
British Standard Specification for
**Safety of tungsten filament lamps
for domestic and similar general
lighting purposes**

Prescriptions de sécurité pour lampes à filament de tungstène pour usage domestique
et éclairage générale similaire – Spécifications

Sicherheitsanforderungen an Glühlampen für den Hausgebrauch und
ähnliche Beleuchtungszwecke

The European Standard EN 60 432 has the status of a British Standard

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National foreword

This British Standard has been prepared under the direction of the Electrical Illumination Standards Committee and is the English language version of EN 60 432 which consists of IEC 432 : 1984 'Safety requirements for tungsten filament lamps for domestic and similar general lighting purposes', published by the International Electrotechnical Commission (IEC). This British Standard supersedes BS 5971 : Part 1 : 1980 and Part 2 : 1980 both of which are withdrawn.

National appendix W lists the United Kingdom cooperating organizations involved in the production of this standard.

Page numbering. Attention is drawn to the fact that the page numbers quoted in the text of EN 60 432 are the page numbers of IEC 432. These page references do not correspond to the EN page numbers.

Cross-references. Details of other international publications quoted in this standard are given in appendix H. Where there are British Standards either identical or related to these international standards the relationship is given in national appendix X.

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

**Amendment No. 1
published and effective from 28 March 1991
to BS 5971 : 1988**

**Specification for safety of tungsten filament
lamps for domestic and similar general
lighting purposes**

NOTE. This amendment is being published to implement Amendment 1, published in 1989, to EN 60 432, which includes Amendment Nos. 1 and 2 to IEC 432 : 1984.

Revised text

**AMD 6369
March 1991**

National foreword

Delete paragraph 1 and substitute the following.

'This British Standard has been prepared under the direction of the Electrical Illumination Standards Policy Committee and is the English language version of EN 60 432 and Amendment 1 to EN 60 432 which consists of IEC 432 : 1984 'Safety requirements for tungsten filament lamps for domestic and similar general lighting purposes', including Amendment Nos. 1 and 2 to IEC 432, published by the International Electrotechnical Commission (IEC). This British Standard supersedes BS 5971 : Part 1 : 1980 and Part 2 : 1980 both of which are withdrawn.'

**AMD 6369
March 1991**

EN title page, brief history and technical text

Insert the attached EN title page (brief history and technical text on reverse).

**AMD 6369
March 1991**

Text of EN 60 432

Amend the text of European Standard EN 60 432 in accordance with the details given on the attached pages.

NOTE. References to page numbers in the text of this amendment should be ignored.

UDC: 621.326:644.3:620.1:614.8

KEY WORDS: lighting fitting; tungsten filament lamp; definition; safety; protection against live parts; torsion resistance; insulation resistance; temperature rise; interchangeability; quality control

Amendment 1 to the English version of EN 60 432

Safety requirements for tungsten filament lamps for domestic and similar general lighting purposes

(Amendment No. 1 (1985) and Amendment No. 2 (1987)
to IEC 432 (1984 - 2nd edition))

Prescriptions de sécurité pour lampes à
filament de tungstène pour usage domestique
et éclairage général similaire
(Modification no 1 (1985) et
Modification no 2 (1987) à la
CEI 432 (1984 - 2ème édition))

Sicherheitsanforderungen an Glühlampen
für den Hausgebrauch und ähnliche
Beleuchtungszwecke
(Änderung Nr. 1 (1985) und
Änderung Nr. 2 (1987) zur
IEC 432 (1984 - 2. Ausgabe))

Amendment 1 modifies the European Standard EN 60 432, January 1988.
It was ratified by CENELEC on 24 January 1989.

CENELEC members are bound to comply with the requirements of the CENELEC Internal Regulations which specify under which conditions this Amendment should be incorporated, without any alteration, in the corresponding national standard.

