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PAKISTAN STANDARD

DOUBLE-CAPPED FLUORESCENT LAMPS – PERFORMANCE SPECIFICATIONS

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PAKISTAN STANDARD SPECIFICATION FOR DOUBLE-CAPPED FLUORESCENT LAMPS – PERFORMANCE SPECIFICATIONS

0. FOREWORD

0.1 This Pakistan Standard was adopted by the authority of the Board of Directors of Pakistan Standard and Quality Control Authority after the draft prepared by the Technical Committee for "Electric Lamps (EDC-2)" had been approved and endorsed by the National Standards Committee on 19th January 2012.

0.2 This Pakistan Standard PS: 292 was based on IEC 60081/1997 which was subsequently revise. It deemed necessary to revise the standard on the basis of latest IEC: 60081/2010 in order to keep abreast with the latest development in technology.

0.3 This Standard is an adoption of IEC: 60081 / 2010 alongwith amendment-4 and its use is hereby acknowledged with thanks.

0.4 This Standard is subject to periodical review in order to keep pace with the changing requirements and latest development in the industry. Any suggestions for improvement will be recorded and placed before the revising committee in due course.

0.5 This Standard covers technical provisions and it does not purport to include all the necessary provision of a contract.

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DOUBLE-CAPPED FLUORESCENT LAMPS – PERFORMANCE SPECIFICATIONS

1 General

1.1 Scope

This International Standard specifies the performance requirements for double-capped fluorescent lamps for general lighting service.

The requirements of this standard relate only to type testing. Conditions of compliance, including methods of statistical assessment, are under consideration

The following lamp types and modes of operation are included:

a) lamps having preheated cathodes, designed for operation on a.c. mains frequencies with the use of a starter, and additionally operating on high frequency;

b) lamps having preheated high-resistance cathodes, designed for operation on a.c. mains frequencies without the use of a starter (starterless), and additionally operating on high frequency;

c) lamps having preheated low-resistance cathodes, designed for operation on a.c. mains frequencies without the use of a starter (starterless), and additionally operating on high frequency;

d) lamps having preheated cathodes, designed for operation on high frequency;

e) lamps having non-preheated cathodes, designed for operation on a.c. mains frequencies;

f) lamps having non-preheated cathodes, designed for operation on high frequency.

For some of the requirements given in this standard, reference is made to "the relevant lamp data sheet". For some lamps these data sheets are contained in this standard. For other lamps, falling under the scope of this standard, the relevant data are supplied by the lamp manufacturer or responsible vendor.

1.2 Statement

It may be expected that lamps which comply with this standard will start and operate satisfactorily at voltages between 92 % and 106 % of rated supply voltage and at an ambient air temperature of between 10 °C and 50 °C, when operated with a ballast complying with IEC 60921 or IEC 60929, where relevant with a starter complying with IEC 60155 or IEC 60927, and in a luminaire complying with IEC 60598.

1.3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050(845):1987, *International Electrotechnical Vocabulary (IEV[1]) – Chapter 845: Lighting*

IEC 60061-1:1969, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 1: Lamp caps*

IEC 60155:1993, *Glow starters for fluorescent lamps*

IEC 60598 (all parts), *Luminaires*

IEC 60921:1988, *Ballasts for tubular fluorescent lamps – Performance requirements*

IEC 60927:1996, *Auxiliaries for lamps – Starting devices (other than glow starters) – Performance requirements*

IEC 60929:1990, *A.C. supplied electronic ballasts for tubular fluorescent lamps – Performance requirements*

IEC 61049:1991, *Capacitors for use in tubular fluorescent and other discharge lamp circuits – Performance requirements*

IEC 61195:1993, *Double-capped fluorescent lamps – Safety specifications*

IEC 61231:1993, *International lamp coding system (ILCOS)*

1.4 Definitions

For the purpose of this International Standard, the definitions of IEC 60050(845) and the following definitions apply.

1.4.1
fluorescent lamp
discharge lamp of the low-pressure mercury type, in which most of the light is emitted by one or several layers of phosphors excited by the ultra-violet radiation from the discharge [IEV 845-07-26, modified]

1.4.2
double-capped fluorescent lamp
fluorescent lamp having two separate caps and mostly of tubular form and linear shape

1.4.3
nominal value
approximate quantity value used to designate or identify a lamp

1.4.4
rated value
quantity value for a characteristic of a lamp for specified operating conditions. The value and the conditions are specified in this standard, or assigned by the manufacturer or responsible vendor

1.4.5
lumen maintenance
ratio of the luminous flux of a lamp at a given time in its life to its initial luminous flux, the lamp being operated under specific conditions. The ratio is generally expressed as a percentage

1.4.6
initial readings
starting characteristics of a lamp, measured before ageing, and the electrical, photometric and cathode characteristics of a lamp, measured at the end of the 100 h ageing period

1.4.7
starting aid
conductive strip affixed to the outer surface of a lamp, or a conductive plate which is spaced within an appropriate distance from the lamp. A starting aid is usually connected to earth potential, and can only be effective when it has an adequate potential difference from one end of the lamp

1.4.8
reference ballast
special ballast, either inductive for lamps for operation on a.c. mains frequencies, or resistive for lamps for operation on high frequency. It is designed for the purpose of providing comparison standards for use in testing ballasts, for the selection of reference lamps and for testing regular production lamps under standardized conditions. It is essentially characterized by the fact that, at its rated frequency, it has a stable voltage/current ratio which is relatively uninfluenced by variations in current, temperature and magnetic surroundings, as outlined in the relevant ballast standard [IEC 845-08-36, modified]

1.4.9
calibration current of a reference ballast
value of the current on which the calibration and control of the reference ballast are based

1.4.10
type test
test or a series of tests made on a type test sample for the purpose of checking compliance of the design of a given product with the requirements of the relevant standard

1.4.11
type test sample
sample consisting of one or more similar units submitted by the manufacturer or responsible vendor for the purpose of a type test

1.5 Lamp requirements

1.5.1 General

A lamp, on which compliance with this standard is claimed, shall comply with the requirements of IEC 61195.

A lamp shall be so designed that its performance is reliable in normal and accepted use. In general, this can be achieved by satisfying the requirements of the following subclauses.

The requirements and information given apply to 95 % of production.

NOTE The requirements and tolerances permitted by this standard are based on testing of a type test sample submitted by the manufacturer for that purpose. In principle, this type test sample should consist of units having characteristics typical of the manufacturer's production and be as close to the production centre-point values as possible.

It may be expected with the tolerances given in the standard that products manufactured in accordance with the type test sample will comply with the standard for the majority of the production. Due to the production spread, however, it is inevitable that there will sometimes be products outside the specified tolerances. For guidance on sampling plans and procedures for inspection by attributes, see IEC 60410.

1.5.2 Caps

The dimensions of the caps on a finished lamp shall be in accordance with IEC 60061-1.

a) For lamps with G5 or G13 caps, both pins (excluding flanges) of the two caps of a finished lamp shall pass simultaneously, freely without binding, through parallel slots, suitably spaced longitudinally to receive the lamp. The slots shall each be 2,87 mm wide for G5 caps, and 3,05 mm wide for G13 caps.

b) For lamps with R17d caps, both cap bosses of a finished lamp shall pass simultaneously, freely without binding, through parallel slots, suitably spaced longitudinally to receive the lamp with the bottom of the slots against the boss ends. The slots shall each be 6,35 mm deep and 9,22 mm wide.

1.5.3 Dimensions

The dimensions of a lamp shall comply with the values specified on the relevant lamp data sheet.

1.5.4 Starting characteristics

A lamp shall start fully within the time specified on the relevant lamp data sheet and remain alight.

Conditions and method of test are given in Annex A.

1.5.5 Electrical and cathode characteristics

a) The initial reading of the voltage at the lamp terminals shall comply with the values specified on the relevant lamp data sheet.

NOTE 1 It may be expected that over the declared lifetime of the lamp, the lamp voltage may rise typically by 5 V to 10 V.

b) The initial reading of the power dissipated by a lamp shall not exceed the rated wattage, specified on the relevant lamp data sheet, by more than 5 % + 0,5 W.

NOTE 2 Cathode watts due to supplementary heating are not included in the rated lamp wattage unless otherwise stated on the lamp data sheet.

c) For a lamp having preheated cathodes for operation on a.c. mains frequencies starterless circuits, the initial reading of the resistance of each cathode shall be not less than the minimum value specified on the relevant lamp data sheet.

d) For a lamp having preheated cathodes for operation on high frequency, the initial reading of the resistance of each cathode shall comply with the values specified on the relevant lamp data sheet.

Conditions and method of test are given in Annex B.

1.5.6 Photometric characteristics

a) The initial reading of the luminous flux of a lamp shall be not less than 92 % of the rated value.

b) The initial reading of the chromaticity coordinates x and y of a lamp shall be within 5 SDCM (standard deviation of colour matching) from the rated values.

NOTE See also Annex D on chromaticity co-ordinates.

c) The initial reading of the general colour rendering index Ra of a lamp shall be not less than the rated value decreased by three.

Conditions and method of test are given in Annex B.

1.5.7 Lumen maintenance

The lumen maintenance of a lamp shall be not less than 92 % (under consideration) of the rated lumen maintenance value at any time in its life.

Conditions and method of test are given in annex C.

1.5.8 Marking

A lamp shall be marked with an identification which defines, with the aid of information made available by the manufacturer or responsible vendor, the electrical and photometric characteristics of the lamp.

1.6 Information for ballast and starter design

Refer to the relevant lamp data sheet and to annex E for information for ballast and starter design.

1.7 Information for luminaire design

Refer to annex F for information for luminaire design.

Annex A
(normative)

Method of test for starting characteristics

A.1 General

Tests shall be made in a draught-free atmosphere at an ambient temperature of between 20 °C and 27 °C and a relative humidity of 65 % maximum.

Metallic parts and wires in the vicinity of the lamp, except starting aids when required, shall be avoided as far as possible.

Immediately prior to the starting test the lamps shall be kept inoperative and in an ambient temperature of between 20 °C and 27 °C and a relative humidity of 65 % maximum for a period of at least 24 h.

A.2 Lamps having preheated cathodes for operation on a.c. mains frequencies with the use of a starter

A.2.1 Test circuit

Lamps shall be tested with a 50 Hz or 60 Hz supply in the circuit shown in figure A.1.

A.2.2 Ballast

The ballast used shall be of the inductive type, unless specified otherwise on the relevant lamp data sheet, and shall comply with the requirements of IEC 60921. It shall be rated as specified on the relevant lamp data sheet. Where a capacitive circuit is specified, additionally the capacitor used shall comply with the requirements of IEC 61049.

When the ballast, at its rated voltage, is associated with a test lamp, the lamp shall dissipate a power which does not differ from its rated value by more than 4 %. A test lamp is a lamp whose voltage at lamp terminals does not deviate by more than 2 % from its rated value, when operated with its reference ballast.

The preheating current, when measured at 90 % of rated ballast voltage, shall be between 1,1 and 1,2 times the rated lamp current. To obtain a value of the preheating current within this range, it may be necessary either to make a special selection from among commercial ballasts or else to design and manufacture a ballast for this specific purpose. In some cases, it may be possible to bring the preheating current down to be within this range by adding resistance in series with the starter.

NOTE – In some cases the ballast may include an autotransformer to increase (or reduce) the voltage to the proper value for the starting and operation of the lamp. Ballasts incorporating step-up transformers are particularly likely to be used in countries where 120 V or 100 V power systems predominate.

A.2.3 Starter

The type of glow starter to be used shall comply with the requirements of IEC 60155, and shall in any case be subject to agreement with the lamp manufacturer or responsible vendor.

A.2.4 Test voltage

The test voltage applied to the circuit shall be as specified on the relevant lamp data sheet.

A.3 Lamps having preheated cathodes for operation on a.c. mains frequencies without the use of a starter (starterless)

A.3.1 Test circuit

Lamps shall be tested with a 50 Hz or 60 Hz supply in the circuit shown in figure A.2.

A.3.2 Ballast

The ballast used shall be of the inductive type, and shall comply with the requirements of IEC 60921. It shall be rated as specified on the relevant lamp data sheet.

When the ballast, at its rated voltage, is associated with a test lamp, the lamp shall dissipate a power which does not differ from its rated value by more than 4 %. A test lamp is a lamp whose voltage at lamp terminals does not deviate by more than 2 % from its rated value, when operated with its reference ballast.

NOTE 1 In some cases the ballast may include an autotransformer to increase (or reduce) the voltage to the proper value for starting and operation of the lamp. Ballasts incorporating transformers are particularly likely to be used in countries where 100 V, 120 V, 200 V, 277 V or 347 V power systems predominate.

NOTE 2 The earthing of the circuit as shown in figure A.2 may make it necessary to supply it through an isolating transformer.

A.3.3 Starting aid

The starting aid, a metal plate, shall be connected to earth potential together with one lamp cathode. Its length shall be not less than that of the lamp under test and it shall be 25 mm wide for 16 mm diameter lamps and 40 mm wide for 26 mm to 38 mm diameter lamps. The distance between the surface of the lamp and the starting aid shall be as specified on the relevant lamp data sheet.

The manufacturer or responsible vendor shall specify whether or not the lamps require an external starting aid, and whether one cathode shall be connected to earth potential. For lamps not requiring a separate starting aid, the metal plate shall be removed.

A.3.4 Test voltages

The voltage of the heating circuit to be applied to the cathode terminals and the open circuit voltage at the lamp terminals for the starting test shall be as specified on the relevant lamp data sheet.

NOTE The voltages specified for the starting test are chosen primarily to secure reproducibility of test results, and are not necessarily applicable to the design of ballasts.

The voltages of the main circuit and of the heating circuits shall be applied simultaneously.

The voltage applied to the cathode heating circuits shall not be so connected as to increase the voltage of the main circuit. The two circuits shall be connected to the same phase of the supply.

The two cathode heating transformers may be replaced by one with isolated secondary windings. The transformer(s) shall be such that the voltage does not change by more than 2 % when the maximum cathode load is connected.

If the lamp does not start at the specified open circuit voltage, this voltage shall be gradually increased up to a maximum of 110 % of the test value. If the lamp still does not start, it shall be rejected. If the lamp does start, it shall be operated for 30 min at rated voltage and the normal test shall be made again after a rest period of 24 h.

A.4 Lamps having non-preheated cathodes for operation on a.c. mains frequencies

A.4.1 Test circuit

Lamps shall be tested with a 50 Hz or 60 Hz supply in the circuit shown in figure A.3.

A.4.2 Ballast

The ballast used shall be of the inductive type, and shall comply with the requirements of IEC 60921. It shall have a suitable open circuit voltage.

A.4.3 Test voltage

The open circuit voltage at the lamp terminals for the starting test shall be as specified on the relevant lamp data sheet.

NOTE – The voltage specified for the starting test is chosen primarily to secure reproducibility of test results and is not necessarily applicable to the design of ballasts.

If the lamp does not start at the specified open circuit voltage, this voltage shall be gradually increased up to a maximum of 125 % of the test value. If the lamp still does not start, it shall be rejected. If the lamp does start, it shall be operated for 30 min at rated voltage, and the normal test shall be made again after a rest period of 24 h.

A.5 Lamps for operation on high frequency

A.5.1 Test circuit

Lamps shall be tested with an a.c supply with a frequency between 20 kHz and 26 kHz, unless otherwise specified on the relevant lamp data sheet, and in the circuits shown in:

- figure A.4 for lamps with preheated cathodes;
- figure A.5 for lamps with non-preheated cathodes

NOTE – The frequency range specified for this lamp test is not necessarily applicable to the design of ballasts (see also annex E).

A.5.2 Ballast

The non-inductive ballast resistor shall be so adjusted that the high frequency lamp current is equal to the value as specified on the relevant lamp data sheet.

A.5.3 Starting aid

For lamps with preheated cathodes, the starting aid, a metal plate, shall be connected to earth potential together with one lamp cathode. Its length shall be not less than that of the lamp under test, and it shall be 25 mm wide for 16 mm diameter lamps, and 40 mm wide for 26 mm to 38 mm diameter lamps. The distance between the surface of the lamp and the starting aid shall be as specified on the relevant lamp data sheet.

The manufacturer or responsible vendor shall specify whether or not the lamps require an external starting aid, and whether one cathode shall be connected to earth potential. For lamps not requiring a separate starting aid, the metal plate shall be removed

A.5.4 Test voltage and current

For lamps with preheated cathodes, the cathode heating supplies shall be adjusted to supply a preheat current as specified on the relevant lamp data sheet. During the preheat time, specified on the relevant lamp data sheet, switch S_1 shall be kept open and switches S_2 closed. After this period of time, switches S_2 shall be opened simultaneously as switch S_1 is closed.

The open circuit voltage applied to the circuit shall be as specified on the relevant lamp data sheet.

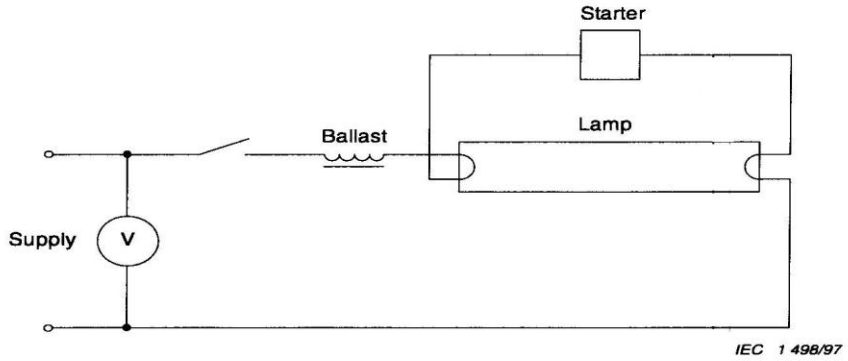


Figure A.1 – Circuit diagram for starting test for lamps for operating with starter

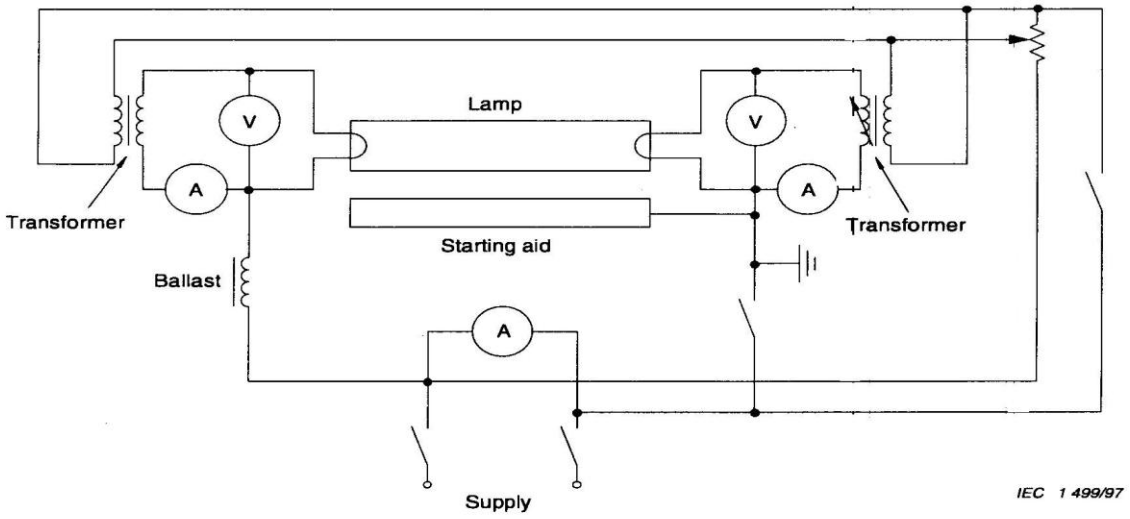


Figure A.2 – Circuit diagram for starting test for lamps with preheated cathodes for operation on starterless circuits

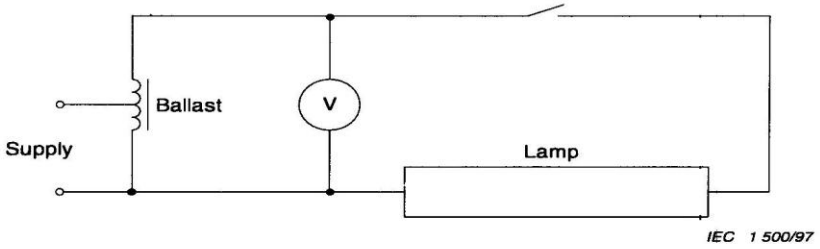


Figure A.3 – Circuit diagram for starting test for lamps with non-preheated cathodes

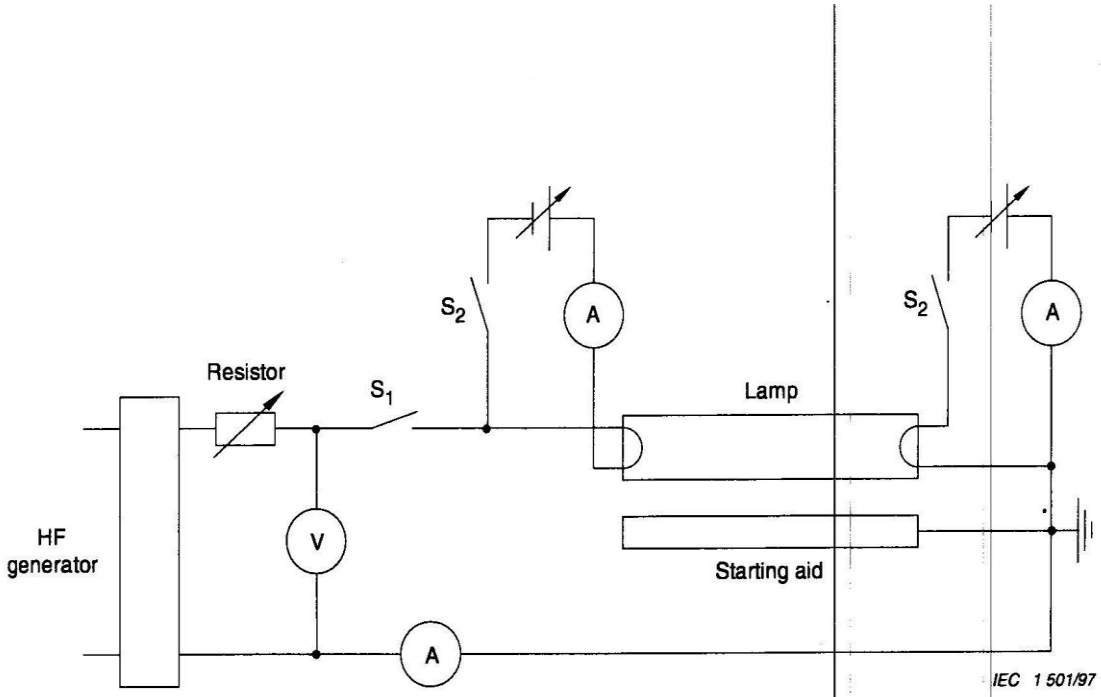


Figure A.4 – Circuit diagram for starting test for lamps with preheated cathodes for operation on high frequency

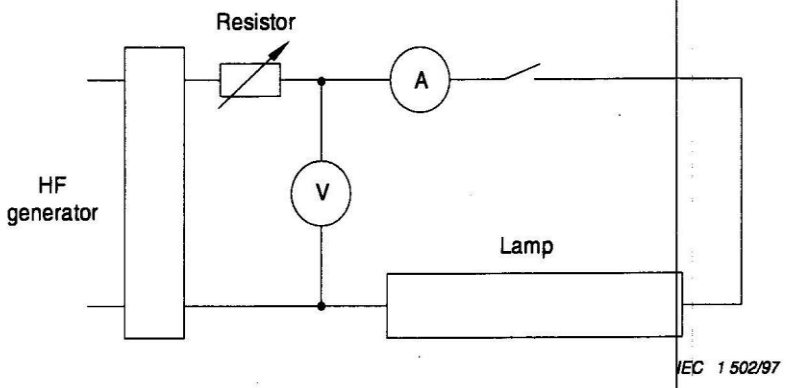


Figure A.5 – Circuit diagram for starting test for lamps with non-preheated cathodes for operation on high frequency

Annex B
(normative)

Method of test for electrical, photometric and cathode characteristics

B.1 Electrical and photometric characteristics for lamps without supplementary cathode heating during operation

B.1.1 General

Photometric characteristics shall be measured in accordance with the relevant recommendations of the CIE (Commission Internationale de l'Eclairage).

