 Ageing	30 min at test voltage
1.2 Test voltage	In accordance with IEC Publication 809
2) <i>Narrow-band random vibration test</i>	
2.1 Frequency range	30 – 1 050 Hz
2.2 Bandwidth	100 Hz
2.3 Sweep range	80 – 1 000 Hz
2.4 Sweep rate	1 octave per min
2.5 Sweep duration (full cycle)	7,3 min
2.6 Acceleration level	0,12 g ² /Hz (= 3,5 g eff) from 80 to 150 Hz 0,014 g ² /Hz (= 1,2 g eff) from 150 to 1 000 Hz
2.7 Tolerance of the acceleration values	± 1 dB
2.8 Test duration	20 h
2.9 Switching cycle	20 min lit 10 min unlit
2.10 Compressor speed	10 dB per s

NOTE - All data are provisional.

Table B2
Vibration test on motor vehicle lamps
Heavy duty test conditions

1) <i>Electrical test conditions</i>	
1.1 Ageing	30 min at test voltage
1.2 Test voltage	In accordance with IEC Publication 809
2) <i>Narrow-band random vibration test</i>	
2.1 Frequency range	30 – 1 050 Hz
2.2 Bandwidth	100 Hz
2.3 Sweep range	80 – 1 000 Hz
2.4 Sweep rate	1 octave per min
2.5 Sweep duration (full cycle)	7,3 min
2.6 Acceleration level	0,36 g ² /Hz (= 6,0 g eff) from 80 to 150 Hz 0,09 g ² /Hz (= 3,0 g eff) from 150 to 1 000 Hz
2.7 Tolerance of the acceleration values	± 1 dB
2.8 Test duration	20 h
2.9 Switching cycle	20 min lit 10 min unlit
2.10 Compressor speed	10 dB per s

NOTE - All data are provisional.

APPENDIX C

GLASS BULB STRENGTH TEST

C1. General

If required the test specified in this appendix shall be used to determine the strength of glass bulbs of certain road vehicle lamps.

This test is necessary for these lamps because mechanical handling is utilised for their assembly in equipment.

C2. Test equipment and procedure

C2.1 *The principle of the test equipment*

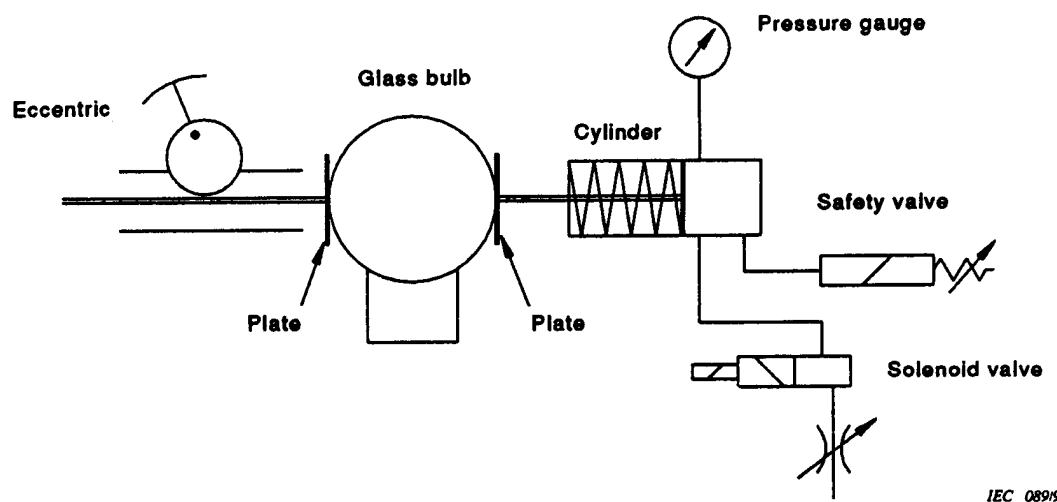


Fig. C1. – Diagrammatic sketch of the principle of the test equipment

The test apparatus consists mainly of:

- a pneumatic cylinder applying the necessary force,
- two plates transmitting the force onto the test sample,
- a measuring apparatus indicating the applied force.

C2.2 *Test conditions*

This apparatus shall test bulbs with a maximum diameter of 50 mm. The bulb shall be tested with a slowly increasing compressive force. In no case, shall bulbs be exposed to a shock load.

The increase of force from 0 to 200 N shall be in 4 to 5 s during which period the compression increases approximately in a linear manner.

It shall be possible to limit the maximum force applied by the apparatus to 200 N by a safety valve. The apparatus shall incorporate a suitable safety screen to prevent injury from glass fragments in the event of a bulb failure during the test.

C2.3 Requirements for plates

Each plate shall have a plane smooth surface with a diameter of approximately 20 mm and shall be of hardened tool steel. The hardness of the plates shall lie between 55 and 60 Rockwell (HRC).

C3. Requirements

The compression strength of the bulb may not fall below the values stated in the following table taking an AQL 1% as a basis.

Table CI
Compression strength

Category	Minimum glass bulb strength (N)	AQL (%)
R2 P21W P21/5W R5W R10W T4W W3W W5W	40	1

C4. Evaluation

One of the following procedures shall be applied.

C4.1 Assessment based on attributes

Set the test apparatus at the minimum force specified in table CI. A first sample is selected randomly from the batch, the number selected being determined by the batch size (see table CII). The number of bulbs are compared with the acceptance and rejection numbers. If there is no decision, a second sample is tested in accordance with table CII.

Table CII
Inspection by attributes – Double sampling plan

Batch	Sample	Accept	Reject
1 201 – 3 200	1st sample $n_1 = 80$	1	4
	2nd sample $n_2 = 80$	4	5
3 201 – 10 000	1st sample $n_1 = 125$	2	5
	2nd sample $n_2 = 125$	6	7
10 001 – 35 000	1st sample $n_1 = 200$	3	7
	2nd sample $n_2 = 200$	8	9
35 001 – 150 000	1st sample $n_1 = 315$	5	9
	2nd sample $n_2 = 315$	12	13

NOTE - If a second sample has to be taken, the number of bulbs breaking in the combined sample is compared with the acceptance and rejection numbers in the corresponding line.

This random test, based on attributes, corresponds with ISO 2859.

C2.4 Assessment based on variables

The size of the sample (selected randomly) is determined by the batch size as shown in table CIII.

Each lamp is tested until the bulb breaks and the value at which this occurs is recorded.

The result is assessed as follows:

the lower quality statistic (Q_L) is calculated using the equation:

$$Q_L = \frac{\bar{X} - 40}{S}$$

where $\bar{X}$ is the mean value of all the results in the sample

and

$$S = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n - 1}}$$

where X_i is the value of individual results

n is the number of results

The test is passed if: $Q_L \geq K$

where K is the acceptability constant determined from table CIII.