This Amendment exists in the three official versions (English, French and German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to CENELEC Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, 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 Bréderode 2, B-1000 Brussels

Brief history

The CENELEC Questionnaire Procedure performed for finding out whether or not Amendment No. 1 (1985) and Amendment No. 2 (1987) to IEC 432 (2nd edition - 1984) could be accepted without textual changes, has shown that no CENELEC common modifications were necessary. The Reference Document was submitted to the CENELEC members for formal vote and acceptance by CENELEC.

Technical text

The text of Amendment No. 1 (1985) and Amendment No. 2 to the International Standard IEC 432 (2nd edition - 1984) was approved by CENELEC on 24 January 1989 as Amendment 1 to the European Standard EN 60 432.

The following dates were fixed:

- | | |
|---|--------------|
| — date of announcement (doa) | : 1989—09—01 |
| — date of latest publication (dop) | : 1990—03—01 |
| — date of withdrawal of conflicting national standard (dow) | : 1990—03—01 |

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CONTENTS

APPENDIX A

Amend the heading as follows:

Packaging marking symbols for dichroic reflectorized “cool beam” lamps and bowl mirror lamps.

Add the following to the list of contents:

APPENDIX H — Method of measuring mains impedance 57

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4. Marking

Add the following new sub-clause:

4.3 For bowl mirror lamps the immediate lamp wrapping and container shall be marked with the symbol shown in Appendix A.

Compliance shall be checked by visual inspection.

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TABLE VII, Clause number 11

Delete “³⁾” in columns 3 and 4; insert “200” in column 3 and “2” in column 4.

Delete “³⁾ Under consideration” below the table.

Page 17

Replace Table III and text following it by the table of data and text shown below:

TABLE III

Wattage ¹⁾	(°C) Maximum temperature rise (Δt_s max.)				Bulb shape
	E14	E27	B15d	B22d	
60 100, 150 and 200	– –	120 130	– –	125 135	Pear-shape, mushroom or lamps with other shapes intended for use in the same luminaire
40 60	130 140	140 ²⁾ 120	135 145	140 ²⁾ 125	Candle, round bulb or lamps with other shapes intended for use in the same luminaire
40 60 60 100, 150 and 200	135 135 – –	135 – 130 135	135 135 – –	135 – 130 135	} Round bulb with bowl mirror ³⁾ } Pear-shape with bowl mirror ³⁾
40 60 100, 150 and 200 75, 100 and 150	120 – – –	120 130 ²⁾ 135 150	120 – – –	120 130 ²⁾ 135 –	} Reflector lamps with blown bulb Reflector lamps with PAR-bulb
150	–	175	–	–	Reflector lamps with PAR-bulb and dichroic mirror ³⁾

¹⁾ For lamps with intermediate wattage ratings, the requirements for the next higher wattage apply.

²⁾ Under consideration.

³⁾ The package of such lamps shall be marked with the symbol shown in Appendix A.

Compliance shall be checked by the measurement of lamp cap temperature rise on lamps in the same class in accordance with the test procedure specified in IEC Publication 360: Standard Method of Measurement of Lamp Cap Temperature Rise.

Note. — A test procedure for lamps intended for “cap down” operation and expressly marked in this way on the packaging is under consideration.

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APPENDIX A

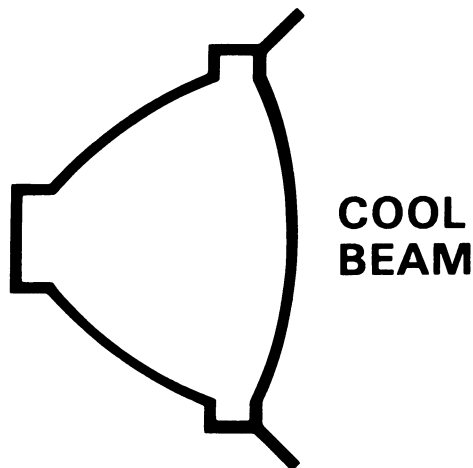
Replace the existing text of this appendix by the following:

APPENDIX A

PACKAGING MARKING SYMBOLS FOR DICHROIC REFLECTORIZED “COOL BEAM” LAMPS AND BOWL MIRROR LAMPS

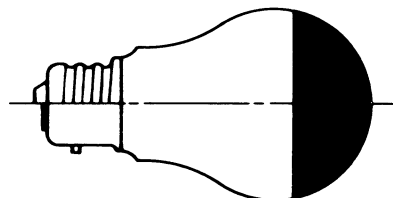
These symbols are to safeguard against the use of the lamps below in unsuitable luminaire installations where overheating could occur. Such luminaires are required to be marked also with a symbol. See IEC Publication 598.

Dichroic reflectorized “cool beam” lamps



248/84

Bowl mirror lamps



450/85

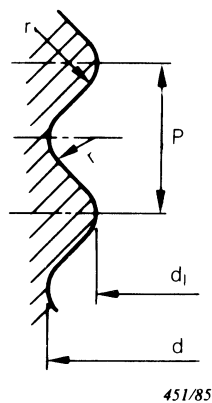
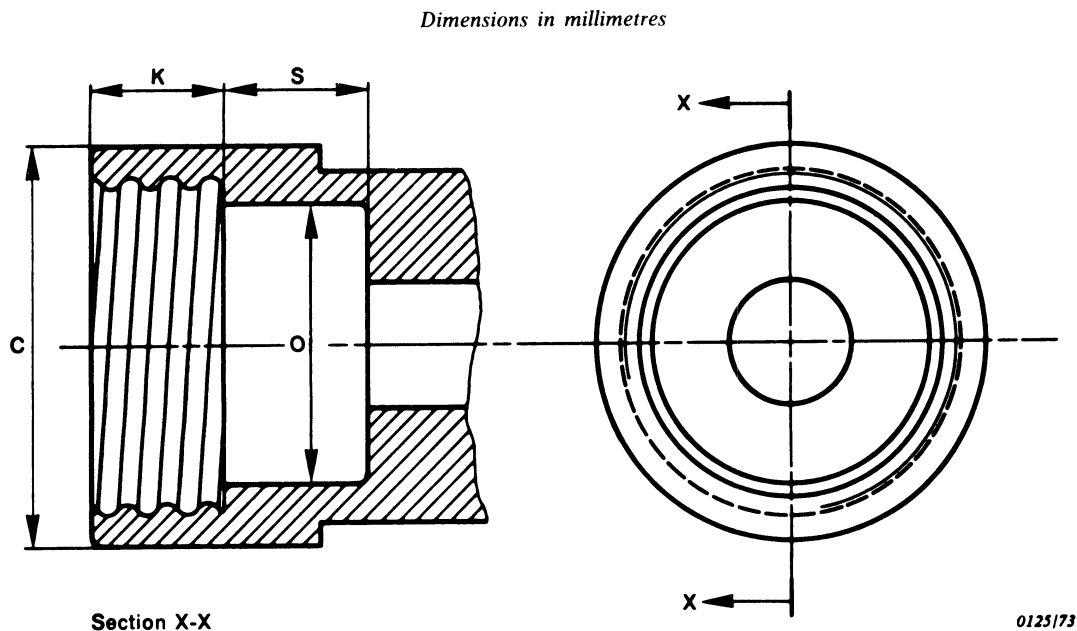
Note. — The cap shown in the symbol may be bayonet or Edison screw. The bowl shape may be varied to show the shape of the lamp.

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FIGURE 3

Replace the existing figure by the following new figure:

The drawing is intended only to illustrate the essential dimensions of the holder.
Compliance with the dimensions of these holders is only checked if a doubt arises from the application of the test.