Before the lamps are measured for the first time, they shall be aged for a period of 100 h of normal operation.

Measurements shall be made after a sufficient period of stabilisation of the lamp. An appropriate stabilisation time is 15 min, after the conditioning period as declared by the manufacturer or responsible vendor.

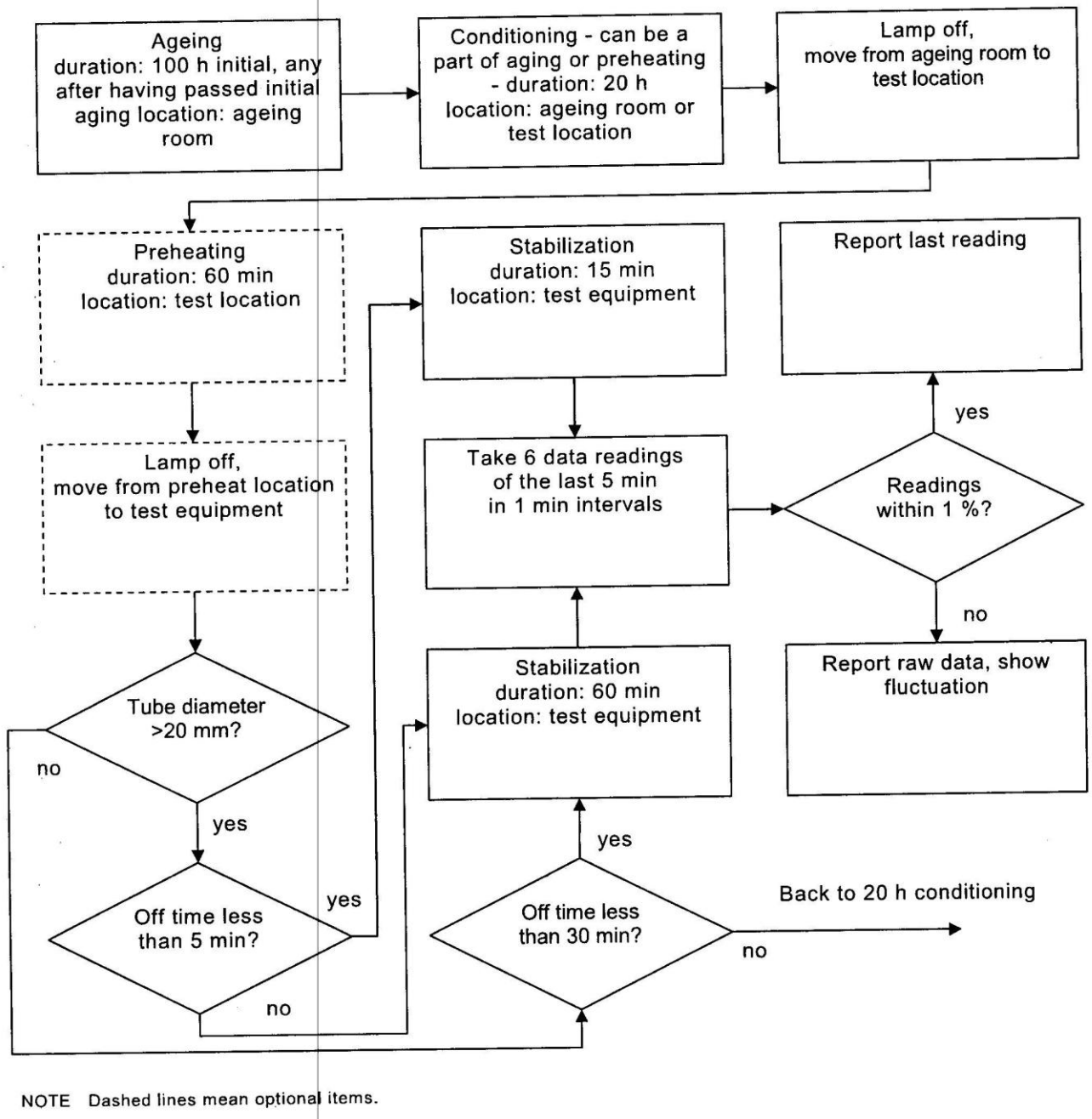
NOTE During shipping and normal handling of the lamps, e.g. rotating of the lamp, any excess amount of mercury may be distributed in small droplets within the discharge tube. Proper conditioning is reached when all the excess mercury has been collected at the coldest spot in the tube. Experience has shown that initially this process of lamp conditioning may take up to 20 h. A lamp is ready for measurement when it has passed the conditioning period.

For conditioning and pre-warming, the lamp may be operated in a location distant to the test location. When moving to the test location, provided that the lamp has been kept in the same position and not subjected to vibration or shock, and no warm glass parts are touched (i.e. creating a parasitic cold spot), a stabilisation period of 15 min to 60 min (see Table B.1) is necessary in the test location. To avoid cooling down of warm glass parts during moving the lamp to test location, thermally insulating gloves or similar technique shall be used. The interruption of the supply should be as short as possible. If deviating from the values in the Table B.1. the relevant specification of the manufacturer should be observed. See Clause B.4 for lamp conditioning and test position for 16mm tube diameter lamps.

Measurement of light output and lamp operating voltage shall be taken at least once per minute. During the final 5 min of stabilisation time, the difference of maximum and minimum readings of light output and lamp operating voltage shall be less than 1 % of the average of the readings. If this is not feasible, the real fluctuation shall be stated.

Table B.1 – Stabilisation time versus off time

Conditioning (can be part of aging)	h	20			
Scope		For lamps > 20 mm diameter		For lamps < 20 mm diameter	
Off time (transport to test location)	min	≤ 5	> 5	≤ 30	> 30
Stabilisation time	min	15	60	60	20 × 60
NOTE For 16 mm lamps with datasheet numbers 1020, 1030, 1040 and 1060, the stabilisation time for lamps > 20 mm is applied.					

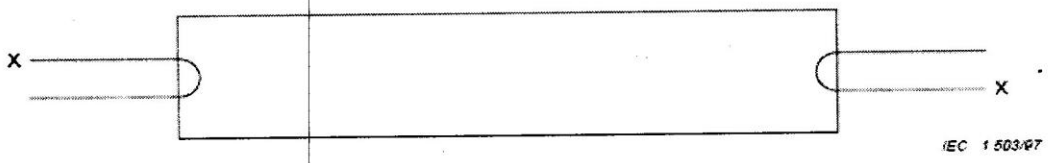


NOTE Dashed lines mean optional items.

Figure B.1a – Typical flowchart of photometry test

Lamps shall be tested in a horizontal operating position.

The connections of the lamp contacts, with reference to the terminations of the ballast, shall not be changed for the whole course of the tests. For lamps having caps with two pins or contacts, by convention the following arrangement is used (where x indicates the contacts to be connected to the main circuit):



Lamps shall be tested in a draught-free atmosphere at an ambient temperature of 25 °C ± 1 °C, unless otherwise specified on the relevant lamp data sheet.

When measuring in a suitable photometric integrator, the ambient temperature is taken to be the air temperature at the following position:

- at a distance from the bulb wall of not less than 10 % of the nominal diameter of the integrator;
- at a distance from the wall of the integrator of not less than one-sixth of the nominal diameter of the integrator;
- near the lamp axis on a level with the centre of the lamp.

A uniform temperature distribution in the integrator shall be maintained during the test. In the horizontal plane containing the lamp centre, except in the immediate vicinity of the lamp wall, a uniform temperature of ±1 °C is required. Special care shall be taken if the integrator incorporates a heating system.

The temperature is usually measured by a thermocouple or a thermistor, both protected against radiation by a small shield.

B.1.2 Test circuit

Lamps shall be tested in the circuits shown in:

- figure B.1 for lamps having preheated cathodes;
- figure B.2 for lamps having non-preheated cathodes;
- figure B.3 for lamps for operation on high frequency.

Before making the measurements, any device used to start the lamp shall be disconnected from the test circuit.

In the test circuit for lamps for operation on high frequency, given in figure B.3, connections shall be as short and straight as possible to avoid parasitic capacitance. The parasitic capacitance parallel to the lamp shall be less than 1 nF.

B.1.3 Ballast

Ballasts used for these tests shall be reference ballasts as specified in IEC 60921 for a.c. mains frequencies, or IEC 60929 for high frequency. The reference ballast electrical characteristics shall be as specified on the relevant lamp data sheet.

B.1.4 Supply voltage

The supply voltage shall be equal to the rated voltage of the reference ballast. During periods of stabilization, the supply voltage shall be stable within ±0,5 %, this tolerance being reduced to 0,2 % during measurement.

For a.c. mains supplies, the frequency shall be equal to the rated frequency of the reference ballast, with a tolerance of 0,5 %. For high frequency supplies, the frequency shall be between 20 kHz and 26 kHz, unless otherwise specified on the relevant lamp data sheet.

NOTE – The frequency range specified for this lamp test is not necessarily applicable to the design of ballasts, see also annex E.

The wave shape of the supply voltage shall be a sine wave. The total harmonic content shall not exceed 3 % of the fundamental (for high frequency supplies this value is under consideration). The total harmonic content is defined as the root-mean-square (r.m.s.) summation of the individual harmonic components, using the fundamental as 100 %.

NOTE – This implies that the source of supply should have sufficient power, and that the supply circuit should have a sufficiently low impedance, compared with the ballast impedance. Care should be taken that this applies under all conditions that occur during the measurement.

B.1.5 Electrical instruments

Instruments shall be of the true r.m.s. type, essentially free from waveform errors, and suitable for the frequency of operation.

The voltage measuring circuit of the instruments shall have an impedance of not less than 100 000 Ω, and shall be disconnected when not in use. The current measuring circuit of the instruments shall have the lowest possible resistance and, if necessary, shall be short circuited when not in use.

When measuring the lamp wattage, no correction shall be made for the wattmeter consumption (the circuit connection being made on the lamp side of the current measuring circuit).

When measuring the luminous flux, the voltage measuring circuit of the voltmeter and of the wattmeter shall be open.

B.2 Electrical and photometric characteristics for lamps with supplementary cathode heating during operation

B.2.1 General

For lamps having preheated low-resistance cathodes, for operation on 60 Hz starterless circuits, the characteristics shall also be measured with supplementary cathode heating during operation.

The conditions and method of test are the same as given in B.1 except for the test circuit.

For lamps measured according to this method, the lamp power shall be considered to be the sum of the power delivered through the reference ballast (as measured in the conventional portion of the circuit) and the power used to heat the cathodes (being the power measured on the input side of the cathode heating transformers, minus the transformer losses determined as described in B.2.4).

B.2.2 Test circuit

Lamps shall be tested in the circuit shown in figure B.4.

Supply voltage A is the voltage specified for the reference ballast for the type of lamp being measured. Supply voltage B shall have separate voltage control so that it can be adjusted independently of supply voltage A. The voltage sources A and B shall come from the same supply, and shall not come from different phases of a polyphase power supply.

The primary voltage of the low voltage transformers, used to heat the lamp cathodes shall be adjustable in order that the desired output voltage may be obtained. The cathode transformers shall be so connected that their voltage subtracts from the voltage of the ballast circuit.

B.2.3 Cathode heating transformers

The two cathode heating transformers (or one transformer with two secondary windings) shall have good regulation, and have a current capacity several times the actual current required. They shall also have low losses to minimize the effect that any error in the measurement of these losses would have on the total lamp watts.

The centre value of the cathode voltage for low-resistance cathodes is 3,6 V, and it is convenient to use a regular 6,3 V filament transformer operated at a reduced primary voltage so that an output of 3,6 V is obtained.

B.2.4 Calibration of cathode heating transformer

Each cathode transformer (or pair of transformers) shall be individually calibrated to determine the power loss that will exist during normal operation.

This power will vary with the current to be supplied to the particular type of cathode involved. These loss values, however, need to be determined only once for a given transformer for each cathode type. The appropriate transformer loss can then be applied to the measurement of the various types of lamps.

It is convenient to obtain a "voltage calibration" on each transformer. This involves determining the primary voltage that must be set in order to obtain the required secondary output voltage. This calibration, although not entirely essential, makes it possible to use primary voltage settings in all routine work, thus avoiding the need for constant use of the more fragile low-range thermocouple voltmeters.

In making the calibration, each secondary winding of the transformer should be connected to a substitution resistor, having the electrical characteristics specified for the particular cathode type involved. The primary voltage should be adjusted so that the average of the two secondary voltages is 3,6 V, and the value of the primary voltage should then be recorded. It is essential that this calibration is repeated for any other cathode type with which the transformer is used.

The power loss in the transformer (core loss and E^2/R loss considered together) shall also be determined for each load condition. With the primary voltage again set so as to give the specified voltage of 3,6 V across the substitution resistors, the power input shall be read. (Since the total wattage to be read is likely to be below 10 W, a low-range wattmeter shall be used). The loss in the transformer may be calculated as the wattage input reading, minus the instrument corrections, and also minus the power absorbed by the substitution resistors. This power in the resistors can be calculated as E^2/R for each of the windings.

The transformer loss is assumed to be constant for all lamps having the same cathode resistance, and no allowance is necessary for the slight differences resulting from variations in actual cathodes.

B.3 Cathode characteristics of lamps having preheated cathodes for operation on starterless circuits

B.3.1 Test circuit

Cathode resistance shall be measured using a suitable d.c. supply or a 50 Hz or 60 Hz a.c. supply.

B.3.2 Lamps for operation on a.c. mains frequencies

The voltage at the cathode terminals shall be adjusted to the value of the test voltage given on the relevant lamp data sheet, and the current shall be measured. From these, after deduction of the consumption of the voltmeter, the cathode resistance shall be determined.

B.3.3 Lamps for operation on high frequency

The current flowing through the cathode shall be adjusted to the value of the test current given on the relevant lamp data sheet, and the supply voltage shall be measured. From these, after deduction of the voltage across the ammeter, the cathode resistance shall be determined.

B.4 Measurement procedure for the determination of the maximum luminous flux of 16 mm tube diameter lamps for operation on high frequency

B.4.1 General

This procedure applies when a requirement is given on the lamp data sheet concerning maximum luminous flux at ambient temperatures other than 25 °C. The tolerance of the ambient temperature at which the maximum luminous flux shall be obtained is given on the relevant lamp data sheet.

B.4.2 Conditioning of the lamp

The lamp shall be aged for 100 h in a vertical position. During ageing the cold chamber shall be at the lowest point. The position of the cold chamber shall be indicated by the manufacturer.

Measurements shall be made after a sufficient period of stabilization of the lamp. After stabilization, any lamp movement shall be carried out carefully with no vibration or shock and with the cold chamber always at the lowest point.

B.4.3 Absolute measurement

Apart from the conditioning procedure, the rated luminous flux measurement is performed as described in clause B.1.

B.4.4 Relative measurement

The maximum luminous flux measurement is based on a relative measurement of either luminous flux or of illuminance versus ambient temperature.

B.4.4.1 Equipment for relative measurement and operating position

A thermally insulated container of suitable shape (for example a rectangular box) and size shall be used.

Alternative: an un-insulated container, located inside a temperature-controlled chamber, i.e. "double-layer" (which allows air to circulate around the container without the presence of a draught on the lamp).

The internal temperature of the container shall be controllable within the temperature range of 20 °C to 45 °C, so that the temperature at which maximum luminous flux occurs is included.

The inner surface of the container shall be coated with a suitable material dependant upon the applied detection method (the recorded signal shall be proportional to luminous flux or illuminance in the temperature range of measurement).

The lamp shall be mounted in the centre of the container in a horizontal position. The distance between the lamp and the walls of the container shall be at least 200 mm in all directions.

NOTE If it can be shown that distances less than 200 mm give the same result, then smaller distances can be used.

Electrical connection to the lamp pins shall be made using a method which minimizes heat sinking of the lamp (for example using lamp holders with low thermal capacitance or connecting directly to the lamp pins).

The temperature within the container shall be measured at a position which is level with the centre of the lamp in the vertical plane, equidistant between the lamp ends in the horizontal plane and equidistant between the lamp and container wall.

NOTE In practice, an additional measurement point at the control point of the lamp is advised (in the vicinity of the cold chamber which determines the mercury vapour pressure).

A suitable light detector (thermally insulated and/or stabilized) shall be mounted outside the container or inside the container if its temperature dependence is known. For luminous flux measurements, the light detector shall receive light via reflection only with the direct light being blocked by a baffle. For illuminance measurements, the light detector shall receive light directly from the lamp.

The recorded signal from the detector shall be proportional to the luminous flux or the illuminance in the temperature range of measurement.

B.4.4.2 Execution of relative measurements

The lamp shall be tested in the appropriate circuit given in figure B.3. The reference ballast shall be positioned outside the container. After starting, the supply voltage of the reference ballast shall be held constant throughout the measurement.

There shall be no artificial air movement in the container. However, air ventilation is needed in order to obtain an isotropic temperature distribution.

The measurement shall start at the lowest temperature of interest. It is recommended that the rate of temperature rise in the range of 20 °C to 45 °C be less than 5 K/h.

NOTE This is required in order to achieve reproducible results with minimum measurement uncertainties.

Measurements of the luminous flux or illuminance and the ambient temperature shall be made in suitable temperature/time intervals throughout the period of measurement.

B.4.5 Translation into absolute values

Combining the absolute measurement with the relative measurements will provide a complete luminous flux versus ambient temperature profile for the lamp.

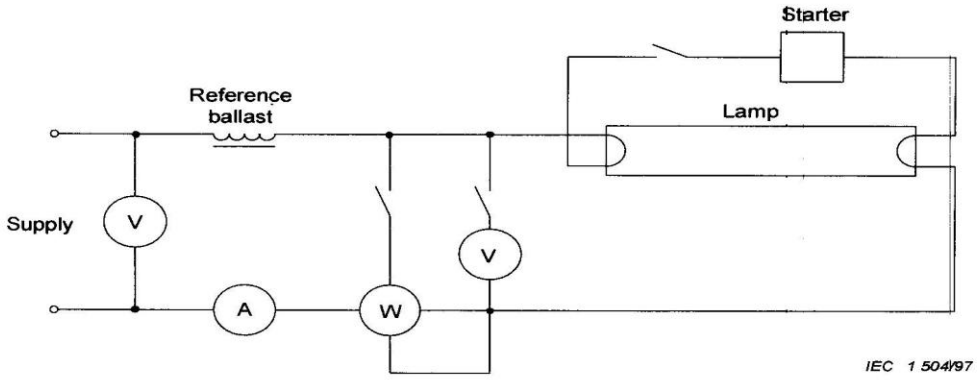


Figure B.1 – Circuit diagram for measurement of electrical and photometric characteristics for lamps with preheated cathodes

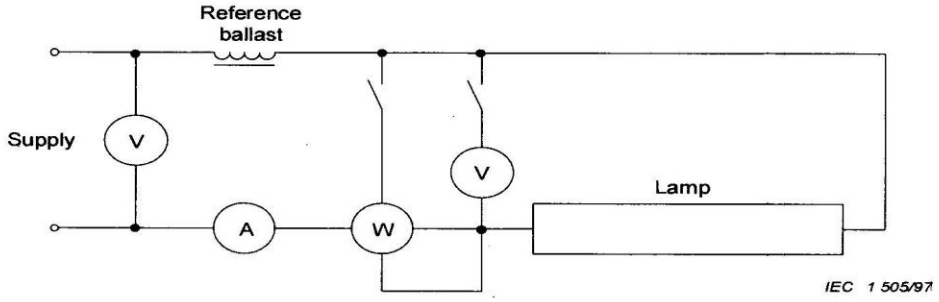


Figure B.2 – Circuit diagram for measurement of electrical and photometric characteristics for lamps with non-preheated cathodes

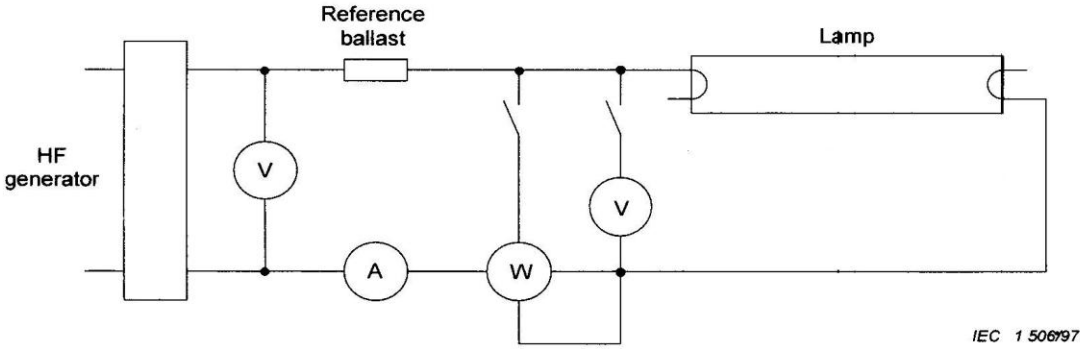


Figure B.3 – Circuit diagram for measurement of electrical and photometric characteristics for lamps for operation on high frequency

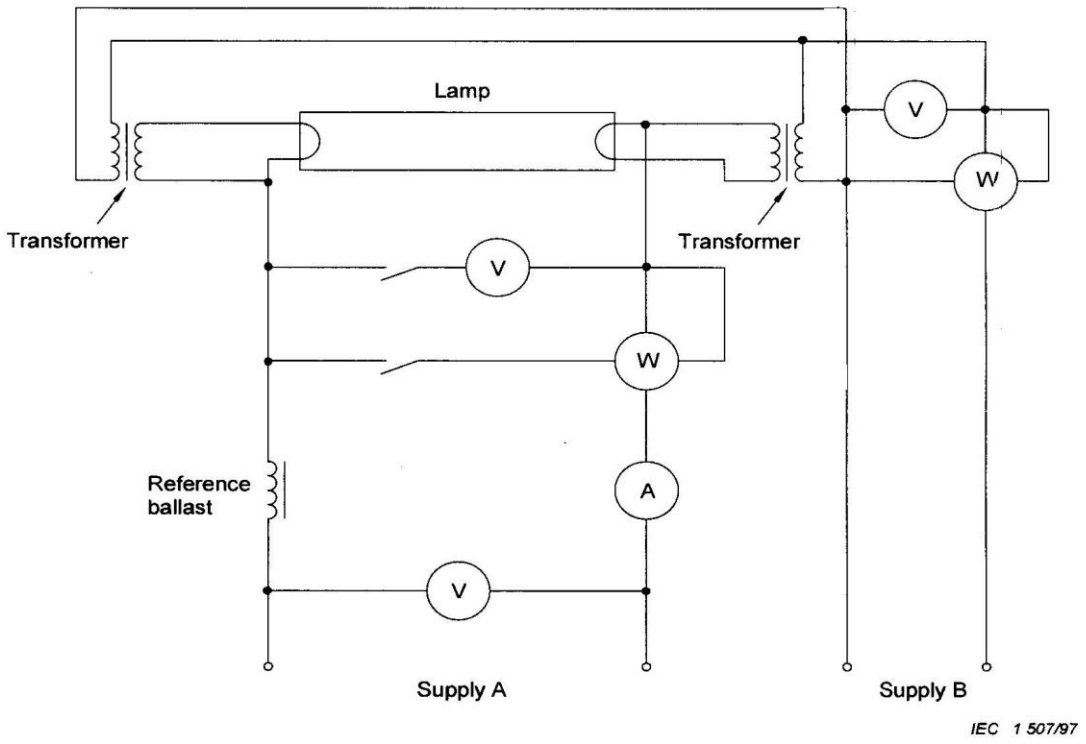


Figure B.4 – Circuit diagram for measurement of electrical and photometric characteristics for lamps with supplementary cathode heating

Annex C
(normative)

Method of test for lumen maintenance and life

C.1 General

The luminous flux at a given time in the life of a lamp shall be measured as specified in Annex B.

During the life testing, lamps shall be operated as follows:

- lamps shall be operated at an ambient temperature of between 15 °C and 50 °C. Excessive draughts shall be avoided, and the lamps shall not be subject to extreme vibration and shock;
- lamps shall be operated in a horizontal position;
- the connections of the lamp contacts, with reference to the terminations of the ballast, shall not be changed for the whole course of the tests;
- lamps shall be operated in the circuit for which they are intended by the manufacturer;
- lamps shall be switched off for 15 min after each 2 h 45 min of operation.

NOTE 1 In North America, a cycle of 3 h on, 20 min off is used.

NOTE 2 If an additional cycle deviating from the 3 h cycle is requested, a 12 h cycle (11 h on, 1 h off) should be used.

C.2 Lamps for operation on a.c. mains frequencies

The ballast used shall comply with the requirements of IEC 60921. For capacitive circuits additionally the capacitor used shall comply with the requirements of IEC 61049.

When the ballast, at its rated voltage, is associated with a test lamp, the lamp shall dissipate a power which does not differ from its rated value by more than 4 %. A test lamp is a lamp whose voltage at lamp terminals does not deviate by more than 2 % from its rated value, when operated with its reference ballast.

NOTE The choice of the type of ballasts for these tests is left open, but the type used can have an influence on the results of the test. It is recommended that the type of ballast employed should be stated. In case of doubt, the use of an inductive type of ballast is recommended because such a type has the smallest number of parameters capable of affecting the results.

For lamps operated with a starter the preheating current, at rated supply voltage, shall not differ by more than 10 % from the rated value specified on the relevant lamp data sheet.

For lamps operated with a starter, the type of starter to be used shall comply with the requirements of IEC 60155, and shall in any case be subject to agreement with the lamp manufacturer or responsible vendor.

During the life testing, the supply voltage and frequency shall not differ by more than 2 % from the rated voltage and frequency of the ballast used.

C.3 Lamps for operation on high frequency

The ballast used shall comply with the requirements of IEC 60929.

Annex D
(normative)

Chromaticity co-ordinates

D.1 General

This annex covers the standardized rated values and tolerance areas for the chromaticity co-ordinates x and y applying to fluorescent lamps.

For lamps with non-standardized chromaticity co-ordinates, the rated values shall be assigned by the manufacturer or responsible vendor.

NOTE – The chromaticity co-ordinates x and y are specified according to the CIE 1931 Standard Colorimetric System (see CIE Publication 15-2)[1]. The tolerance areas are based on the ellipses defined by D.L. MacAdam in his paper "Specification of small chromaticity differences", published in the Journal of the Optical Society of America, vol 1, No. 1, Jan. 1943, pp 18-26.

The tolerance areas are defined by MacAdam ellipses of 5 SDCM (standard deviation of colour matching). Co-ordinates 5 SDCM away from the rated values are given by the equation:

$$g_{11}\,\Delta x^2 + 2\,g_{12}\,\Delta x\,\Delta y + g_{22}\,\Delta y^2 = 5^2$$

in which Δx and Δy represent the deviations with respect to the rated co-ordinates, while the coefficients g_{11}, g_{12} and g_{22} depend on these rated values. These coefficients are the basis for calculating θ, a and b, where θ is the angle between the major axis of the ellipse and the x-axis, and a and b are the major and minor semi-axes of an ellipse of 1 SDCM.

D.2 Standard chromaticity co-ordinates

For the standardized chromaticity co-ordinates the following rated values x and y apply for the different lamp "colours" (with the correlated colour temperatures T_c in kelvin given as extra information):

"Colour"	T_c	x	y
F 6500	6400	0,313	0,337
F 5000	5000	0,346	0,359
F 4000	4040	0,380	0,380
F 3500	3450	0,409	0,394
F 3000	2940	0,440	0,403
F 2700	2720	0,463	0,420

For the coefficients g_{11}, g_{12} and g_{22}, the following values apply:

"Colour"	g_{11}	g_{12}	g_{22}
F 6500	86 $\times 10^4$	- 40 $\times 10^4$	45 $\times 10^4$
F 5000	56 $\times 10^4$	- 25 $\times 10^4$	28 $\times 10^4$
F 4000	39,5 $\times 10^4$	- 21,5 $\times 10^4$	26 $\times 10^4$
F 3500	38 $\times 10^4$	- 20 $\times 10^4$	25 $\times 10^4$
F 3000	[illegible] $\times 10^4$	- 19,5 $\times 10^4$	27,5 $\times 10^4$
F 2700	[illegible] $\times 10^4$	- 18,6 $\times 10^4$	27 $\times 10^4$

For θ, a and b, the following values apply:

"Colour"	θ	a	b
F 6500	58° 23'	0,00223	0,00095
F 5000	59° 37'	0,00274	0,00118
F 4000	54° 00'	0,00313	0,00134
F 3500	52° 58'	0,00317	0,00139
F 3000	53° 10'	0,00278	0,00136
F 2700	57° 17'	0,00258	0,00137

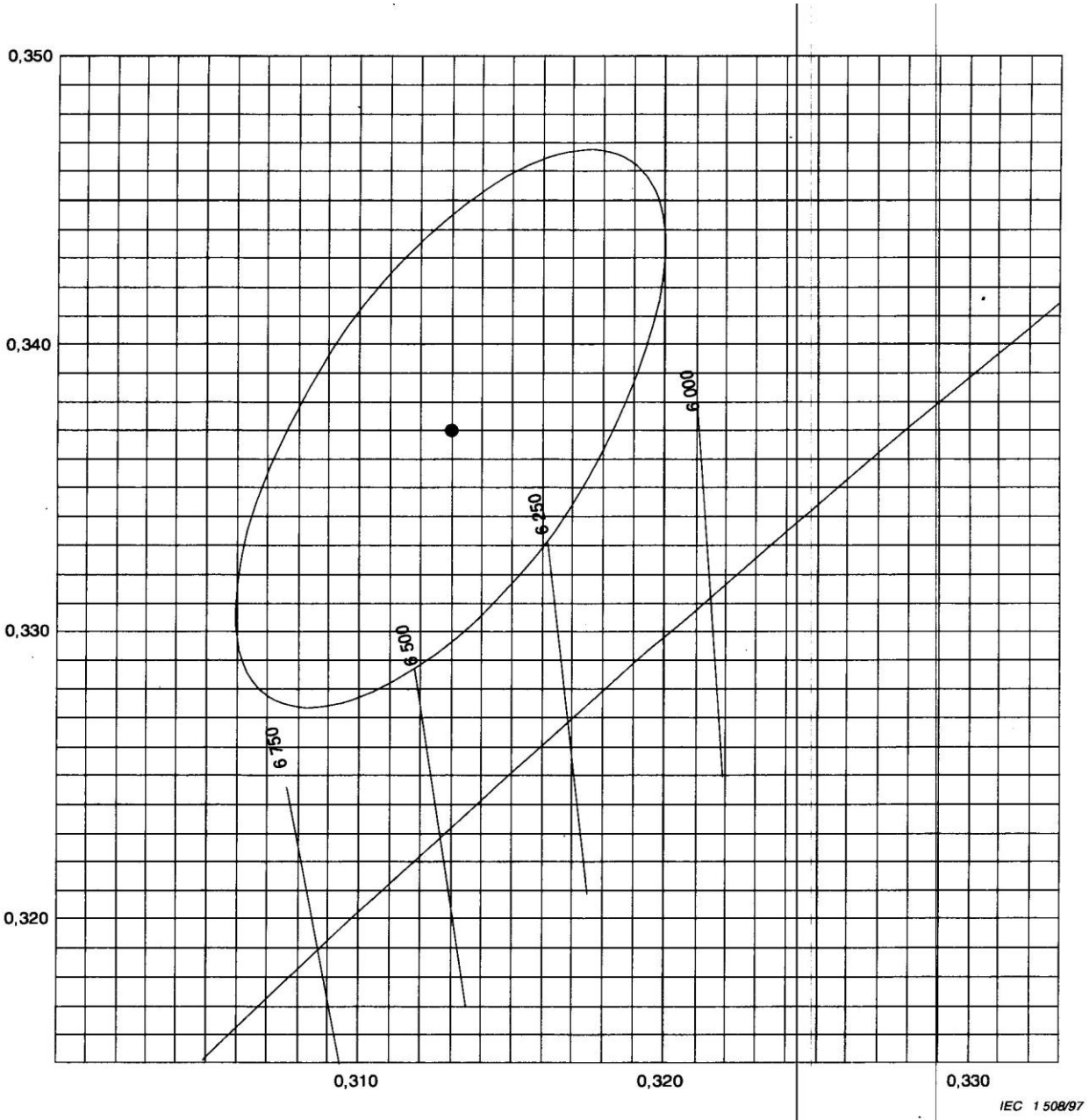
The tolerance areas are shown in figures D.1 to D.6, together with the rated values, a part of the black body locus, and lines of constant correlated colour temperature.

D.3 Shifted chromaticity co-ordinates

For some lamps, as specified on the relevant lamp data sheet, slightly shifted chromaticiy co-ordinates apply, but only for types having a general colour rendering index less than 80.

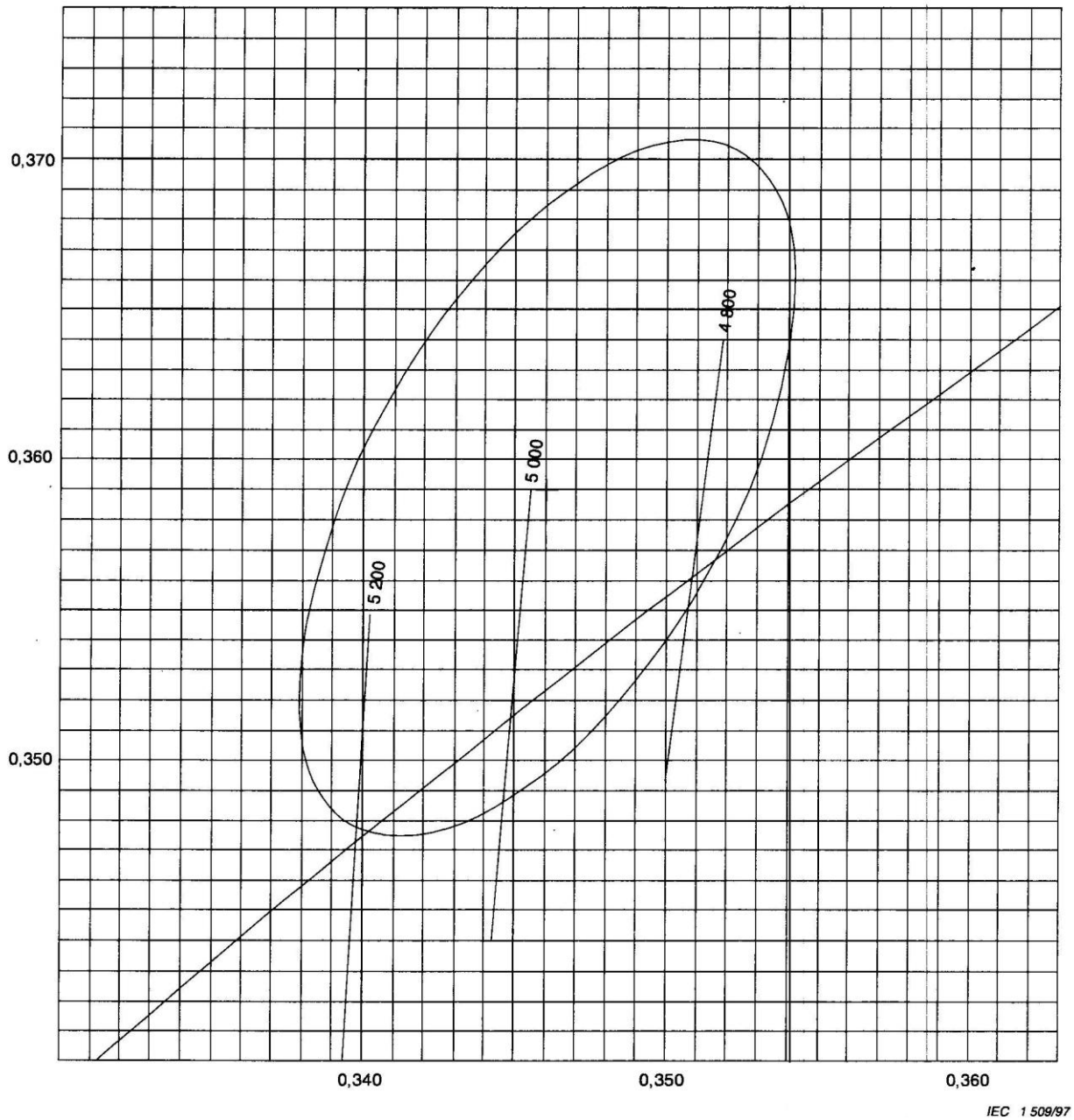
The same tolerance areas as given in D.2 shall be used, but centred on the rated values given in the following table:

"Colour"	x	y
F 6500	0,309	0,337
F 5000	0,342	0,359
F 4000	0,375	0,380
F 3500	0,403	0,394
F 3000	0,433	0,403
F 2700	–	–