Detail of thread

Dimension	E14	E26d	E27	Tolerance
C	20.0	32.0	32.0	Min.
K	11.5	11.0	13.5	+0 -0.3
O	12.0	23.0	23.0	±0.1
S	7.0	12.0	12.0	Min.
d	13.89	26.492	26.45	+0.1 -0
d ₁	12.29	24.816	24.26	+0.1 -0
P	2.822	3.629	3.629	-
r	0.822	1.191	1.025	-

Notes. — Surface roughness of screw thread $R_a = 0.2$ as per ISO/R 468.

Care should be taken to ensure that before use, the test holders are completely free from lubricants and grease.

FIG. 3. — Holder for torque test on lamps with screw caps.

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APPENDIX D

Replace the text of Clause D4 by the following:

D4. For lamps of 200 V to 250 V rating, the test rack circuit is to have the following characteristics when measured by the method in Appendix H:

Resistance	0.5 ± 0.1 Ω
Inductance	500 ± 100 μH*
Individual external lamp fuse, min.	10 A slow acting
Surge limit	600 V**

* Manufacturers undertaking their own testing may use higher levels of inductance provided that the total impedance does not exceed 0.7 Ω. On a 60 Hz supply, the inductance should be proportionately lower (values under consideration).

** The information is given to enable surge limiters of the correct rating to be selected.

Add the following new appendix:

APPENDIX H

METHOD OF MEASURING MAINS IMPEDANCE

The method shown below enables mains impedance to be measured with sufficient accuracy to show that test conditions comply with the requirements of Clause D4.

This method uses currents that occur under the conditions of normal operation whilst maintaining the mains voltage.

On the principle of “ ΔU measurements” a measurable potential difference U is produced by large resistive and inductive loads. The figure shows the bridge circuit.

Terminals a and b of the bridge are the terminals of the mains of which the impedance is to be found. The e.m.f. of the mains is E_m and its impedance $Z_m = R_m + jx_m$.

When either R_{21} or X_{22} has been switched into circuit, the bridge is balanced if closure of S does not alter voltage U_{ac} , i.e. $\Delta U = 0$.

The equilibrium conditions are:

$$R_m \simeq \frac{R_{21}}{R_4} \cdot R_3 = R'_m \text{ for the resistive bridge;}$$

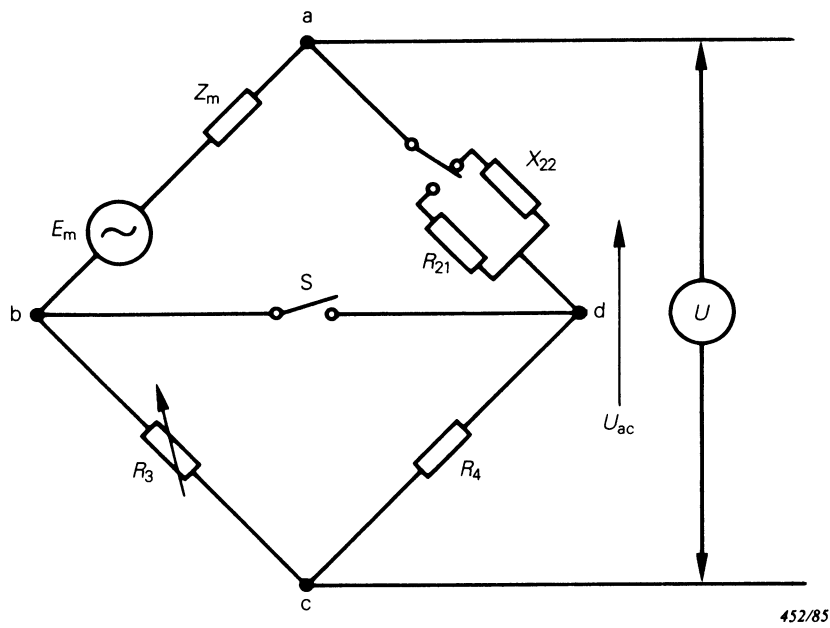
$$X_m \simeq \frac{X_{22}}{R_4} \cdot R_3 = X'_m \text{ for the inductive bridge.}$$

R_{21} and X_{22} are loads that produce a current of approximately 10 A.