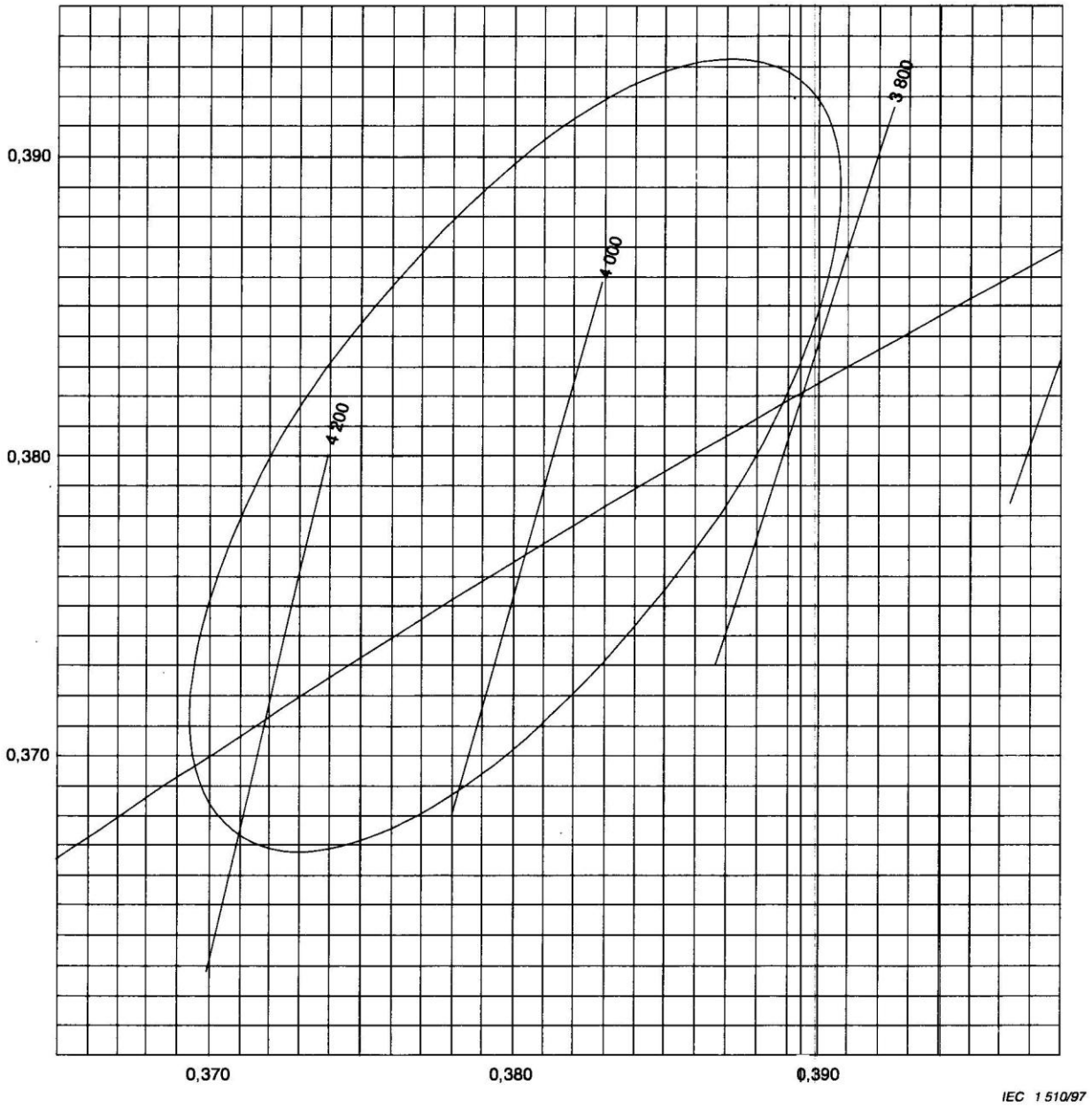
$x = 0,313$ $y = 0,337$

Figure D.1 – Tolerance area for standard "colour" F 6500



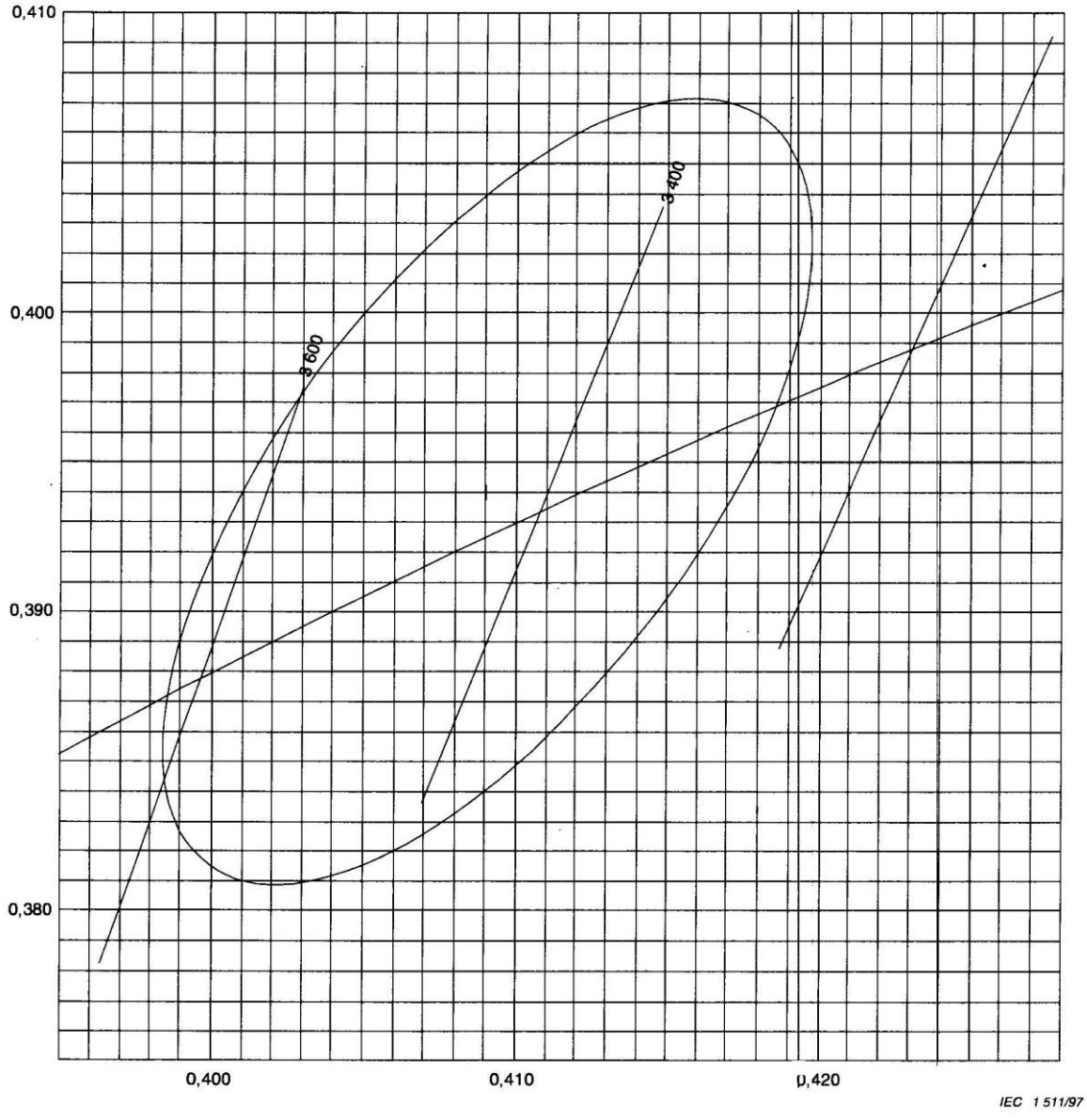
$x = 0,346$ $y = 0,359$

Figure D.2 – Tolerance area for standard "colour" F 5000



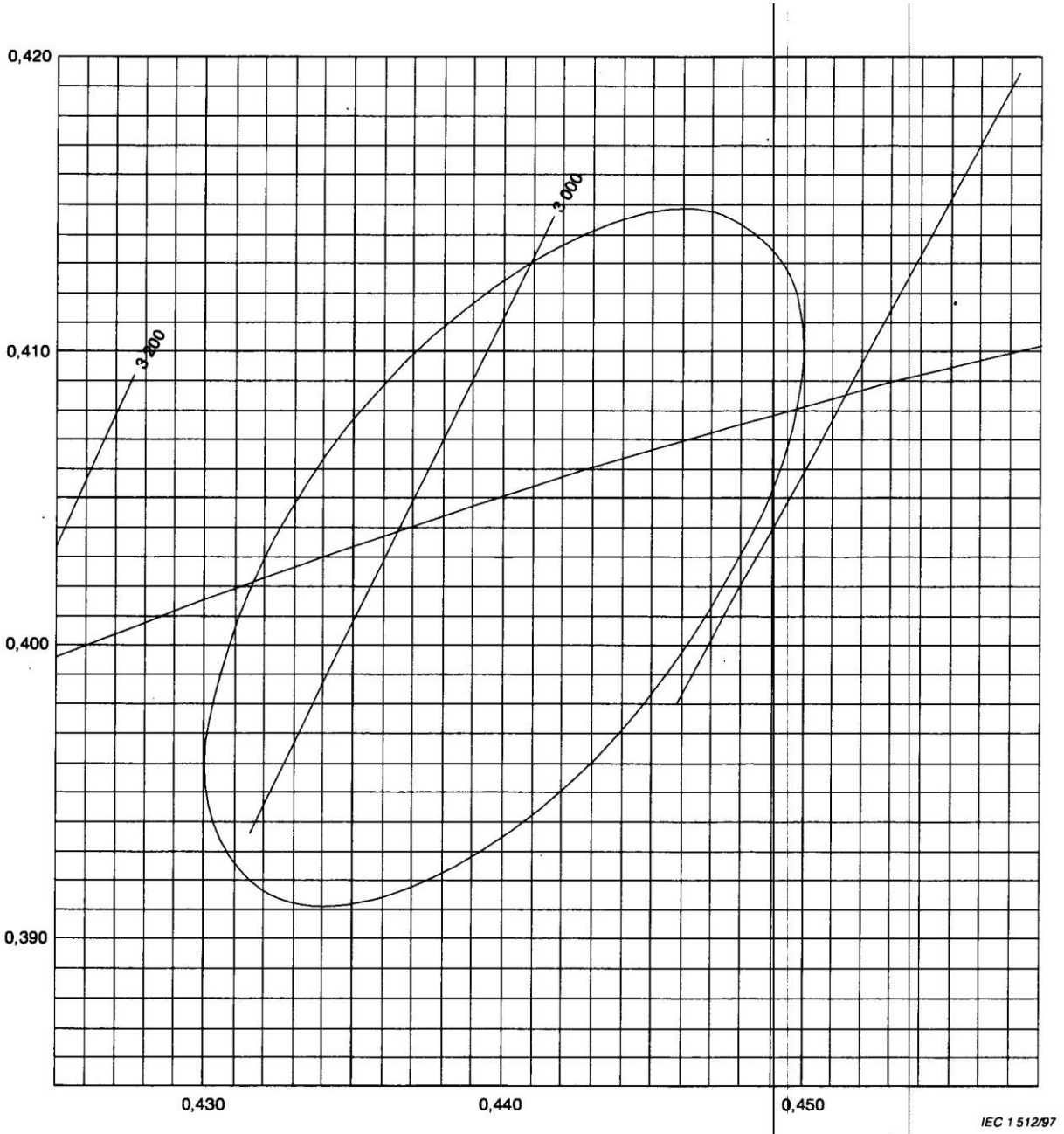
$x = 0{,}380$ $y = 0{,}380$

Figure D.3 – Tolerance area for standard "colour" F 4000



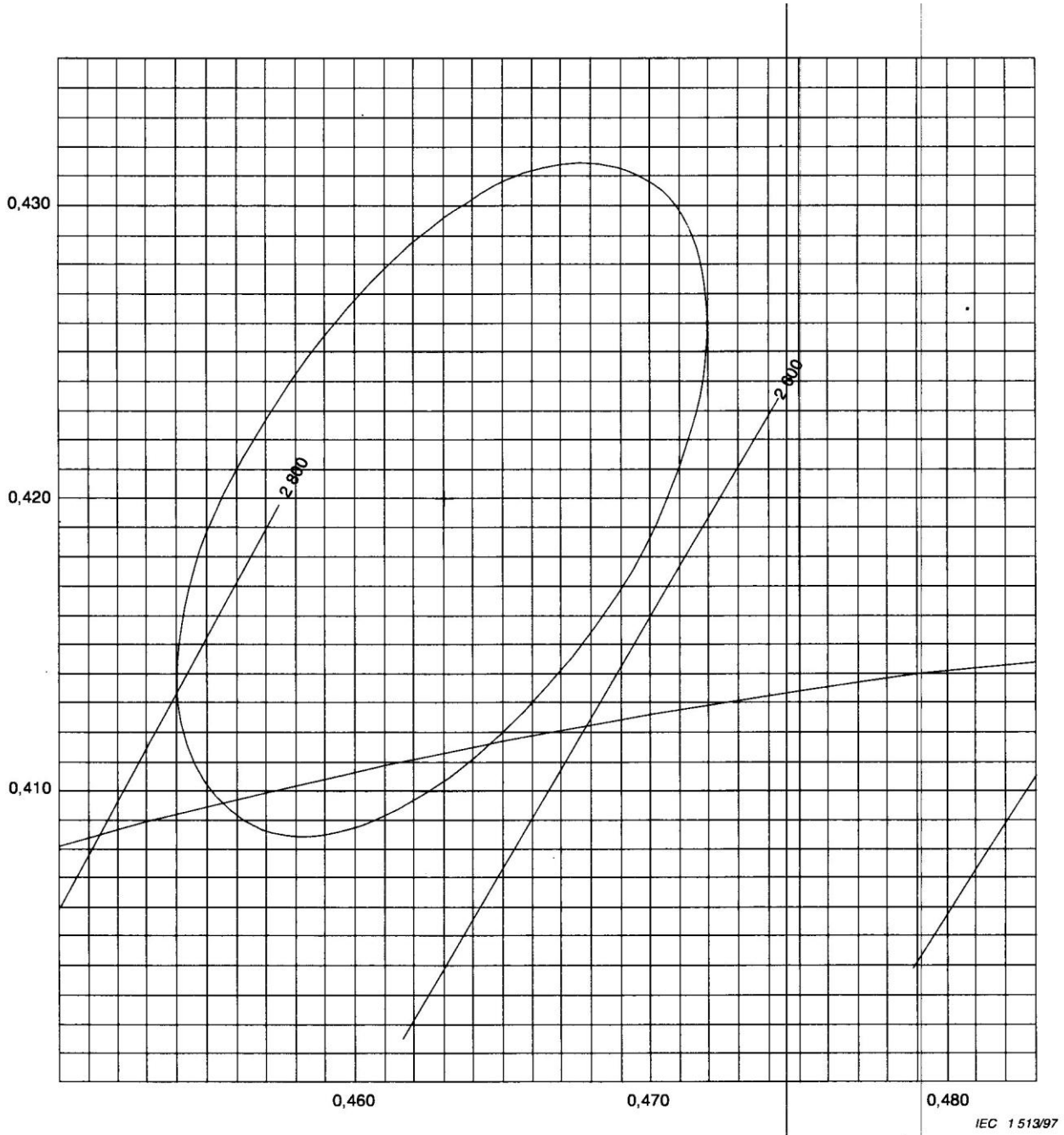
$x = 0,409$ $y = 0,394$

Figure D.4 – Tolerance area for standard "colour" F 3500



$x = 0,440$ $y = 0,403$

Figure D.5 – Tolerance area for standard "colour" F 3000



$x = 0,463$ $y = 0,420$

Figure D.6 – Tolerance area for standard "colour" F 2700

Annex E
(informative)

Information for ballast and starter design

E.1 General

In order to safeguard proper functioning of the lamp, the relevant information, given on the lamp data sheet and in this annex, should be taken into account when designing ballasts and starters.

E.2 Prestarting conditions for high frequency operated lamps

For lamps operated on high frequency and having preheated cathodes, the requirements for proper preheating are specified on the relevant lamp data sheet. An explanation of these requirements is given in Annex D of IEC 60929 and in Annex B of IEC 60927.

For some lamps, additional information concerning high frequency non-preheat starting requirements is given on the relevant lamp data sheet.

E.3 Frequency to be used for high frequency operated lamps

For lamps designed for operation on high frequency, the lamp data sheets prescribe a frequency range for the reference ballast and for the testing of lamps (starting, electrical and photometric characteristics). This frequency range has been chosen for ease of reproducing test results and is not intended to restrict the design of high frequency ballasts, where for practical reasons a higher frequency may be appropriate.

E.4 Tolerable DC-offset during preheat

The peak-peak value of the open-circuit voltage shall be less than or equal to 2,8 times maximum r.m.s value of the open-circuit voltage for $t \leq t_s$. Narrow voltage peaks during the first half period of the mains voltage after switching on preheat shall be disregarded when testing the control gear against this sub-clause.

The DC-offset (mean value) of the open-circuit voltage shall not exceed the r.m.s. open circuit voltage for $t \leq t_s$ as specified on the relevant lamp data sheet. In cases where the r.m.s. open circuit voltage for $t \leq t_s$ is specified to less than 200 V, the DC-offset of the open-circuit voltage shall be less than or equal to 200 V.

Annex F
(informative)

Information for luminaire design

F.1 General

In order to safeguard proper functioning of the lamp, the relevant information, given in this annex, should be taken into account when designing luminaires.

F.2 Free space

For mechanical acceptance of lamps complying with this standard, a free space should be provided in the luminaire, based on the maximum lamp dimensions specified on the relevant lamp data sheet.

F.3 Series capacitors used in capacitive circuits

An initial capacitor tolerance of 10 %, which is typical for shunt connected capacitors, is unsuitable for series capacitors. The summation of capacitor and ballast tolerances may lead to poor lamp performance, when unfavourable tolerances coincide.

In order to satisfy the requirements specified on the relevant lamp data sheets, either the capacitor tolerance should be narrow, or the capacitor and the inductive reactance component of the ballast should be selected so that unfavourable tolerances do not coincide.

F.4 Starting aid

Operation of lamps on a.c. mains or high frequency starterless circuits requires, in most cases, the presence of a conductive starting aid at earth potential. This can be a conventional part of the luminaire.

The distance between the surface of the lamp and the starting aid should not exceed the value specified for the lamp starting characteristics on the relevant lamp data sheet. In addition, a minimum distance of 3 mm should be observed.

2 Data sheets

2.1 General principles of numbering of data sheets

The first number represents the number of this standard "60081", followed by the letters "IEC".

The second number represents the data sheet number.

The third number represents the edition of the page of the data sheet. In cases where a data sheet has more than one page, it is possible for the pages to have different edition numbers, with the data sheet number remaining the same.

2.2 Diagrammatic data sheets for location of lamp dimensions

2.2.1 List of diagrammatic data sheets

60081-IEC-01 Linear-shaped lamps with G5 or G13 caps.

60081-IEC-02 Linear-shaped lamps with Fa6, Fa8, R17d caps or W4.3×8.5d.

PS: 292/2012

2.3 Lamp data sheets

2.3.1 List of lamp data sheets

Sheet No. 60081-IEC-	Nominal wattage W	Frequency Hz		Nominal dimensions mm	Cap	Circuit		Cathode type
						AC mains	High frequency	
1020	4	50	60	16 x 150	G 5	Starter	–	Preheated
1030	6	50	60	16 x 225	G 5	Starter	–	Preheated
1040	8	50	60	16 x 300	G 5	Starter	–	Preheated
1060	13	50	60	16 x 525	G 5	Starter	–	Preheated
2120	15	50	60	26 x 450	G 13	Starter	Starterless	Preheated
2215*	15	50	60	26 x 550	G 13	Starter	Starterless	Preheated
2220	18	50	–	26 x 600	G 13	Starter	Starterless	Preheated
2230	20	50	60	32 x 600	G 13	Starter	–	Preheated
2240	20	50	60	38 x 600	G 13	Starter	–	Preheated
2315	25	50	–	38 x 970	G 13	Starter	–	Preheated
2320	30	50	60	26 x 900	G 13	Starter	Starterless	Preheated
2340	30	50	–	38 x 900	G 13	Starter	–	Preheated
2420	36	50	–	26 x 1200	G 13	Starter	Starterless	Preheated
2425	38	50	–	26 x 1050	G 13	Starter	Starterless	Preheated
2430	40	50	60	32 x 1200	G 13	Starter	–	Preheated
2440	40	50	60	38 x 1200	G 13	Starter	–	Preheated
2520	58	50	–	26 x 1500	G 13	Starter	Starterless	Preheated
2530	65	50	–	32 x 1500	G 13	Starter	–	Preheated
2540	65	50	–	38 x 1500	G 13	Starter	–	Preheated
2620	70	50	60	26 x 1800	G 13	Starter	Starterless	Preheated
2640	75	50	–	38 x 1800	G 13	Starter	–	Preheated
2660*	80	50	–	38 x 1500	G 13	Starter	–	Preheated
2670*	85	50	–	38 x 1800	G 13	Starter	–	Preheated
2840	100	50	–	38 x 2400	G 13	Starter	–	Preheated
2880*	125	50	–	38 x 2400	G 13	Starter	–	Preheated
3020	4	50	60	16 x 150	G 5	Starterless	–	Preheated, high resistance
3030	6	50	60	16 x 225	G 5	Starterless	–	Preheated, high resistance
3040	8	50	60	16 x 300	G 5	Starterless	–	Preheated, high resistance
4240	20	50	60	38 x 600	G 13	Starterless	–	Preheated, high resistance
4340	30	50	–	38 x 900	G 13	Starterless	–	Preheated, high resistance
4440	40	50	60	38 x 1200	G 13	Starterless	–	Preheated, high resistance
4540	65	50	–	38 x 1500	G 13	Starterless	–	Preheated, high resistance
4640	75	50	–	38 x 1800	G 13	Starterless	–	Preheated, high resistance
4660*	80	50	–	38 x 1500	G 13	Starterless	–	Preheated, high resistance
4670*	85	50	–	38 x 1800	G 13	Starterless	–	Preheated, high resistance
4880	125	50	–	38 x 2400	G 13	Starterless	–	Preheated, high resistance
5230	20	50	60	32 x 600	G 13	Starterless	–	Preheated, low resistance
5240	20	50	60	38 x 600	G 13	Starterless	–	Preheated, low resistance
5340	30	50	60	38 x 900	G 13	Starterless	–	Preheated, low resistance
5430	40	50	60	32 x 1200	G 13	Starterless	–	Preheated, low resistance
5440	40	50	60	38 x 1200	G 13	Starterless	–	Preheated, low resistance
5540	65	50	–	38 x 1500	G 13	Starterless	–	Preheated, low resistance
5840	85	50	–	38 x 2400	G 13	Starterless	–	Preheated, low resistance
5960	60	–	60	38 x 1200	R17d	Starterless	–	Preheated, low resistance
5970	87	–	60	38 x 1800	R17d	Starterless	–	Preheated, low resistance
5980	112	–	60	38 x 2400	R17d	Starterless	–	Preheated, low resistance
6030	6	25 k		7 x 220	W4.3	–	Starterless	Preheated
6040	8	25 k		7 x 320	W4.3	–	Starterless	Preheated
6050	11	25 k		7 x 420	W4.3	–	Starterless	Preheated
6060	13	25 k		7 x 520	W4.3	–	Starterless	Preheated
6520	14	≥ 20 k		16 x 550	G 5	–	Starterless	Preheated
6530	21	≥ 20 k		16 x 850	G 5	–	Starterless	Preheated
6620	24	≥ 20 k		16 x 550	G 5	–	Starterless	Preheated
6640	28	≥ 20 k		16 x 1150	G 5	–	Starterless	Preheated
6650	35	≥ 20 k		16 x 1450	G 5	–	Starterless	Preheated
6730	39	≥ 20 k		16 x 850	G 5	–	Starterless	Preheated
6750	49	≥ 20 k		16 x 1450	G 5	–	Starterless	Preheated
6840	54	≥ 20 k		16 x 1150	G 5	–	Starterless	Preheated
6850	80	≥ 20 k		16 x 1450	G 5	–	Starterless	Preheated
7220	16	≥ 20 k		26 x 600	G 13	–	Starterless	Preheated
7420	32	≥ 20 k		26 x 1200	G 13	–	Starterless	Preheated
7520	50	≥ 20 k		26 x 1500	G 13	–	Starterless	Preheated
8240	20	50	–	38 x 600	Fa6	Starterless	–	Non-preheated
8440	40	50	–	38 x 1200	Fa6	Starterless	–	Non-preheated
8540	65	50	–	38 x 1500	Fa6	Starterless	–	Non-preheated
8640	39	–	60	38 x 1200	Fa8	Starterless	–	Non-preheated
8740	57	–	60	38 x 1800	Fa8	Starterless	–	Non-preheated
8840	75	–	60	38 x 2400	Fa8	Starterless	–	Non-preheated
9420	32	≥ 20 k		26 x 1200	Fa6	–	Starterless	Non-preheated
9520	50	≥ 20 k		26 x 1500	Fa6	–	Starterless	Non-preheated

* Mainly intended for replacement purposes.

2.3.2 List of lamp data sheets in order of wattage

Sheet No. 60081-IEC-	Nominal wattage W	Frequency Hz	Nominal dimensions mm	Cap	Circuit		Cathode type
					AC mains	High frequency	
1020	4	50 | 60	16 x 150	G 5	Starter	–	Preheated
3020	4	50 | 60	16 x 150	G 5	Starterless	–	Preheated, high resistance
1030	6	50 | 60	16 x 225	G 5	Starter	–	Preheated
3030	6	50 | 60	16 x 225	G 5	Starterless	–	Preheated, high resistance
6030	6	25 k	7 x 220	W4.3	–	Starterless	Preheated
1040	8	50 | 60	16 x 300	G 5	Starter	–	Preheated
3040	8	50 | 60	16 x 300	G 5	Starterless	–	Preheated, high resistance
6040	8	25 k	7 x 320	W4.3	–	Starterless	Preheated
6050	11	25 k	7 x 420	W4.3	–	Starterless	Preheated
1060	13	50 | 60	16 x 525	G 5	Starter	–	Preheated
6060	13	25 k	7 x 520	W4.3	–	Starterless	Preheated
6520	14	≥ 20 k	16 x 550	G 5	–	Starterless	Preheated
2120	15	50 | 60	26 x 450	G 13	Starter	Starterless	Preheated
2215*	15	50 | 60	26 x 550	G 13	Starter	Starterless	Preheated
7220	16	≥ 20 k	26 x 600	G 13	–	Starterless	Preheated
2220	18	50 | –	26 x 600	G 13	Starter	Starterless	Preheated
2230	20	50 | 60	32 x 600	G 13	Starter	–	Preheated
2240	20	50 | 60	38 x 600	G 13	Starter	–	Preheated
4240	20	50 | 60	38 x 600	G 13	Starterless	–	Preheated, high resistance
5230	20	50 | 60	32 x 600	G 13	Starterless	–	Preheated, low resistance
5240	20	50 | 60	38 x 600	G 13	Starterless	–	Preheated, low resistance
8240	20	50 | –	38 x 600	Fa6	Starterless	–	Non-preheated
6530	21	≥ 20 k	16 x 850	G 5	–	Starterless	Preheated
6620	24	≥ 20 k	16 x 550	G 5	–	Starterless	Preheated
2315	25	50 | –	38 x 970	G 13	Starter	–	Preheated
6640	28	≥ 20 k	16 x 1150	G 5	–	Starterless	Preheated
2320	30	50 | 60	26 x 900	G 13	Starter	Starterless	Preheated
2340	30	50 | –	38 x 900	G 13	Starter	–	Preheated
4340	30	50 | –	38 x 900	G 13	Starterless	–	Preheated, high resistance
5340	30	50 | 60	38 x 900	G 13	Starterless	–	Preheated, low resistance
7420	32	≥ 20 k	26 x 1200	G 13	–	Starterless	Preheated
9420	32	≥ 20 k	26 x 1200	Fa6	–	Starterless	Non-preheated
6650	35	≥ 20 k	16 x 1450	G 5	–	Starterless	Preheated
2420	36	50 | –	26 x 1200	G 13	Starter	Starterless	Preheated
2425	38	50 | –	26 x 1050	G 13	Starter	Starterless	Preheated
6730	39	≥ 20 k	16 x 850	G 5	–	Starterless	Preheated
8640	39	– | 60	38 x 1200	Fa8	Starterless	–	Non-preheated
2430	40	50 | 60	32 x 1200	G 13	Starter	–	Preheated
2440	40	50 | 60	38 x 1200	G 13	Starter	–	Preheated
4440	40	50 | 60	38 x 1200	G 13	Starterless	–	Preheated, high resistance
5430	40	50 | 60	32 x 1200	G 13	Starterless	–	Preheated, low resistance
5440	40	50 | 60	38 x 1200	G 13	Starterless	–	Preheated, low resistance
8440	40	50 | –	38 x 1200	Fa6	Starterless	–	Non-preheated
6750	49	≥ 20 k	16 x 1450	G 5	–	Starterless	Preheated
7520	50	≥ 20 k	26 x 1500	G 13	–	Starterless	Preheated
9520	50	≥ 20 k	26 x 1500	Fa6	–	Starterless	Non-preheated
6840	54	≥ 20 k	16 x 1150	G 5	–	Starterless	Preheated
8740	57	– | 60	38 x 1800	Fa8	Starterless	–	Non-preheated
2520	58	50 | –	26 x 1500	G 13	Starter	Starterless	Preheated
5960	60	– | 60	38 x 1200	R17d	Starterless	–	Preheated, low resistance
2530	65	50 | –	32 x 1500	G 13	Starter	–	Preheated
2540	65	50 | –	38 x 1500	G 13	Starter	–	Preheated
4540	65	50 | –	38 x 1500	G 13	Starterless	–	Preheated, high resistance
5540	65	50 | –	38 x 1500	G 13	Starterless	–	Preheated, low resistance
8540	65	50 | –	38 x 1500	Fa6	Starterless	–	Non-preheated
2620	70	50 | 60	26 x 1800	G 13	Starter	Starterless	Preheated
2640	75	50 | –	38 x 1800	G 13	Starter	–	Preheated
4640	75	50 | –	38 x 1800	G 13	Starterless	–	Preheated, high resistance
8840	75	– | 60	38 x 2400	Fa8	Starterless	–	Non-preheated
2660*	80	50 | –	38 x 1500	G 13	Starter	–	Preheated
4660*	80	50 | –	38 x 1500	G 13	Starterless	–	Preheated, high resistance
6850	80	≥ 20 k	16 x 1450	G 5	–	Starterless	Preheated
2670*	85	50 | –	38 x 1800	G 13	Starter	–	Preheated
4670*	85	50 | –	38 x 1800	G 13	Starterless	–	Preheated, high resistance
5840	85	50 | –	38 x 2400	G 13	Starterless	–	Preheated, low resistance
5970	87	– | 60	38 x 1800	R17d	Starterless	–	Preheated, low resistance
2840	100	50 | –	38 x 2400	G 13	Starter	–	Preheated
5980	112	– | 60	38 x 2400	R17d	Starterless	–	Preheated, low resistance
2880*	125	50 | –	38 x 2400	G 13	Starter	–	Preheated
4880	125	50 | –	38 x 2400	G 13	Starterless	–	Preheated, high resistance

* Mainly intended for replacement purposes.

PS:
292/2012

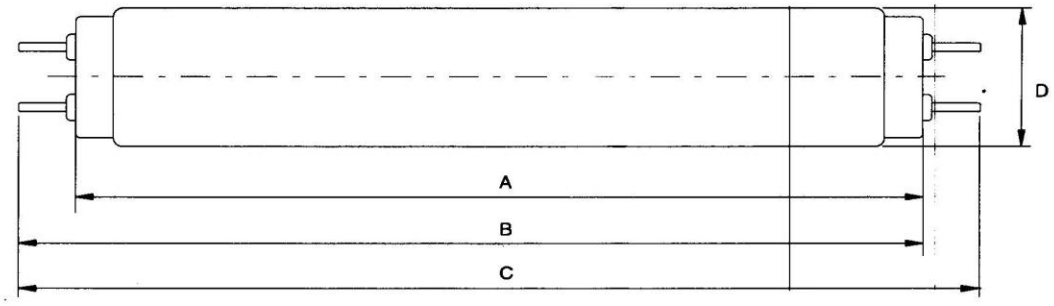
DOUBLE-CAPPED FLUORESCENT LAMPS

DIAGRAMMATIC DATA SHEET FOR LOCATION OF LAMP DIMENSIONS

Linear-shaped

These drawings are intended only to indicate dimensions to be controlled and are to be used in conjunction with the relevant lamp standard sheets

G5 cap (see sheet 7004-52 of IEC 60061-1)
G13 cap (see sheet 7004-51 of IEC 60061-1)



IEC 1514/97

For lamps with G5 and G13 caps

The values for dimensions A, B and C are derived from a basic value, designated X

A = cap face to cap face

$A_{max.} = X$

B = cap face to end of opposite pins

$B_{max.} = X + 7{,}1$ mm

$B_{min.} = X + 4{,}7$ mm (in some countries, $B_{min.} = X + 4{,}6$ mm)

C = overall length of the lamp between pin ends

$C_{max.} = X + (2 \times 7{,}1) = X + 14{,}2$ mm

$C_{min.}$ = not specified

The dimensions given on the lamp data sheets comply with the above system.

NOTE 1 – When converting the thus calculated values to inches it is obvious that the consistency between the rounded off converted values is lost.

NOTE 2 – In some instances, the dimensions in national specifications differ slightly from those in the data sheets. Because these specifications are well established, it is not intended that they should be changed. The dimensions in the data sheets are quoted as a desirable objective.

NOTE 3 – Original USA types are sometimes designated by the nominal overall length in inches of the lamp assembled in two lampholders, each 5/16 inch thick for G5 caps and 3/8 inch thick for G13 caps.

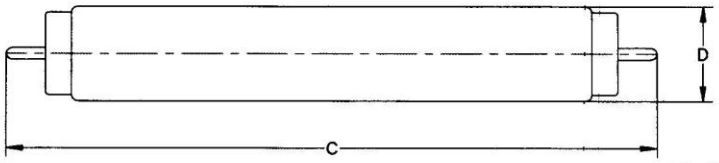
DOUBLE-CAPPED FLUORESCENT LAMPS

DIAGRAMMATIC DATA SHEET FOR LOCATION OF LAMP DIMENSIONS

Linear-shaped

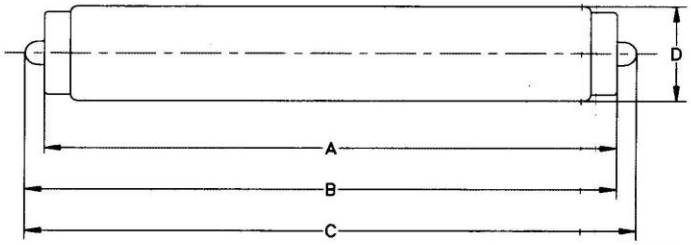
These drawings are intended only to indicate dimensions to be controlled and are to be used in conjunction with the relevant lamp standard sheets

Fa6 cap (see sheet 7004-55 of IEC 60061-1)



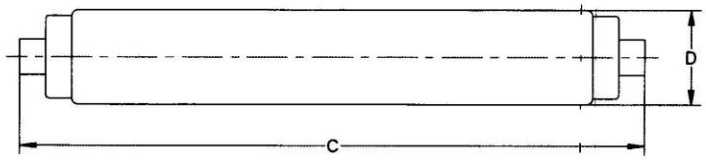
IEC 2009/99

Fa8 cap (see sheet 7004-57 of IEC 60061-1)



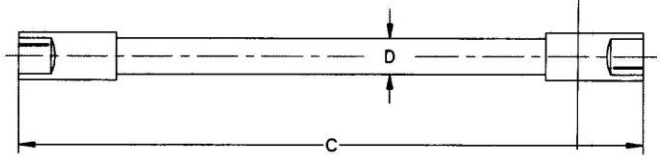
IEC 2010/99

R17d cap (see sheet 7004-56 of IEC 60061-1)



IEC 2011/99

W4.3x8.5d cap (see sheet 7004-115 of IEC 60061-1)



IEC 2012/99

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-4-E-G5-16/150

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
4	With starter	Preheated	G5	16 × 150

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
135,9	140,6	143,0	150,1	16,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	110/120	103,5	30
60	110/120	103,5	30

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	4,5	29	24	34	0,170	0,205
60	4,5	29	24	34	0,170	0,205

Chromaticity co-ordinates: see D.2, Annex D.

Cathode characteristics			
Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,110	80	60	100

NOTE In Japan, the rated resistance of each cathode is 90 Ω and maximum is 120 Ω..

ILCOS: FD-4-E-G5-16/150

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	6	127	0,160	700	0,12
60	6	118	0,160	650	0,075

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,144	0,144
		Max.	0,275	0,275
Open circuit voltage across starter	V	Min. (r.m.s.)	103,5	103,5
Open circuit voltage across lamp	V	Max. (peak)	400	400
Substitution resistor for both cathodes in series		Ω	140	140
Voltage across starter with lamp operating	V	Max. (r.m.s.)	68	68

Information for starter design			
Pulse voltage V		Non-reclosure voltage V	
Minimum		Maximum	
250		70	

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-4-E-G5-16/150

Information for high frequency ballast design

Typical lamp characteristics

Frequency kHz	Nominal wattage W	Rated wattage W	Lamp voltage V
20 - 26	4	3,6	24

Frequency					kHz	≥ 20
Normal operation						
Lamp operating current	I_D		A	Min.		0,090
				Max.		0,180
Current in any lead to cathodes			A	Max.		0,190
Dimming operation						
Lamp operating current	I_D		A	Min.		0,015
				Max.		0,090
Minimum sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_1 - Y_1 I_D$		A^2	X_1	A^2	0,022
Target sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_1 - 0,3\ Y_1 I_D$			Y_1	A	0,205
Maximum sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_2 - Y_2 I_D$		A^2	X_2	A^2	0,030
				Y_2	A	-0,050
Current in any lead to cathodes	I_{LH}		A	Max.		0,190
	I_{LL}		A	Max.		0,120
Substitution resistor for each cathode for testing dimming requirements				R_{Test1}	Ω	80
				R_{Test2}	Ω	90
Lamp substitution resistor at n % of the test current	n =	10 %	R_{10} Ω	Min.		1 500
				Max.		1 800
		30 %	R_{30} Ω	Nominal		510
		60 %	R_{60} Ω	Nominal		240
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s						
Minimum cathode preheat energy	$E_{min} = Q_{min} + P_{min}\ t_s$		J	Q_{min} (J)		1,0
				P_{min} (W)		0,7
Voltage across each cathode for $E(t) < E_{min}$			V	Max.(r.m.s.)		11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements					Ω	50
Maximum cathode preheat energy	$E_{max} = Q_{max} + P_{max}\ t_s$		J	Q_{max} (J)		1,5
				P_{max} (W)		1,1
Substitution resistor for each cathode, for testing maximum cathode preheat requirements					Ω	65
Open circuit voltage across lamp (with starting aid)		Non-ignition voltage	$t \le t_s$	Max.(r.m.s.)		90
	V	Ignition voltage	$t > t_s$ (+10 °C)	Min.(r.m.s.)		160
			$t > t_s$ (-15 °C)	Min.(r.m.s.)		220
Substitution resistor range for each cathode, for testing open circuit voltage requirements					Ω	50.....150

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-6-E-G5-16/225

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
6	With starter	Preheated	G5	16 × 225

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
212,1	216,8	219,2	226,3	16,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	110/120	103,5	30
60	110/120	103,5	30

Electrical characteristics						
Frequency Hz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A	Rated preheat current A
		Rated	Minimum	Maximum		
50	6	42	36	48	0,160	0,205
60	6	42	36	48	0,160	0,205

Chromaticity co-ordinates: see D.2, Annex D.

Cathode characteristics			
Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,110	80	60	100

NOTE In Japan, the rated resistance of each cathode is 90 Ω and maximum is 120 Ω.

ILCOS: FD-6-E-G5-16/225

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	6	127	0,160	700	0,12
60	6	118	0,160	650	0,075

Information for ballast design				
Frequency	Hz		50	60
Preheat cathode current	A	Min.	0,144	0,144
		Max.	0,275	0,275
Open circuit voltage across starter	V	Min. (r.m.s.)	103,5	103,5
Open circuit voltage across lamp	V	Max. (peak)	400	400
Substitution resistor for both cathodes in series	Ω		140	140
Voltage across starter with lamp operating	V	Max. (r.m.s.)	68	68

Information for starter design		
Pulse voltage V	Non-reclosure voltage V	
Minimum	Maximum	
250	70	

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-6-E-G5-16/225

Information for high frequency ballast design

Typical lamp characteristics

Frequency kHz	Nominal wattage W	Rated wattage W	Lamp voltage V
20 - 26	6	5,4	36

Frequency						kHz	≥ 20
Normal operation							
Lamp operating current	I_D		A		Min.		0,090
					Max.		0,180
Current in any lead to cathodes			A		Max.		0,190
Dimming operation							
Lamp operating current	I_D		A		Min.		0,015
					Max.		0,090
Minimum sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_1 - Y_1 I_D$		A^2	X_1		A^2	0,022
Target sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_1 - 0{,}3\ Y_1 I_D$		A^2	Y_1		A	0,205
Maximum sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_2 - Y_2 I_D$		A^2	X_2		A^2	0,030
			A^2	Y_2		A	-0,050
Current in any lead to cathodes	I_{LH}		A		Max.		0,190
	I_{LL}		A		Max.		0,120
Substitution resistor for each cathode for testing dimming requirements				R_{Test1}		Ω	80
				R_{Test2}		Ω	90
Lamp substitution resistor at n % of the test current	n =	10 %	R_{10} Ω		Min.		2 400
					Max.		3 000
		30 %	R_{30} Ω		Nominal		820
		60 %	R_{60} Ω		Nominal		360
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s							
Minimum cathode preheat energy	$E_{min} = Q_{min} + P_{min} t_s$		J		Q_{min} (J)		1,0
					P_{min} (W)		0,7
Voltage across each cathode for $E(t) < E_{min}$			V		Max.(r.m.s.)		11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements						Ω	50
Maximum cathode preheat energy	$E_{max} = Q_{max} + P_{max} t_s$		J		Q_{max} (J)		1,5
					P_{max} (W)		1,1
Substitution resistor for each cathode, for testing maximum cathode preheat requirements						Ω	65
Open circuit voltage across lamp (with starting aid)	V	Non-ignition voltage	$t \le t_s$		Max.(r.m.s.)		100
		Ignition voltage	$t > t_s$ (+10 °C)		Min.(r.m.s.)		185
			$t > t_s$ (-15 °C)		Min.(r.m.s.)		250
Substitution resistor range for each cathode, for testing open circuit voltage requirements						Ω	50.....150

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-8-E-G5-16/300

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
8	With starter	Preheated	G5	16 × 300

Dimensions
mm

A	B		C	D
Max.	Min.	Max.	Max.	Max.
288,3	293,0	295,4	302,5	16,0

Starting characteristics

Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	110/120	103,5	30
60	110/120	103,5	30

Electrical characteristics

Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	7,1	56	48	64	0,145	0,205
60	7,2	57	48	64	0,145	0,205

Chromaticity co-ordinates: see D.2, Annex D.

Cathode characteristics

Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,110	80	60	100

NOTE In Japan the minimum resistance of each cathode is 50 Ω and maximum is 110 Ω.

ILCOS: FD-8-E-G5-16/300

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	6	127	0,160	700	0,12
60	6	118	0,160	650	0,075

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,144	0,144
		Max.	0,275	0,275
Open circuit voltage across starter	V	Min. (r.m.s.)	103,5	103,5
Open circuit voltage across lamp	V	Max. (peak)	400	400
Substitution resistor for both cathodes in series		Ω	140	140
Voltage across starter with lamp operating	V	Max. (r.m.s.)	68	68

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
250	70

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-8-E-G5-16/300

Information for high frequency ballast design

Typical lamp characteristics

Frequency kHz	Nominal wattage W	Rated wattage W	Lamp voltage V
20 - 26	8	7,5	50

Frequency						kHz	≥ 20
Normal operation							
Lamp operating current	I_D		A		Min.		0,090
					Max.		0,180
Current in any lead to cathodes			A		Max.		0,190
Dimming operation							
Lamp operating current	I_D		A		Min.		0,015
					Max.		0,090
Minimum sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_1 - Y_1 I_D$		A^2	X_1		A^2	0,022
Target sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_1 - 0{,}3\ Y_1 I_D$		A^2	Y_1		A	0,205
Maximum sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_2 - Y_2 I_D$		A^2	X_2		A^2	0,030
				Y_2		A	-0,050
Current in any lead to cathodes	I_{LH}		A		Max.		0,190
	I_{LL}		A		Max.		0,120
Substitution resistor for each cathode for testing dimming requirements				R_{Test1}		Ω	80
				R_{Test2}		Ω	90
Lamp substitution resistor at n % of the test current	n =	10 %	R_{10} Ω	Min.			3 300
				Max.			5 100
		30 %	R_{30} Ω	Nominal			1 200
		60 %	R_{60} Ω	Nominal			560
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s							
Minimum cathode preheat energy	$E_{min} = Q_{min} + P_{min} t_s$		J		Q_{min} (J)		1,0
					P_{min} (W)		0,7
Voltage across each cathode for $E(t) < E_{min}$			V		Max.(r.m.s.)		11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements						Ω	50
Maximum cathode preheat energy	$E_{max} = Q_{max} + P_{max} t_s$		J		Q_{max} (J)		1,5
					P_{max} (W)		1,1
Substitution resistor for each cathode, for testing maximum cathode preheat requirements						Ω	65
Open circuit voltage across lamp (with starting aid)		Non-ignition voltage	V	$t \le t_s$		Max.(r.m.s.)	100
		Ignition voltage	V	$t > t_s$ (+10 °C)		Min.(r.m.s.)	200
			V	$t > t_s$ (-15 °C)		Min.(r.m.s.)	280
Substitution resistor range for each cathode, for testing open circuit voltage requirements						Ω	50.....150

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-13-E-G5-16/525

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
13	With starter	Preheated	G5	16 × 525

Dimensions
mm

A	B		C	D
Max.	Min.	Max.	Max.	Max.
516,9	521,6	524,0	531,1	16,0

Starting characteristics

Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	220	198	30

Electrical characteristics

Frequency Hz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A	Rated preheat current A
		Rated	Minimum	Maximum		
50	13	95	85	105	0,165	0,225
60	13	95	*	*	0,165	0,225

Chromaticity co-ordinates: see D.2, Annex D.