The fixed resistor R_4 and resistance box R_3 (adjustable in three decades) together constitute the high resistance branch. For switch S, a triac may be used which switches at the current zero point.

The equipment to measure ΔU shall have a sensitivity sufficient to identify the null point. In determining R_m and X_m slight errors will occur due to X_m and $(R_m + R_{22})$ respectively. R_{22} is the relatively low but nevertheless unavoidable resistance of load X_{22} . The error present in finding R_m will be negligible. The error involved in determining X_m will usually be a few per cent and will then be negligible. If it exceeds 10% a correction should be made in accordance with the normal rules of electrical engineering.

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Note. — A suitable measurement circuit is described in “Messgerät zur Bestimmung des komplexen Innenwiderstandes in Niederspannungsnetzen” (An instrument for the determination of complex source impedance in low voltage mains supplies) by R. Gretsch, Elektrotech. Zeitschrift (ETZ), A, vol. 91, No. 9, pp. 526–7 (1970).

432 Amend. 2 © IEC 1987

PREFACE

This amendment has been prepared by Sub-Committee 34A: Lamps, of I E C Technical Committee No. 34: Lamps and Related Equipment.

The text of this amendment is based upon the following documents:

Six Months' Rule	Report on Voting
34A(CO)321	34A(CO)360

Further information can be found in the relevant Report on Voting indicated in the table above.

Page 3

CONTENTS

Add the following to the list of contents:

APPENDIX J – Induced failure test:
Grouping, sampling and compliance

Page 7

2. Definitions

2.9 Type test

Correction in French text only.

Page 19

11. Safety at end of life

Amend the second paragraph to read:

Compliance shall be checked by carrying out:

- an induced failure test in accordance with Appendix E; and
- an operation to failure test in accordance with Appendix D.

Note. – The induced failure test is not suitable for lamps with voltages below 100 V.

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If lamps fail the requirements of the induced failure test, it is not necessary for them to be submitted to the operation to failure test.

Under the circumstances defined in Clause J3 the operation to failure test may be used in place of the induced failure test.

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14. Conditions of compliance by means of manufacturers' records

Add the following new Sub-clause 14.5 and renumber existing Sub-clauses 14.5 to 14.9 in consequence and also references to Sub-clauses 14.6 and 14.7 in Sub-clauses 14.7 and 14.8:

14.5 In relation to Appendix D, the manufacturer shall have a sampling plan which does not deliberately exclude any of the classes in his nominated list.

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TABLE V

Amend as follows:

Column 6

Delete NQA insert AQL

Clause number 11

Amend as follows:

	a) Induced failure	Design	See Appendix J Clause J1	Appendix J Clause J2	Appendix J Clause J4
11.	b) Operation to failure	Periodic	All lamps of all classes	315	0.25

Delete Note ² and renumber the remainder.

Note ³. Correction in French text only.

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APPENDIX D

Delete the first sentence: "Alternative test for Clause 11"

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APPENDIX E

Delete "PROPOSED" from the title

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E2. Test procedures

Add E2.1 at the start of this clause

Add the following new sub-clause:

E2.2 If the lamp still remains alight it may be conditioned by being operated at an over-voltage for a period of time equivalent to 60% of nominal life (Sub-clause J2.3). It shall then be re-subjected to the high voltage pulse (Sub-clause E2.1).

The conditioning requirements are as follows:

- Conditioning by a test house — permitted to condition up to 10% over-voltage. Any burn-outs occurring during the conditioning shall be counted in the final assessment (provided the impedance limits are met).
- Conditioning by manufacturer — permitted to condition up to 30% over-voltage. If the over-voltage is greater than 10% or the test racks do not comply with the requirements then burn-outs occurring during the conditioning shall not be counted in the final assessment.