Cathode characteristics

Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,110	80	60	100

* Under consideration

ILCOS: FD-13-E-G5-16/525

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	13	220	0,165	1070	0,12
60	13	236	0,165	1200	0,075

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,146	0,146
		Max.	0,297	0,297
Open circuit voltage across starter	V	Min. (r.m.s.)	198	198
Open circuit voltage across lamp	V	Max. (peak)	400	400
Substitution resistor for both cathodes in series		Ω	140	140
Voltage across starter with lamp operating	V	Max. (r.m.s.)	128	128

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
400	140

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-13-E-G5-16/525

Information for high frequency ballast design

Typical lamp characteristics

Frequency kHz	Nominal wattage W	Rated wattage W	Lamp voltage V
20 - 26	13	12,8	85

Frequency						kHz	≥ 20
Normal operation							
Lamp operating current	I_D		A		Min.		0,090
					Max.		0,180
Current in any lead to cathodes			A		Max.		0,190
Dimming operation							
Lamp operating current	I_D		A		Min.		0,015
					Max.		0,090
Minimum sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_1 - Y_1 I_D$		A^2	X_1		A^2	0,022
Target sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_1 - 0{,}3\ Y_1 I_D$		A^2	Y_1		A	0,205
Maximum sum of squares lead currents	$I_{LH}^2 + I_{LL}^2 = X_2 - Y_2 I_D$		A^2	X_2		A^2	0,030
			A^2	Y_2		A	-0,050
Current in any lead to cathodes	I_{LH}		A		Max.		0,190
	I_{LL}		A		Max.		0,120
Substitution resistor for each cathode for testing dimming requirements				R_{Test1}		Ω	80
				R_{Test2}		Ω	90
Lamp substitution resistor at n % of the test current	n =	10 %	R_{10} Ω	Min.			6 200
				Max.			9 100
		30 %	R_{30} Ω	Nominal			2 200
		60 %	R_{60} Ω	Nominal			1 000
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s							
Minimum cathode preheat energy	$E_{min} = Q_{min} + P_{min} t_s$		J	Q_{min} (J)			1,0
				P_{min} (W)			0,7
Voltage across each cathode for $E(t) < E_{min}$			V	Max.(r.m.s.)			11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements						Ω	50
Maximum cathode preheat energy	$E_{max} = Q_{max} + P_{max} t_s$		J	Q_{max} (J)			1,5
				P_{max} (W)			1,1
Substitution resistor for each cathode, for testing maximum cathode preheat requirements						Ω	65
Open circuit voltage across lamp (with starting aid)	V	Non-ignition voltage	$t \le t_s$	Max.(r.m.s.)			120
		Ignition voltage	$t > t_s$ (+10 °C)	Min.(r.m.s.)			230
			$t > t_s$ (-15 °C)	Min.(r.m.s.)			330
Substitution resistor range for each cathode, for testing open circuit voltage requirements						Ω	50.....150

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-15-E-G13-26/450

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
15	With starter	Preheated	G13	26 × 450

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
437,4	442,1	444,5	451,6	28,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	110/120	103,5	30
60	110/120	103,5	30

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	15	55	46	64	0,310	0,440
60	15	55	46	64	0,305	0,550

Chromaticity co-ordinates: see D.2, annex D.

ILCOS: FD-15-E-G13-26/450

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	15	127	0,310	325	0,12
60	15	118	0,300	305	0,075

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,280	0,280
		Max.	0,650	0,650
Open circuit voltage across starter	V	Min. (r.m.s.)	103,5	103,5
Open circuit voltage across lamp	V	Max. (peak)	400	400
Substitution resistor for both cathodes in series		Ω	50	50
Voltage across starter with lamp operating	V	Max. (r.m.s.)	68	68

Information for starter design		
Pulse voltage V	Non-reclosure voltage V	
Minimum	Maximum	
250	70	

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-15-E-G13-26/450

Information for high frequency ballast design

Typical lamp characteristics

Frequency kHz	Lamp wattage W	Lamp voltage V	Lamp current A
≥ 20	13,5	45	0,310

Current in any lead to cathodes	A	Max.		*
Lamp operating current	A	Min.		*
		Max.		*

Current controlled preheating

Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$		a	0,130
		i_m (A)	0,260

Maximum preheat current	A	$t \leq 0,4$	1,400
		$0,4 < t < 2,0$	1,580 - 0,450 t
		$t \geq 2,0$	0,680

Open circuit voltage across lamp	V	$t \leq t_e$	Max.	(r.m.s.)	*
		$t > t_e$	Min.	(r.m.s.)	*
Voltage to starting aid	V	$t \leq t_e$	Max.	(peak)	*
		$t > t_e$	Min.	(peak)	*

Substitution resistor for each cathode		Ω	12,5*

Voltage controlled preheating

*

Without preheating

Open circuit voltage across lamp	V	Min.	(r.m.s.)	*
Current through lamp substitution resistor	A	Min.		*
Lamp substitution resistor			Ω	*
Substitution resistor for each cathode			Ω	*
Cathode current	A	Max.		*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-15-E-G13-26/550

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
15	With starter	Preheated	G13	26 × 550

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
549,0	553,7	556,1	563,2	28,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	110	103,5	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	15	57	50	64	0,300	0,450
60	–	–	–	–	–	–

Chromaticity coordinates: see D.2, annex D.

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-15-E-G13-26/550

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	15	127	0,300	327	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,270	–
		Max.	0,630	–
Open circuit voltage across starter	V	Min. (r.m.s.)	103,5	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	50	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	68	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
800	70

ILCOS: FD-15-E-G13-26/550

Information for high-frequency ballast design					
Typical lamp characteristics					
Frequency kHz	Lamp wattage W	Lamp voltage V		Lamp current A	
≥ 20	13	52		0,245	

Current in any lead to cathodes	A	Max.	0,650
Lamp operating current	A	Min.	*
		Max.	*

Current controlled preheating				
Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$			a	0,240
			i_m (A)	0,315
Maximum preheat current	A	$t \leq 0,4$		1,800
		$0,4 < t < 2,0$		2,100 - 0,300 t
		$t \geq 2,0$		0,900
Open circuit voltage across lamp	V	$t \leq t_e$	Max. (r.m.s.)	270
		$t > t_e$	Min. (r.m.s.)	280
Voltage to starting aid	V	$t \leq t_e$	Max. (peak)	*
		$t > t_e$	Min. (peak)	*
Substitution resistor for each cathode			Ω	12,5*

Voltage controlled preheating
*

Without preheating				
Open circuit voltage across lamp	V	Min. (r.m.s.)		*
Current through lamp substitution resistor	A	Min.		*
Lamp substitution resistor			Ω	*
Substitution resistor for each cathode			Ω	*
Cathode current	A	Max.		*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-18-E-G13-26/600

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
18	With starter	Preheated	G13	26 × 600

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
589,8	594,5	596,9	604,0	28,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	110	103,5	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	18	57	50	64	0,370	0,550
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

ILCOS: FD-18-E-G13-26/600

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	20	127	0,370	270	0,12
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,333	–
		Max.	0,800	–
Open circuit voltage across starter	V	Min. (r.m.s.)	103,5	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	50	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	68	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
800	70

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-18-E-G13-26/600

Information for high frequency ballast design

Typical lamp characteristics

Frequency kHz	Lamp wattage W	Lamp voltage V	Lamp current A
≥ 20	16	55	0,290

Current in any lead to cathodes	A	Max.	0,650
Lamp operating current	A	Min.	*
		Max.	*

Current controlled preheating

Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$		a	0,240
		i_m (A)	0,315

Maximum preheat current	A	$t \leq 0,4$	1,800
		$0,4 < t < 2,0$	$2,000 - 0,560\ t$
		$t \geq 2,0$	0,900

Open circuit voltage across lamp	V	$t \leq t_e$	Max. (r.m.s.)	270
		$t > t_e$	Min. (r.m.s.)	280
Voltage to starting aid	V	$t \leq t_e$	Max. (peak)	*
		$t > t_e$	Min. (peak)	*

Substitution resistor for each cathode		Ω	12,5*

Voltage controlled preheating

*

Without preheating

Open circuit voltage across lamp	V	Min. (r.m.s.)	*
Current through lamp substitution resistor	A	Min.	*
Lamp substitution resistance		Ω	*
Substitution resistor for each cathode		Ω	*
Cathode current	A	Max.	*

* Under consideration.

	DOUBLE-CAPPED FLUORESCENT LAMP DATA SHEET	Page 1

ILCOS: FD-20-E-G13-32/600

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
20	With starter	Preheated	G13	32 × 600

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
589,8	594,5	596,9	604,0	34,1

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	110	95	30
60	110	95	30

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	19	58	52	64	0,360	0,550
60	19	58	52	64	0,360	0,550

Chromaticity co-ordinates: see D.2, annex D.

ILCOS: FD-20-E-G13-32/600

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	20	127	0,370	270	0,12
60	20	118	0,380	240	0,075

Information for ballast design						
Frequency			Hz	50		60
Preheat cathode current	A	Min.		0,333		0,333
		Max.		0,800		0,800
Open circuit voltage across starter	V	Min. (r.m.s.)		95		95
Open circuit voltage across lamp	V	Max. (peak)		400		400
Substitution resistor for both cathodes in series			Ω	50		50
Voltage across starter with lamp operating	V	Max. (r.m.s.)		68		68

Information for starter design		
Pulse voltage V	Non-reclosure voltage V	
Minimum	Maximum	
800	70	

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-20-E-G13-38/600

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
20	With starter	Preheated	G13	38 × 600

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
589,8	594,5	596,9	604,0	40,5

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	110	103,5	30
60	110	103,5	30

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	19,3	57	50	64	0,370	0,550
60	20,5	57	50	64	0,380	0,550

Chromaticity co-ordinates: see D.2, annex D.

ILCOS: FD-20-E-G13-38/600

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	20	127	0,370	270	0,12
60	20	118	0,380	240	0,075

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,333	0,333
		Max.	0,800	0,800
Open circuit voltage across starter	V	Min. (r.m.s.)	103,5	103,5
Open circuit voltage across lamp	V	Max. (peak)	400	400
Substitution resistor for both cathodes in series		Ω	50	50
Voltage across starter with lamp operating	V	Max. (r.m.s.)	68	68

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
250	70

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-25-E-G13-38/970

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
25	With starter	Preheated	G13	38 × 970

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
970,0	974,7	977,1	984,2	40,5

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	24,5	94	84	104	0,290	0,450
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

ILCOS: FD-25-E-G13-38/970

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	25	220	0,290	605	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,261	–
		Max.	0,609	–
Open circuit voltage across starter	V	Min. (r.m.s.)	198	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	50	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	128	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
400	140

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-30-E-G13-26/900

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
30	With starter	Preheated	G13	26 × 900

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
894,6	899,3	901,7	908,8	28,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	220	198	30

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	30	96	86	106	0,365	0,550
60	30,5	99	89	109	0,355	0,530

Chromaticity co-ordinates: see D.2, annex D.

ILCOS: FD-30-E-G13-26/900

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	30	220	0,360	480	0,10
60	30	236	0,355	548	0,075

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,328	0,328
		Max.	0,766	0,766
Open circuit voltage across starter	V	Min. (r.m.s.)	198	198
Open circuit voltage across lamp	V	Max. (peak)	400	400
Substitution resistor for both cathodes in series		Ω	50	50
Voltage across starter with lamp operating	V	Max. (r.m.s.)	128	128

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
400	140

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-30-E-G13-26/900

Information for high frequency ballast design

Typical lamp characteristics

Frequency kHz	Lamp wattage W	Lamp voltage V	Lamp current A
≥ 20	24	95	0,260

Current in any lead to cathodes	A	Max.	0,630
Lamp operating current	A	Min.	*
		Max.	*

Current controlled preheating

Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$		a	0,240
		i_m (A)	0,310

Maximum preheat current	A	$t \leq 0,4$		1,600
		$0,4 < t < 2,0$		$1,810 - 0,525\ t$
		$t \geq 2,0$		0,760
Open circuit voltage across lamp	V	$t \leq t_e$	Max. (r.m.s.)	*
		$t > t_e$	Min. (r.m.s.)	*
Voltage to starting aid	V	$t \leq t_e$	Max. (peak)	*
		$t > t_e$	Min. (peak)	*

Substitution resistor for each cathode		Ω	12,5

Voltage controlled preheating

*

Without preheating

Open circuit voltage across lamp	V	Min. (r.m.s.)	*
Current through lamp substitution resistor	A	Min.	*
Lamp substitution resistance		Ω	*
Substitution resistor for each cathode		Ω	*
Cathode current	A	Max.	*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-30-E-G13-38/900

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
30	With starter	Preheated	G13	38 × 900

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
894,6	899,3	901,7	908,8	40,5

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	29,5	81	71	91	0,405	0,620
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-30-E-G13-38/900

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	30	220	0,405	460	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,365	–
		Max.	0,850	–
Open circuit voltage across starter	V	Min. (r.m.s.)	198	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	40	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	128	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
400	140

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-33-E-G13-26/1150

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
33	With starter	Preheated	G13	26 × 1150

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1149,0	1153,7	1156,1	1163,2	28,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	33	103	93	113	0,380	0,570
60	–	–	–	–	–	–

Chromaticity coordinates: see D.2, annex D.

ILCOS: FD-33-E-G13-26/1150

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	33	230	0,380	474	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,342	–
		Max.	0,798	–
Open circuit voltage across starter	V	Min. (r.m.s.)	198	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	40	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	128	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
800	140

ILCOS: FD-33-E-G13-26/1150

Information for high-frequency ballast design

Typical lamp characteristics

Frequency kHz	Lamp wattage W	Lamp voltage V	Lamp current A
≥ 20	30	103	*0,304

Current in any lead to cathodes	A	Max.	0,750
Lamp operating current	A	Min.	*
		Max.	*

Current controlled preheating

Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$		a	0,340
		i_m (A)	0,300
Maximum preheat current	A	$t \leq 0,4$	1,900
		$0,4 < t < 2,0$	2,150 - 0,630 t
		$t \geq 2,0$	0,900
Open circuit voltage across lamp	V	$t \leq t_e$	Max. (r.m.s.) 290*
		$t > t_e$	Min. (r.m.s.) 330*
Voltage to starting aid	V	$t \leq t_e$	Max. (peak) 410*
		$t > t_e$	Min. (peak) 465*
Substitution resistor for each cathode			Ω 10*

Voltage controlled preheating

*

Without preheating

Open circuit voltage across lamp	V	Min. (r.m.s.)	800
Current through lamp substitution resistor	A	Min.	0,200
Lamp substitution resistor		Ω	1000
Substitution resistor for each cathode		Ω	2
Cathode current	A	Max.	2,200

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-36-E-G13-26/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
36	With starter	Preheated	G13	26 × 1200

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1199,4	1204,1	1206,5	1213,6	28,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	36	103	93	113	0,430	0,650
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

ILCOS: FD-36-E-G13-26/1200

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	40	220	0,430	390	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,387	–
		Max.	0,904	–
Open circuit voltage across starter	V	Min. (r.m.s.)	198	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	40	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	128	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
800	140

ILCOS: FD-36-E-G13-26/1200

Information for high frequency ballast design						
Typical lamp characteristics						
Frequency kHz	Lamp wattage W	Lamp voltage V		Lamp current A		
≥ 20	32	102		0,320		
Current in any lead to cathodes			A	Max.		0,750
Lamp operating current			A	Min.		*
				Max.		*
Current controlled preheating						
Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$				a		0,340
				i_m (A)		0,300
Maximum preheat current		A	$t \leq 0,4$			1,900
			$0,4 < t < 2,0$			2,150 - 0,630 t
			$t \geq 2,0$			0,900
Open circuit voltage across lamp		V	$t \leq t_e$	Max. (r.m.s.)		290*
			$t > t_e$	Min. (r.m.s.)		330*
Voltage to starting aid		V	$t \leq t_e$	Max. (peak)		410*
			$t > t_e$	Min. (peak)		465*
Substitution resistor for each cathode					Ω	10*
Voltage controlled preheating						
*						
Without preheating						
Open circuit voltage across lamp				V	Min. (r.m.s.)	800
Current through lamp substitution resistor				A	Min.	0,200
Lamp substitution resistor					Ω	1000
Substitution resistor for each cathode					Ω	2
Cathode current				A	Max.	2,200

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-38-E-G13-26/1050

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
38	With starter	Preheated	G13	26 × 1050

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1047,0	1051,7	1054,1	1061,2	28,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	38,5	104	94	114	0,430	0,650
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.3, annex D.

ILCOS: FD-38-E-G13-26/1050

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	40	220	0,430	390	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,387	–
		Max.	0,904	–
Open circuit voltage across starter	V	Min. (r.m.s.)	198	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	40	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	128	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
800	140

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-38-E-G13-26/1050

Information for high frequency ballast design

Typical lamp characteristics

Frequency kHz	Lamp wattage W	Lamp voltage V	Lamp current A
≥ 20	32	105	0,310

Current in any lead to cathodes	A	Max.		0,750
Lamp operating current	A	Min.		*
		Max.		*

Current controlled preheating

Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$			a	0,340
			i_m (A)	0,350
Maximum preheat current	A	$t \leq 0,4$		1,900
		$0,4 < t < 2,0$		2,150 - 0,630 t
		$t \geq 2,0$		0,900
Open circuit voltage across lamp	V	$t \leq t_e$	Max. (r.m.s.)	240*
		$t > t_e$	Min. (r.m.s.)	230*
Voltage to starting aid	V	$t \leq t_e$	Max. (peak)	340*
		$t > t_e$	Min. (peak)	325*
Substitution resistor for each cathode			Ω	10*

Voltage controlled preheating

*

Without preheating

Open circuit voltage across lamp	V	Min.	(r.m.s.)	800
Current through lamp substitution resistor	A	Min.		0,200
Lamp substitution resistor			Ω	1000
Substitution resistor for each cathode			Ω	2
Cathode current	A	Max.		2,200

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-40-E-G13-32/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
40	With starter	Preheated	G13	32 × 1200

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1199,4	1204,1	1206,5	1213,6	34,1

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	180	30
60	220	180	30

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	39	106	99	113	0,420	0,650
60	39,5	105	98	112	0,425	0,650

Chromaticity co-ordinates: see D.2, annex D.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-40-E-G13-32/1200

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	40	220	0,430	390	0,10
60	40	236	0,430	439	0,075

Information for ballast design						
Frequency		Hz		50		60
Preheat cathode current	A	Min.		0,387		0,387
		Max.		0,904		0,904
Open circuit voltage across starter	V	Min. (r.m.s.)		180		180
Open circuit voltage across lamp	V	Max. (peak)		400		400
Substitution resistor for both cathodes in series		Ω		40		40
Voltage across starter with lamp operating	V	Max. (r.m.s.)		128		128

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
900	130

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-40-E-G13-38/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
40	With starter	Preheated	G13	38 × 1200

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1199,4	1204,1	1206,5	1213,6	40,5

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	220	198	30

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	39,5	103	93	113	0,430	0,650
60	40	102	92	112	0,435	0,650

Chromaticity co-ordinates: see D.2, annex D.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-40-E-G13-38/1200

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	40	220	0,430	390	0,10
60	40	236	0,430	439	0,075

Information for ballast design						
Frequency			Hz		50	60
Preheat cathode current	A	Min.			0,387	0,387
		Max.			0,904	0,904
Open circuit voltage across starter	V	Min. (r.m.s.)			198	198
Open circuit voltage across lamp	V	Max. (peak)			400	400
Substitution resistor for both cathodes in series			Ω		40	40
Voltage across starter with lamp operating	V	Max. (r.m.s.)			128	128

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
400	140

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-58-E-G13-26/1500

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
58	With starter	Preheated	G13	26 × 1500

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1500,0	1504,7	1507,1	1514,2	28,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	58	110	100	120	0,670	1,000
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.3, annex D.

ILCOS: FD-58-E-G13-26/1500

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	65	220	0,670	240	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,603	–
		Max.	1,410	–
Open circuit voltage across starter	V	Min. (r.m.s.)	198	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	25	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	132	–

Information for starter design		
Pulse voltage V	Non-reclosure voltage V	
Minimum	Maximum	
900	140	

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-58-E-G13-26/1500

Information for high frequency ballast design						
Typical lamp characteristics						
Frequency kHz	Lamp wattage W	Lamp voltage V		Lamp current A		
≥ 20	50	111		0,455		
Current in any lead to cathodes			A	Max.		1,100
Lamp operating current			A	Min.		*
				Max.		*
Current controlled preheating						
Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$				a		0,390
				i_m (A)		0,350
Maximum preheat current	A	$t \leq 0,4$				2,900
		$0,4 < t < 2,0$				$3,300 - 0,970\ t$
		$t \geq 2,0$				1,350
Open circuit voltage across lamp	V	$t \leq t_e$		Max. (r.m.s.)		295*
		$t > t_e$		Min. (r.m.s.)		335*
Voltage to starting aid	V	$t \leq t_e$		Max. (peak)		420*
		$t > t_e$		Min. (peak)		475*
Substitution resistor for each cathode					Ω	8*
Voltage controlled preheating						
*						
Without preheating						
Open circuit voltage across lamp			V	Min. (r.m.s.)		800
Current through lamp substitution resistor			A	Min.		0,250
Lamp substitution resistor					Ω	800
Substitution resistor for each cathode					Ω	2
Cathode current			A	Max.		3,000

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-65-E-G13-32/1500

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
65	With starter	Preheated	G13	32 x 1500

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1500,0	1504,7	1507,1	1514,2	34,1

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	62	110	100	120	0,670	1,000
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-65-E-G13-32/1500

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	65	220	0,670	240	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,603	–
		Max.	1,410	–
Open circuit voltage across starter	V	Min. (r.m.s.)	198	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	25	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	132	–

Information for starter design		
Pulse voltage V	Non-reclosure voltage V	
Minimum		Maximum
900		140

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-65-E-G13-38/1500

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
65	With starter	Preheated	G13	38 ×1500

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1500,0	1504,7	1507,1	1514,2	40,5

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	220	198	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	64	110	100	120	0,670	1,000
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

ILCOS: FD-65-E-G13-38/1500

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	65	220	0,670	240	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency			Hz	50	60
Preheat cathode current	A	Min.		0,603	–
		Max.		1,410	–
Open circuit voltage across starter	V	Min. (r.m.s.)		198	–
Open circuit voltage across lamp	V	Max. (peak)		400	–
Substitution resistor for both cathodes in series			Ω	25	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)		132	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
400	140

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-70-E-G13-26/1800

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
70	With starter	Preheated	G13	26 × 1800

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1763,8	1768,5	1770,9	1778,0	28,0

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	240	216	30
60	240	216	30

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	69,5	128	118	138	0,700	1,000
60	69,5	128	118	138	0,700	1,000

Chromaticity co-ordinates: see D.3, annex D.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-70-E-G13-26/1800

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	70	240	0,700	240	0,10
60	70	240	0,700	240	0,10

Information for ballast design				
Frequency	Hz		50	60
Preheat cathode current	A	Min.	0,590	0,590
		Max.	1,470	1,470
Open circuit voltage across starter	V	Min. (r.m.s.)	216	216
Open circuit voltage across lamp	V	Max. (peak)	400	400
Substitution resistor for both cathodes in series	Ω		25	25
Voltage across starter with lamp operating	V	Max. (r.m.s.)	160	160

Information for starter design		
Pulse voltage V	Non-reclosure voltage V	
Minimum		Maximum
900		170

ILCOS: FD-70-E-G13-26/1800

Information for high frequency ballast design

Typical lamp characteristics

Frequency kHz	Lamp wattage W	Lamp voltage V	Lamp current A
≥ 20	60	129	0,470

Current in any lead to cathodes	A	Max.	1,160
Lamp operating current	A	Min.	*
		Max.	*

Current controlled preheating

Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0.5}$	a	0,800
	i_m (A)	0,400

Maximum preheat current	A	$t \leq 0,4$		3,100
		$0,4 < t < 2,0$		3,500 - 1,030 t
		$t \geq 2,0$		1,450
Open circuit voltage across lamp	V	$t \leq t_e$	Max. (r.m.s.)	410*
		$t > t_e$	Min. (r.m.s.)	465*
Voltage to starting aid	V	$t \leq t_e$	Max. (peak)	580*
		$t > t_e$	Min. (peak)	660*
Substitution resistor for each cathode			Ω	8*

Voltage controlled preheating

*

Without preheating

Open circuit voltage across lamp	V	Min. (r.m.s.)	*
Current through lamp substitution resistor	A	Min.	*
Lamp substitution resistor		Ω	*
Substitution resistor for each cathode		Ω	*
Cathode current	A	Max.	*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-75-E-G13-38/1800

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
75	With starter	Preheated	G13	38 × 1800

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1763,8	1768,5	1770,9	1778,0	40,5

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	240	216	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	75	130	120	140	0,670	1,000
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

ILCOS: FD-75-E-G13-38/1800

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	75	235	0,670	240	0,10
60	–	–	–	–	–

NOTE – A 65 W reference ballast is used, operated at 235 V.

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,570	–
		Max.	1,410	–
Open circuit voltage across starter	V	Min. (r.m.s.)	216	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	25	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	160	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
800	170

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

Mainly intended for replacement purposes.

ILCOS: FD-80-E-G13-38/1500

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
80	With starter	Preheated	G13	38 × 1500

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1500,0	1504,7	1507,1	1514,2	40,5

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	240	198	30
60	–	–	–

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	76	99	89	109	0,870	1,300
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.3, annex D.

ILCOS: FD-80-E-G13-38/1500

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	80	240	0,865	223	0,06
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,790	–
		Max.	1,830	–
Open circuit voltage across starter	V	Min. (r.m.s.)	198	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	25	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	128	–

Information for starter design		
Pulse voltage V	Non-reclosure voltage V	
Minimum	Maximum	
400	140	

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

Mainly intended for replacement purposes. **ILCOS:** FD-85-E-G13-38/1800

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
85	With starter	Preheated	G13	38 × 1800

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1763,8	1768,5	1770,9	1778,0	40,5

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	240	216	30
60	–	–	–

NOTE – An 80 W/240 V inductive ballast is used.

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	84	120	110	130	0,800	1,300
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.3 annex D.

ILCOS: FD-85-E-G13-38/1800

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	80	240	0,865	223	0,06
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,680	–
		Max.	1,700	–
Open circuit voltage across starter	V	Min. (r.m.s.)	216	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	25	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	160	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
800	170

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-100-E-G13-38/2400

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
100	With starter	Preheated	G13	38 × 2400

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
2374,3	2379,0	2381,4	2388,5	40,5

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	240	220	30
60	–	–	–

NOTE – An 80 W/240 V inductive ballast is used, together with a 6,8 µF capacitor in series.

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	W	Rated	Minimum	Maximum	A	A
50	102	125	110	140	0,960	1,300
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

ILCOS: FD-100-E-G13-38/2400

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	100	350	0,940	308	0,06
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,810	–
		Max.	2,000	–
Open circuit voltage across starter	V	Min. (r.m.s.)	216	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	25	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	160	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
900	170

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

Mainly intended for replacement purposes.

ILCOS: FD-125-E-G13-38/2400

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
125	With starter	Preheated	G13	38 × 2400

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
2374,3	2379,0	2381,4	2388,5	40,5

Starting characteristics			
Frequency Hz	Ballast rated voltage V	Test voltage (r.m.s.) V	Starting time s
50	240	220	30
60	–	–	–

NOTE – An 80 W/240 V inductive ballast is used, together with a 6,8 µF capacitor in series.

Electrical characteristics						
Frequency Hz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A	Rated preheat current A
		Rated	Minimum	Maximum		
50	123	149	134	164	0,940	1,300
60	–	–	–	–	–	–

Chromaticity co-ordinates: see D.3, annex D.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-125-E-G13-38/2400

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	125	350	0,940	300	0,06
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode current	A	Min.	0,800	–
		Max.	1,970	–
Open circuit voltage across starter	V	Min. (r.m.s.)	216	–
Open circuit voltage across lamp	V	Max. (peak)	400	–
Substitution resistor for both cathodes in series		Ω	25	–
Voltage across starter with lamp operating	V	Max. (r.m.s.)	160	–

Information for starter design	
Pulse voltage V	Non-reclosure voltage V
Minimum	Maximum
800	180

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-4-L/P/H-G5-16/150

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
4	Starterless	Preheated, high resistance	G5	16 × 150

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
135,9	140,6	143,0	150,1	16,0

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	4/6/8	220	6	8,0	200	10
60	4/6/8	220	6	8,0	200	10

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	4,5	29	24	34	0,170
60	4,5	29	24	34	0,170

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	70	50

ILCOS: FD-4-L/P/H-G5-16/150

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	6	127	0,160	700	0,12
60	6	118	0,160	650	0,075

Information for ballast design						
Frequency			Hz	50		60
Preheat cathode voltage	V	Min. (r.m.s.)		6,5		6,5
		Max. (r.m.s.)		9,2		9,2
Open circuit voltage across lamp	V	Min. (r.m.s.)		105		105
		Max. (r.m.s.)		145		145
Open circuit voltage across two lamps in series	V	Min. (r.m.s.)		120		120
		Max. (r.m.s.)		165		165
Starting capacitor	µF	Min.		*		0,008
		Max.		*		0,060
Substitution resistor for each cathode			Ω	70		70
Voltage to starting aid	V	Min. (peak)		400		400
Current in any lead to cathodes	A	Max.		*		*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-6-L/P/H-G5-16/225

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
6	Starterless	Preheated, high resistance	G5	16 × 225

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
212,1	216,8	219,2	226,3	16,0

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	4/6/8	220	6	8,0	200	10
60	4/6/8	220	6	8,0	200	10

Electrical characteristics					
Frequency Hz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A
		Rated	Minimum	Maximum	
50	6	42	36	48	0,160
60	6	42	36	48	0,160

Chromaticity co-ordinates: see D.2 annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	70	50

ILCOS: FD-6-L/P/H-G5-16/225

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	6	127	0,160	700	0,12
60	6	118	0,160	650	0,075

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	6,5	6,5
		Max. (r.m.s.)	9,2	9,2
Open circuit voltage across lamp	V	Min. (r.m.s.)	105	105
		Max. (r.m.s.)	145	145
Open circuit voltage across two lamps in series	V	Min. (r.m.s.)	130	130
		Max. (r.m.s.)	180	180
Starting capacitor	µF	Min.	*	0,008
		Max.	*	0,060
Substitution resistor for each cathode		Ω	70	70
Voltage to starting aid	V	Min. (peak)	400	400
Current in any lead to cathodes	A	Max.	*	*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-8-L/P/H-G5-16/300

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
8	Starterless	Preheated, high resistance	G5	16 × 300

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
288,3	293,0	295,4	302,5	16,0

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	4/6/8	220	6	8,0	200	10
60	4/6/8	220	6	8,0	200	10

Electrical characteristics					
Frequency Hz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A
		Rated	Minimum	Maximum	
50	7,1	56	48	64	0,145
60	7,2	57	48	64	0,145

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	70	50

ILCOS: FD-8-L/P/H-G5-16/300

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	6	127	0,160	700	0,12
60	6	118	0,160	650	0,075

Information for ballast design				
Frequency	Hz		50	60
Preheat cathode voltage	V	Min. (r.m.s.)	6,5	6,5
		Max. (r.m.s.)	9,2	9,2
Open circuit voltage across lamp	V	Min. (r.m.s.)	105	105
		Max. (r.m.s.)	145	145
Open circuit voltage across two lamps in series	V	Min. (r.m.s.)	140	140
		Max. (r.m.s.)	190	190
Starting capacitor	µF	Min.	*	0,008
		Max.	*	0,060
Substitution resistor for each cathode	Ω		70	70
Voltage to starting aid	V	Min. (peak)	400	400
Current in any lead to cathodes	A	Max.	*	*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-20-L/P/H-G13-38/600

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
20	Starterless	Preheated, high resistance	G13	38 × 600

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
589,8	594,5	596,9	604,0	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	40	220	13	8,0	180	10
60	40	220	13	8,0	180	10

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	19,3	57	50	64	0,370
60	20,5	57	50	64	0,380

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	20	14

ILCOS: FD-20-L/P/H-G13-38/600

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	20	127	0,370	270	0,12
60	20	118	0,380	240	0,075

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	6,5	6,5
		Max. (r.m.s.)	10,0	10,0
Open circuit voltage across lamp	V	Min. (r.m.s.)	180	180
		Max. (peak)	345	345
Substitution resistor for each cathode		Ω	19	19
Voltage to starting		Min. (peak)	*	*
Current in any lead to cathodes	A	Max.	0,650	0,650

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-30-L/P/H-G13-38/900

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
30	Starterless	Preheated, high resistance	G13	38 × 900

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
894,6	899,3	901,7	908,8	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	30	220	13	8,0	205	10
60	–	–	–	–	–	–

Electrical characteristics					
Frequency Hz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A
		Rated	Minimum	Maximum	
50	29,5	81	71	91	0,405
60	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	20	14

ILCOS: FD-30-L/P/H-G13-38/900

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	30	220	0,405	460	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	6,5	–
		Max. (r.m.s.)	10,0	–
Open circuit voltage across lamp	V	Min. (r.m.s.)	205	–
		Max. (peak)	420	–
Substitution resistor for each cathode		Ω	19	–
Voltage to starting aid	V	Min. (peak)	*	–
Current in any lead to cathodes	A	Max.	0,750	–

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-40-L/P/H-G13-38/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
40	Starterless	Preheated, high resistance	G13	38 × 1200

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1199,4	1204,1	1206,5	1213,6	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	40	220	13	8,0	205	10
60	40	220	13	8,0	205	10

Electrical characteristics					
Frequency Hz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A
		Rated	Minimum	Maximum	
50	39,5	103	93	113	0,430
60	40	102	92	112	0,435

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	20	14

ILCOS: FD-40-L/P/H-G13-38/1200

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	40	220	0,430	390	0,10
60	40	236	0,430	439	0,075

Information for ballast design				
Frequency	Hz		50	60
Preheat cathode voltage	V	Min. (r.m.s.)	6,5	6,5
		Max. (r.m.s.)	10,0	10,0
Open circuit voltage across lamp	V	Min. (r.m.s.)	205	205
		Max. (peak)	420	420
Substitution resistor for each cathode	Ω		19	19
Voltage to starting	V	Min. (peak)	*	*
Current in any lead to cathodes	A	Max.	0,750	0,750

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-65-L/P/H-G13-38/1500

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
65	Starterless	Preheated, high resistance	G13	38 × 1500

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1500,0	1504,7	1507,1	1514,2	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	65	220	13	8,0	220	10
60	–	–	–	–	–	–

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	64	110	100	120	0,670
60	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.)	Resistance of each cathode Ω	
	V	Rated	Minimum
High resistance	8,0	11	*

* Under consideration.

ILCOS: FD-65-L/P/H-G13-38/1500

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	65	220	0,670	240	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	6,5	–
		Max. (r.m.s.)	11,0	–
Open circuit voltage across lamp	V	Min. (r.m.s.)	220	–
		Max. (peak)	475	–
Substitution resistor for each cathode		Ω	11	–
Voltage to starting aid	V	Min. (peak)	*	–
Current in any lead to cathodes	A	Max.	1,100	–

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-75-L/P/H-G13-38/1800

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
75	Starterless	Preheated, high resistance	G13	38 × 1800

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1763,8	1768,5	1770,9	1778,0	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	75	240	13	8,0	250	10
60	–	–	–	–	–	–

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	75	130	120	140	0,670
60	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	12	9

ILCOS: FD-75-L/P/H-G13-38/1800

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	75	235	0,670	240	0,10
60	–	–	–	–	–

NOTE – A 65 W reference ballast is used, operated at 235 V.

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	6,5	–
		Max. (r.m.s.)	11,0	–
Open circuit voltage across lamp	V	Min. (r.m.s.)	220	–
		Max. (peak)	500	–
Substitution resistor for each cathode		Ω	11	–
Voltage to starting aid	V	Min. (peak)	*	–
Current in any lead to cathodes	A	Max.	1,100	–

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

Mainly intended for replacement purposes. **ILCOS:** FD-80-L/P/H-G13-38/1500

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
80	Starterless	Preheated, high resistance	G13	38 × 1500

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1500,0	1504,7	1507,1	1514,2	40,5

Starting characteristics						
Frequency Hz	Ballast, nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	80	240	13	8,0	220	10
60	–	–	–	–	–	–

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	76	99	89	109	0,870
60	–	–	–	–	–

Chromaticity co-ordinates: see D.3, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	12	9

ILCOS: FD-80-L/P/H-G13-38/1500

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	80	240	0,865	223	0,06
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	6,5	–
		Max. (r.m.s.)	11,0	–
Open circuit voltage across lamp	V	Min. (r.m.s.)	220	–
		Max. (peak)	475	–
Substitution resistor for each cathode		Ω	11	–
Voltage to starting	V	Min. (peak)	*	–
Current in any lead to cathodes	A	Max.	1,600	–

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

Mainly intended for replacement purposes. **ILCOS:** FD-85-L/P/H-G13-38/1800

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
85	Starterless	Preheated, high resistance	G13	38 × 1800

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1763,8	1768,5	1770,9	1778,0	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	85	240	13	8,0	250	10
60	–	–	–	–	–	–

Electrical characteristics					
Frequency Hz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A
		Rated	Minimum	Maximum	
50	84	120	110	130	0,800
60	–	–	–	–	–

Chromaticity co-ordinates: see D.3, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	12	9

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-85-L/P/H-G13-38/1800

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	80	240	0,865	223	0,06
60	–	–	–	–	–

Information for ballast design					
Frequency			Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)		6,5	–
		Max. (r.m.s.)		11,0	–
Open circuit voltage across lamp	V	Min. (r.m.s.)		250	–
		Max. (peak)		500	–
Substitution resistor for each cathode			Ω	11	–
Voltage to starting aid	V	Min. (peak)		*	–
Current in any lead to cathodes	A	Max.		1,300	–

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-125-L/P/H-G13-38/2400

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
125	Starterless	Preheated, high resistance	G13	38 × 2400

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
2374,3	2379,0	2381,4	2388,5	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	125	240	13	8,0	315	10
60	–	–	–	–	–	–

Electrical characteristics					
Frequency Hz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A
		Rated	Minimum	Maximum	
50	123	149	134	164	0,940
60	–	–	–	–	–

Chromaticity co-ordinates: see D.3, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	12	9

ILCOS: FD-125-L/P/H-G13-38/2400

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	125	350	0,940	300	* 0,06
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	6,5	–
		Max. (r.m.s.)	11,0	–
Open circuit voltage across lamp	V	Min. (r.m.s.)	315	–
		Max. (peak)	*	–
Substitution resistor for each cathode		Ω	11	–
Voltage to starting aid	V	Min. (peak)	*	–
Current in any lead to cathodes	A	Max.	1,600	–

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-20-L/P/L-G13-32/600

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
20	Starterless	Preheated, low resistance	G13	32 × 600

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
589,8	594,5	596,9	604,0	34,1

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	40	220	16	3,05	180	10
60	40	220	16	3,05	180	10

Electrical characteristics						
Test method	Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Annex	Hz	W	Rated	Minimum	Maximum	A
B.1	50	19	58	52	64	0,360
B.1	60	19	58	52	64	0,360
B.2	60	*	*	*	*	*

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
Low resistance	3,6	10	7

* Under consideration.

ILCOS: FD-20-L/P/L-G13-32/600

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	20	127	0,370	270	0,12
60	20	118	0,380	240	0,075

Information for ballast design							
Frequency			Hz		50		60
Preheat cathode voltage	V	Min. (r.m.s.)			3,05		3,05
		Max. (r.m.s.)			5,5		5,5
Open circuit voltage across lamp	V	Min. (r.m.s.)			180		180
		Max. (peak)			345		345
Substitution resistor for each cathode			Ω		9		9
Voltage to starting aid	V	Min. (peak)			*		*
Current in any lead to cathodes	A	Max.			0,650		0,650

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-20-L/P/L-G13-38/600

Nominal wattage W	Circu t	Cathode	Cap	Nominal dimensions mm
20	Starterless	Preheated, low resistance	G13	38 × 600

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
589,8	594,5	596,9	604,0	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	40	220	13	3,05	180	10
60	40	220	13	3,05	180	10

Electrical characteristics						
Test method	Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Annex	Hz	W	Rated	Minimum	Maximum	A
B.1	50	19,3	57	50	64	0,370
B.1	60	20,0	56	49	63	0,380
B.2	60	*	*	*	*	*

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
Low resistance	3,6	10	7

* Under consideration.

ILCOS: FD-20-L/P/L-G13-38/600

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	20	127	0,370	270	0,12
60	20	118	0,380	240	0,075

Information for ballast design				
Frequency	Hz		50	60
Preheat cathode voltage	V	Min. (r.m.s.)	3,05	3,05
		Max. (r.m.s.)	5,5	5,5
Open circuit voltage across lamp	V	Min. (r.m.s.)	180	180
		Max. (peak)	345	345
Substitution resistor for each cathode	Ω		9	9
Voltage to starting aid	V	Min. (peak)	*	*
Current in any lead to cathodes	A	Max.	0,650	0,650

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-30-L/P/L-G13-38/900

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
30	Starterless	Preheated, low resistance	G13	38 × 900

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
894,6	899,3	901,7	908,8	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	30	220	13	3,05	205	10
60	30	220	13	3,05	205	10

Electrical characteristics						
Test method	Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Annex	Hz	W	Rated	Minimum	Maximum	A
B.1	50	29,5	81	71	91	0,405
B.1	60	31,5	78	70	86	0,435
B.2	60	32,5 #	77	69	85	0,430

Includes approximately 2 W for supplementary cathode heating with 3,6 V across each cathode.
Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
Low resistance	3,6	10	7

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-30-L/P/L-G13-38/900

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	30	220	0,405	460	* 0,10
60	30	180	0,430	335	0,075

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	3,05	3,05
		Max. (r.m.s.)	5,5	5,5
Open circuit voltage across lamp	V	Min. (r.m.s.)	205	205
		Max. (peak)	420	420
Substitution resistor for each cathode		Ω	9	9
Voltage to starting aid	V	Min. (peak)	*	*
Current in any lead to cathodes	A	Max.	0,750	0,750

Information for ballast design (North American practice)					
Frequency				Hz	60
Preheat cathode voltage		V	Min. (r.m.s.)		3,4
			Max. (r.m.s.)		4,5
Operating cathode voltage		V	Min. (r.m.s.)		2,5
			Max. (r.m.s.)		4,0
Substitution resistor for each cathode				Ω	9,6
			One lamp	Two lamps in series	Three lamps in series
Open circuit voltage across lamp [a]	V	Min. (r.m.s.)	150	215	305
		Max. (r.m.s.)	205	290	410
Voltage to starting aid [b]	V	Min. (peak)	280	280	280
Crest factor of open circuit voltage across lamp and to starting aid		Max.	2,0	2,0	2,0
Starting aid capacitor @ 60 Hz	μF	Min.	–	0,04	0,04
		Max.	–	0,06	0,06

[a] These values are for capacitive circuits only. For inductive circuits add 3 %.
[b] These values are for crest factors 1,55 - 2,0. For crest factors less than 1,55 add 10 %.