Note. — The conditioning requirements for a test house are different from those for the manufacturer in order to ensure that the test house does not inadvertently put unrealistic stresses on the lamps during conditioning. On the other hand they give the manufacturer the possibility of saving testing time and costs by using his detailed knowledge of the stresses his lamps can resist.

E3. Assessment

Amend the second sentence to read:

“ ... then the lamp is deemed to have failed the test and is counted as a non-conformity.”

Replace the last sentence by the following:

If the lamp remains alight after the test procedure specified in Sub-clause E2.2, it is deemed to have passed the test.

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FIGURE 6

Replace the existing figure by the following new figure:

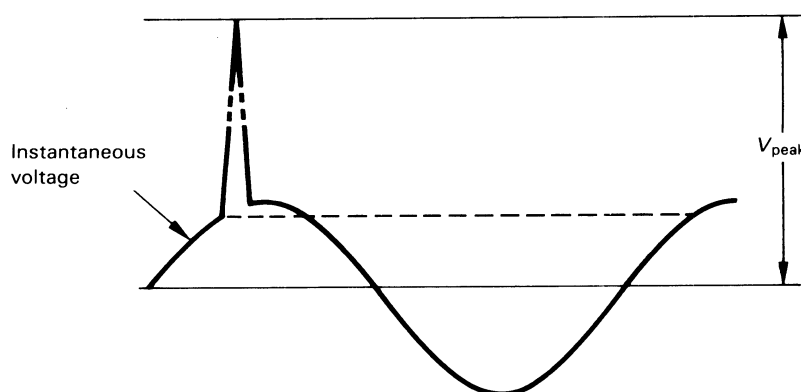


FIGURE 6

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Add the following new appendix:

APPENDIX J

INDUCED FAILURE TEST: GROUPING, SAMPLING AND COMPLIANCE

This test is a design test, that is to be made in the case of a design change.

J1. Grouping

Classes of lamps are generally assessed separately, but:

J1.1 Classes which differ only in respect to the cap may be grouped as follows:

B15 and B22 E14 and E27

J1.2 Classes which differ only in having different finishes, for example white, coloured, mirrored, may be grouped provided the tests are carried out on those classes having an extra coating rather than on clear or pearl lamps. If there are lamps with an inside coating these should be chosen in preference to lamps with an outside coating.

J2. Sampling

J2.1 If only one class (or classes as grouped in Clause J1) is to be assessed, then a sample of 125 is taken; a second sample of 125 may be necessary depending on the result (see Sub-clause J4.1).

J2.2 If several classes (or grouped classes) are to be tested, then the number of samples per class may be reduced to not less than 50 providing the total sample for all classes is at least 1 000, and the initial samples from each class are approximately equal.

J2.3 In the case where burn-out on the induced failure test does not always occur, a definitive result may be ascribed providing that in each class tested not less than 25 lamps burn out. If less than 25 lamps burn out, one of the two procedures below shall be applied.

J2.3.1 The number of lamps submitted to the test shall be increased until 25 have burnt out. If this still fails to achieve the requisite number of burn-outs, a quantity of lamps sufficient to make up the number to 25 shall be subjected to the procedures in Appendix E, Sub-clause E2.2 and Clause E3. A definite result may be ascribed providing, in each class tested, not less than 25 lamps pass the induced failure test.

J2.3.2 Alternatively, a sufficient number of lamps to complete the minimum number specified in Sub-clause J2.3 shall be subjected to the procedures in Appendix E, Sub-clause E2.2 and Clause E3. A definite result may be ascribed providing, in each class tested, not less than 25 lamps pass the induced failure test.

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J3. Alternative test data

- J3.1 Provided the requirements of Clause J1, and Sub-clauses J2.1 and J2.2 are met, it shall be permissible to use the test procedure in Appendix D in place of that in Appendix E.
- J3.2 Providing there have been no design changes, operation to failure data accumulated over any period under the conditions of Appendix D may be used wholly or partly in place of part of the sample requirements of Sub-clauses J2.1 and J2.2 on a one for one basis.

J4. Conditions of compliance

- J4.1 If one class only is being assessed (Sub-clause J2.1) the result of the first 125 is considered and action taken as follows:
- 0 non-conformity *: Pass
 - 2 (or more) non-conformities: Reject
 - 1 non-conformity: Take second sample of 125, in which case the test is passed only if there are no more non-conformities.

* “Non-conformity” is defined in Clause E3 of the induced failure test.

If a second sample is taken, the requirements of Sub-clause J2.3 apply separately to the second sample.

- J4.2 If a reduced sample size is used in accordance with Sub-clause J2.2, assessment is made on the total of all classes taken together, but if in any individual class (or grouped class) there are:
- a) Two or more non-conformities: All classes submitted are deemed to have failed.
 - b) One non-conformity: Additional samples of this class are taken and, provided there are no more non-conformities by the time the total sample for the class has reached 250, the class is passed.

When all classes have been assessed individually, the total number of lamps in all classes, taken together, is referred to Table VIA. All classes are deemed to have passed if the number of non-conformities does not exceed the corresponding acceptance number or qualifying percentage limit.

When a small number of classes is being assessed, such that the sample size is not reduced, they are treated individually in accordance with Sub-clause J4.1.

J5. Examples to illustrate applications of the proposals for induced failure test sampling

- J5.1 A manufacturer wishes to assess the following classes:
- 200-250 V 40 W sc Pearl,

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- 200-250 V 40 W cc inside White,
- 200-250 V 40 W cc Red, Blue, Green and Yellow
(the colours being external glazes),
- 200-250 V 60 W cc Pearl,
- 200-250 V 60 W cc Bowl mirror.

He takes:

- 125 samples of 40 W sc Pearl,
- 125 samples of 40 W cc inside White,
- 125 samples of 60 W cc Bowl mirror.

(In each case a further sample of 125 may be necessary if one non-conformity occurs.)

J5.2 A manufacturer wishes to assess 11 classes — he takes 91 lamps from each class (total sample 1 001).

J5.3 A manufacturer wishes to assess 25 classes — initially he takes 50 lamps per class (total sample 1 250).

J5.4 The testing in example J5.2 proceeds and in one class, out of the 91 lamps only 27 burn out — without any bulb failing to comply with Clause E3. As the number of burn-outs exceeds 25, and there are no non-conformities in the 91 lamps tested, the test on this class is passed.

J5.5 Again taking example J5.2, in another class only 13 burn out.

The manufacturer may then take a further sample to try to achieve 25 burn-outs — this could involve possibly another 85 lamps; or he could test 12 lamps in accordance with Clauses E2 and E3 to obtain a result for this class.

J5.6 In example J5.2, 91 lamps were taken — in one class 39 burn out, but one failed to comply with Clause E3. A further sample of 159 is taken. This time 70 lamps burn out but none fail to comply with Clause E3. 250 lamps of this class have now been tested with 109 burn-outs and one failing to comply with Clause E3. This meets the individual class requirement, but the results of all 11 classes must be summarized and applied to Table VIA.

J5.7 In example J5.1:

The test on 125 40 W inside white lamps gives 103 burn-outs and one non-conformity. A further 125 lamps are taken with 87 burn-outs and one more non-conformity. The result is assessed on the basis of 250 test results and two non-conformities. Thus all the manufacturer's 200 V to 250 V 40 W cc, inside white and colours are deemed not to be in compliance.

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J5.8 In example J5.1:

The test on 125 60 W bowl mirror lamps gives seven burn-outs with no non-conformities; 18 lamps are put on life test and one fails to comply with Clause E3. A further sample of 125 is taken. On the induced failure test, 11 burn-outs occur with no non-conformities. Fourteen lamps are then tested in accordance with Clauses E2 and E3, none of which fail to comply with Clause E3 at the end of life.

The result is now one non-conformity in 250 lamps tested and is, therefore, a pass.