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-40-L/P/L-G13-32/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
40	Starterless	Preheated, low resistance	G13	32 × 1200

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1199,4	1204,1	1206,5	1213,6	34,1

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	40	220	16	3,05	205	10
60	40	220	16	3,05	205	10

Electrical characteristics						
Test method	Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Annex	Hz	W	Rated	Minimum	Maximum	A
B.1	50	39,0	106	96	116	0,420
B.1	60	39,5	105	98	112	0,425
B.2	60	40,5 #	104	97	111	0,420

Includes approximately 2 W for supplementary cathode heating with 3,6 V across each cathode.
Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
Low resistance	3,6	10	7

ILCOS: FD-40-L/P/L-G13-32/1200

Reference ballast characteristics					
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor
Hz	W	V	A	Ω	
50	40	220	0,430	390	* 0,10
60	40	236	0,430	439	0,075

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	3,05	3,05
		Max. (r.m.s.)	5,5	5,5
Open circuit voltage across lamp	V	Min. (r.m.s.)	205	205
		Max. (peak)	420	420
Substitution resistor for each cathode		Ω	9	9
Voltage to starting aid	V	Min. (peak)	*	*
Current in any lead to cathodes	A	Max.	0,750	0,750
Additional information for peak lead ballast design (Japanese practice)				
Open circuit voltage across lamp	V	Min. (r.m.s.)	188	188
Crest factor of open circuit voltage across lamp		Max.	2,3	2,3

Information for ballast design (North American practice)					
Frequency				Hz	60
Preheat cathode voltage		V	Min. (r.m.s.)		3,4
			Max. (r.m.s.)		4,5
Operating cathode voltage		V	Min. (r.m.s.)		2,5
			Max. (r.m.s.)		4,0
Substitution resistor for each cathode				Ω	9,6
			One lamp	Two lamps in series	Three lamps in series
Open circuit voltage across lamp [a]	V	Min. (r.m.s.)	200	256	395
		Max. (r.m.s.)	260	330	525
Voltage to starting aid [b]	V	Min. (peak)	240	240	280
Crest factor of open circuit voltage across lamp and to starting aid		Max.	2,0	2,0	2,0
Starting aid capacitor @ 60 Hz	µF	Min.	–	0,04	0,04
		Max.	–	0,06	0,06

[a] These values are for capacitive circuits only. For inductive circuits add 3 %.
[b] These values are for crest factors 1,55 - 2,0. For crest factors less than 1,55 add 10 %.

* Under consideration.

8-4-03

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-40-L/P/L-G13-38/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
40	Starterless	Preheated, low resistance	G13	38 × 1200

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1199,4	1204,1	1206,5	1213,6	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	40	220	13	3,05	205	10
60	40	220	13	3,05	205	10

Electrical characteristics						
Test method	Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Annex	Hz	W	Rated	Minimum	Maximum	A
B.1	50	39,5	103	93	113	0,430
B.1	60	40,0	102	92	112	0,435
B.2	60	41,0 #	101	91	111	0,430

Includes approximately 2 W for supplementary cathode heating with 3,6 V across each cathode.
Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
Low resistance	3,6	10	7

ILCOS: FD-40-L/P/L-G13-38/1200

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	40	220	0,430	390	0,10
60	40	236	0,430	439	0,075

Information for ballast design					
Frequency				Hz	50	60
Preheat cathode voltage	V	Min.	(r.m.s.)		3,05	3,05
		Max.	(r.m.s.)		5,5	5,5
Open circuit voltage across lamp	V	Min.	(r.m.s.)		205	205
		Max.	(peak)		420	420
Substitution resistor for each cathode				Ω	9*	9*
Voltage to starting aid	V	Min.	(peak)		*	*
Current in any lead to cathodes	A	Max.			0,750	0,750

Information for ballast design (North American practice)					
Frequency				Hz	60
Preheat cathode voltage			V	Min. (r.m.s.)	3,4
				Max. (r.m.s.)	4,5
Operating cathode voltage			V	Min. (r.m.s.)	2,5
				Max. (r.m.s.)	4,0
Substitution resistor for each cathode				Ω	9,6
			One lamp	Two lamps in series	Three lamps in series
Open circuit voltage across lamp [a]	V	Min. (r.m.s.)	200	256	395
		Max. (r.m.s.)	260	330	525
Voltage to starting aid [b]	V	Min. (peak)	240	240	280
Crest factor of open circuit voltage across lamp and to starting aid		Max.	2,0	2,0	2,0
Starting aid capacitor @ 60 Hz	µF	Min.	–	0,04	0,04
		Max.	–	0,06	0,06

[a] These values are for capacitive circuits only. For inductive circuits add 3 %.
[b] These values are for crest factors 1,55 - 2,0. For crest factors less than 1,55 add 10 %.

8-4-03

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-65-L/P/L-G13-38/1500

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
65	Starterless	Preheated, low resistance	G13	38 × 1500

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1500,0	1504,7	1507,1	1514,2	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	65	220	13	3,05	220	10
60	–	–	–	–	–	–

Electrical characteristics						
Test method	Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Annex	Hz	W	Rated	Minimum	Maximum	A
B.1	50	64	110	100	120	0,670
B.1	60	–	–	–	–	–
B.2	60	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
Low resistance	3,6	6	4

ILCOS: FD-65-L/P/L-G13-38/1500

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	65	220	0,670	240	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	3,05	–
		Max. (r.m.s.)	5,5	–
Open circuit voltage across lamp	V	Min. (r.m.s.)	220	–
		Max. (peak)	475	–
Substitution resistor for each cathode		Ω	6	–
Voltage to starting aid	V	Min. (peak)	*	–
Current in any lead to cathodes	A	Max.	1,100	–

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-85-L/P/L-G13-38/2400

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
85 W	Starterless	Preheated, low resistance	G13	38 × 2400

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
2374,3	2379,0	2381,4	2388,5	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	85	240	13	3,05	325	10
60	–	–	–	–	–	–

Electrical characteristics						
Test method	Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Annex	Hz	W	Rated	Minimum	Maximum	A
B.1	50	85	178	163	193	0,550
B.1	60	–	–	–	–	–
B.2	60	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
Low resistance	3,6	6	4

* Under consideration.

ILCOS: FD-85-L/P/L-G13-38/2400

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	85	350	0,550	480	0,06
60	–	–	–	–	–

Information for ballast design				
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	3,05	–
		Max. (r.m.s.)	5,5	–
Open circuit voltage across lamp	V	Min. (r.m.s.)	*	–
		Max. (peak)	*	–
Substitution resistor for each cathode		Ω	6	–
Voltage to starting aid	V	Min. (peak)	*	–
Current in any lead to cathodes	A	Max.	*	–

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-60-L/P/L-R17d-38/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
60	Starterless	Preheated, low resistance	R17d	38 × 1200

Dimensions mm		
C		D
Min.	Max.	Max.
1161,2	1166,0	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	–	–	–	–	–	–
60	60	*	13	3,05	205	10

Electrical characteristics						
Test method	Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Annex	Hz	W	Rated	Minimum	Maximum	A
B.1	50	–	–	–	–	–
B.1	60	*	*	*	*	*
B.2	60	63 #	78	70	86	0,800

Includes approximately 7 W for supplementary cathode heating with 3,6 V across each cathode.
Chromaticity co-ordinates: *

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
Low resistance	3,6	3,2	2,8

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-60-L/P/L-R17d-38/1200

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	–	–	–	–	–
60	60	230	0,800	244	0,075

Information for ballast design					
Frequency			Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)		–	*
		Max. (r.m.s.)		–	*
Open circuit voltage across lamp	V	Min. (r.m.s.)		–	*
		Max. (peak)		–	*
Substitution resistor for each cathode			Ω	–	*
Voltage to starting aid	V	Min. (peak)		–	*
Current in any lead to cathodes	A	Max.		–	*

Information for ballast design (North American practice)					
Frequency				Hz	60
Preheat cathode voltage			V	Min. (r.m.s.)	3,4
				Max. (r.m.s.)	4,5
Operating cathode voltage			V	Min. (r.m.s.)	3,0
				Max. (r.m.s.)	4,0
Substitution resistor for each cathode				Ω	3,2
			One lamp	Two lamps in series	Three lamps in series
Open circuit voltage across lamp [a]	V	Min. (r.m.s.)	155	256	385
		Max. (r.m.s.)	–	–	–
Voltage to starting aid [b]	V	Min. (peak)	325	325	325
Crest factor of open circuit voltage across lamp and to starting aid		Max.	2,0	2,0	2,0
Starting aid capacitor @ 60 Hz	µF	Min.	–	0,06	0,06
		Max.	–	0,12	0,12

[a] These values are for capacitive circuits only. For inductive circuits add 6 %.
[b] These values are for crest factors 1,55 - 2,0. For crest factors less than 1,55 add 10 %.

8-4-03

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-87-L/P/L-R17d-38/1800

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
87	Starterless	Preheated, low resistance	R17d	38 × 1800

Dimensions mm		
C		D
Min.	Max.	Max.
1770,8	1775,6	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	–	–	–	–	–	–
60	87	*	13	3,05	275	10

Electrical characteristics						
Test method	Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Annex	Hz	W	Rated	Minimum	Maximum	A
B.1	50	–	–	–	–	–
B.1	60	*	*	*	*	*
B.2	60	87 #	117	105	129	0,780

Includes approximately 7 W for supplementary cathode heating with 3,6 V across each cathode.
Chromaticity co-ordinates: *

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
Low resistance	3,6	3,2	2,8

* Under consideration.

ILCOS: FD-87-L/P/L-R17d-38/1800

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	–	–	–	–	–
60	87	300	0,800	315	0,075

Information for ballast design					
Frequency			Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)		–	*
		Max. (r.m.s.)		–	*
Open circuit voltage across lamp	V	Min. (r.m.s.)		–	*
		Max. (peak)		–	*
Substitution resistor for each cathode			Ω	–	*
Voltage to starting aid	V	Min. (peak)		–	*
Current in any lead to cathodes	A	Max.		–	*

Information for ballast design (North American practice)				
Frequency			Hz	60
Preheat cathode voltage	V	Min. (r.m.s.)		3,4
		Max. (r.m.s.)		4,5
Operating cathode voltage	V	Min. (r.m.s.)		3,0
		Max. (r.m.s.)		4,0
Substitution resistor for each cathode			Ω	3,2

			One lamp	Two lamps in series	Three lamps in series
Open circuit voltage across lamp [a]	V	Min. (r.m.s.)	260	395	550
		Max. (r.m.s.)	–	–	–
Voltage to starting aid [b]	V	Min. (peak)	325	325	325
Crest factor of open circuit voltage across lamp and to starting aid		Max.	2,0	2,0	2,0
Starting aid capacitor @ 60 Hz	µF	Min.	–	0,06	0,06
		Max.	–	0,12	0,12

[a] These values are for capacitive circuits only. For inductive circuits add 6 %.
[b] These values are for crest factors 1,55 - 2,0. For crest factors less than 1,55 add 10 %.

8-4-03

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-112-L/P/L-R17d-38/2400

Nominal wattage W	Circu t	Cathode	Cap	Nominal dimensions mm
112	Starterless	Preheated, low resistance	R17d	38 × 2400

Dimensions mm		
C		D
Min.	Max.	Max.
2380,4	2385,2	40,5

Starting characteristics						
Frequency Hz	Ballast nominal wattage W	Ballast rated voltage V	Starting aid distance mm	Cathode voltage (r.m.s.) V	Open circuit voltage (r.m.s.) V	Starting time s
50	–	–	–	–	–	–
60	112	*	13	3,05	315	10

Electrical characteristics						
Test method	Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Annex	Hz	W	Rated	Minimum	Maximum	A
B.1	50	–	–	–	–	–
B.1	60	*	*	*	*	*
B.2	60	113 #	153	138	168	0,790

Includes approximately 7 W for supplementary cathode heating with 3,6 V across each cathode.
Chromaticity co-ordinates: *

Cathode characteristics			
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
Low resistance	3,6	3,2	2,8

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-112-L/P/L-R17D-38/2400

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	–	–	–	–	–
60	112	400	0,800	415	0,075

Information for ballast design				
Frequency			50	60
Preheat cathode voltage	V	Min. (r.m.s.)	–	3,05
		Max. (r.m.s.)	–	5,0
Open circuit voltage across lamp	V	Min. (r.m.s.)	–	315
		Max. (peak)	–	*
Substitution resistor for each cathode		Ω	–	3,2
Voltage to starting aid	V	Min. (peak)	–	*
Current in any lead to cathodes	A	Max.	–	*

Information for ballast design (North American practice)				
Frequency			Hz	60
Preheat cathode voltage	V	Min. (r.m.s.)		3,4
		Max. (r.m.s.)		4,5
Operating cathode voltage	V	Min. (r.m.s.)		3,0
		Max. (r.m.s.)		4,0
Substitution resistor for each cathode			Ω	3,2

			One lamp	Two lamps in series	Three lamps in series
Open circuit voltage across lamp [a]	V	Min. (r.m.s.)	295	465	660
		Max. (r.m.s.)	–	–	–
Voltage to starting aid [b]	V	Min. (peak)	325	325	325
Crest factor of open circuit voltage across lamp and to starting aid		Max.	2,0	2,0	2,0
Starting aid capacitor @ 60 Hz	µF	Min.	–	0,06	0,06
		Max.	–	0,12	0,12

[a] These values are for capacitive circuits only. For inductive circuits add 6 %.
[b] These values are for crest factors 1,55 - 2,0. For crest factors less than 1,55 add 10 %.

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* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-6-L/P-W4.3x8.5d-7/220

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
6	HF starterless	Preheated	W4.3x8.5d	7 × 220

Dimensions mm		
C		D
Min.	Max.	Max.
217,3	219,3	7,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 – 26	6	0,120	1,5	290	0,1

Electrical characteristics					
Frequency kHz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp Current A
		Rated	Minimum	Maximum	
20 – 26	5,0	51	46	56	0,100

Chromaticity coordinates: see D.2, Annex D.

Cathode characteristics			
Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,100	100	75	125

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-6-L/P-W4.3x8.5d-7/220

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 – 26	6	220	0,100	1 690

Information for high frequency ballast design						
Frequency					kHz	≥ 20
Normal operation						
Lamp operating current I_D				A	Min.	0,080
					Max.	0,135
Current in any lead to cathodes				A	Max.	0,140
Dimming operation						
Lamp operating current I_D				A	Min.	0,010
					Max.	0,080
Minimum sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_1 - Y_1 I_D$				A^2	X_1 A^2	0,018
Target sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_1 - 0{,}3\ Y_1 I_D$				A^2	Y_1 A	0,185
Maximum sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_2 - Y_2 I_D$				A^2	X_2 A^2	0,022
					Y_2 A	-0,047
$I_{LL\ max}$; $I_{LH\ max}$				A	0,105	0,140
Substitution resistor for each cathode for testing dimming requirements:					R_{Test1} Ω	100
					R_{Test2} Ω	115
Lamp substitution resistor at n % of the test current	n =	10 %	R_{10}	Ω	Min.	4 700
					Max.	8 200
		30 %	R_{30}	Ω	Nominal	1 800
		60 %	R_{60}	Ω	Nominal	910

Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s				
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\ t_s$			J	Q_{min} (J)	0,50
				P_{min} (W)	0,35
Voltage across each cathode for $E(t) < E_{min}$			V	Max. (r.m.s.)	11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements				Ω	54
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\ t_s$			J	Q_{max} (J)	1,00
				P_{max} (W)	0,70
Substitution resistor for each cathode, for testing maximum cathode preheat requirements				Ω	68
Open circuit voltage across lamp (with starting aid)	V	Non-ignition voltage	$t \le t_s$	Max. (r.m.s.)	160
		Ignition voltage	$t > t_s$ (+10 °C)	Min. (r.m.s.)	290
			$t > t_s$ (-15 °C)	Min. (r.m.s.)	350
Substitution resistor range for each cathode, for testing open circuit voltage requirements				Ω	54 ... 162

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-8-L/P-W4.3x8.5d-7/320

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
8	HF starterless	Preheated	W4.3x8.5d	7 × 320

Dimensions mm		
C		D
Min.	Max.	Max.
318,9	320,9	7,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 – 26	6	0,120	1,5	310	0,1

Electrical characteristics					
Frequency kHz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp Current A
		Rated	Minimum	Maximum	
20 – 26	7,7	78	70	86	0,100

Chromaticity coordinates: see D.2, Annex D.

Cathode characteristics			
Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,100	100	75	125

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-8-L/P-W4.3x8.5d-7/320

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 – 26	8	220	0,100	1 410

Information for high frequency ballast design							
Frequency						kHz	≥ 20
Normal operation							
Lamp operating current I_D	A					Min.	0,080
						Max.	0,135
Current in any lead to cathodes	A					Max.	0,140
Dimming operation							
Lamp operating current I_D	A					Min.	0,010
						Max.	0,080
Minimum sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_1 - Y_1 I_D$	A^2				X_1	A^2	0,018
Target sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_1 - 0{,}3\ Y_1 I_D$					Y_1	A	0,185
Maximum sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_2 - Y_2 I_D$	A^2				X_2	A^2	0,022
					Y_2	A	-0,047
$I_{LL\ max}$; $I_{LH\ max}$	A					0,105	0,140
Substitution resistor for each cathode for testing dimming requirements:					R_{Test1}	Ω	100
					R_{Test2}	Ω	115
Lamp substitution resistor at n % of the test current	n =	10 %	R_{10}	Ω	Min.		7 500
					Max.		15 000
		30 %	R_{30}	Ω	Nominal		3 000
		60 %	R_{60}	Ω	Nominal		1 200
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s							
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\ t_s$	J					Q_{min} (J)	0,50
						P_{min} (W)	0,35
Voltage across each cathode for $E(t) < E_{min}$	V					Max.(r.m.s.)	11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements						Ω	54
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\ t_s$	J					Q_{max} (J)	1,00
						P_{max} (W)	0,70
Substitution resistor for each cathode, for testing maximum cathode preheat requirements						Ω	68
Open circuit voltage across lamp (with starting aid)	V	Non-ignition voltage	$t \le t_s$			Max.(r.m.s.)	170
		Ignition voltage	$t > t_s$ (+10 °C)			Min.(r.m.s.)	310
			$t > t_s$ (-15 °C)			Min.(r.m.s.)	390
Substitution resistor range for each cathode, for testing open circuit voltage requirements						Ω	54 ... 162

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-11-L/P-W4.3x8.5d-7/420

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
11	HF starterless	Preheated	W4.3x8.5d	7 × 420

Dimensions mm		
C		D
Min.	Max.	Max.
420,5	422,5	7,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 – 26	6	0,120	1,5	330	0,1

Electrical characteristics					
Frequency kHz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp Current A
		Rated	Minimum	Maximum	
20 – 26	10,6	107	97	117	0,100

Chromaticity coordinates: see D.2, Annex D.

Cathode characteristics			
Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,100	100	75	125

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-11-L/P-W4.3x8.5d-7/420

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 – 26	11	277	0,100	1 670

Information for high frequency ballast design				
Frequency			kHz	≥ 20
Normal operation				
Lamp operating current I_D	A	Min.		0,080
		Max.		0,135
Current in any lead to cathodes	A	Max.		0,140
Dimming operation				
Lamp operating current I_D	A	Min.		0,010
		Max.		0,080
Minimum sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_1 - Y_1 I_D$ Target sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_1 - 0{,}3\ Y_1 I_D$	A^2	X_1	A^2	0,018
		Y_1	A	0,185
Maximum sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_2 - Y_2 I_D$	A^2	X_2	A^2	0,022
		Y_2	A	-0,047
$I_{LL\ max}$; $I_{LH\ max}$	A	0,105		0,140
Substitution resistor for each cathode for testing dimming requirements:		R_{test1}	Ω	100
		R_{test2}	Ω	115
Lamp substitution resistor at n % of the test current	n = 10 % (R_{10}, Ω)	Min.		10 000
		Max.		18 000
	30 % (R_{30}, Ω)	Nomina		3 900
	60 % (R_{60}, Ω)	Nomina		1 500
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s				
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\ t_s$	J	Q_{min} (J)		0,50
		P_{min} (W)		0,35
Voltage across each cathode for $E(t) < E_{min}$	V	Max.(r.m.s.)		11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements			Ω	54
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\ t_s$	J	Q_{max} (J)		1,00
		P_{max} (W)		0,70
Substitution resistor for each cathode, for testing maximum cathode preheat requirements			Ω	68
Open circuit voltage across lamp (with starting aid)	V — Non-ignition voltage	$t \le t_s$	Max.(r.m.s.)	180
	V — Ignition voltage	$t > t_s$ (+10 °C)	Min.(r.m.s.)	330
	V — Ignition voltage	$t > t_s$ (-15 °C)	Min.(r.m.s.)	430
Substitution resistor range for each cathode, for testing open circuit voltage requirements			Ω	54 … 162

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-13-L/P-W4.3x8.5d-7/520

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
13	HF starterless	Preheated	W4.3x8.5d	7× 520

Dimensions mm		
C		D
Min.	Max.	Max.
522,1	524,1	7,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 – 26	6	0,120	1,5	380	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp Current
kHz	W	Rated	Minimum	Maximum	A
20 – 26	13,2	133	120	146	0,100

Chromaticity coordinates: see D.2, Annex D.

Cathode characteristics			
Test current	Resistance of each cathode Ω		
A	Rated	Minimum	Maximum
0,100	100	75	125

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-13-L/P-W4.3x8.5d-7/520

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 – 26	13	310	0,100	1 740

Information for high frequency ballast design								
Frequency							kHz	≥ 20
Normal operation								
Lamp operating current I_D				A			Min.	0,080
							Max.	0,135
Current in any lead to cathodes				A			Max.	0,140
Dimming operation								
Lamp operating current I_D				A			Min.	0,010
							Max.	0,080
Minimum sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_1 - Y_1 I_D$				A^2			X_1 A^2	0,018
Target sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_1 - 0{,}3\ Y_1 I_D$							Y_1 A	0,185
Maximum sum of squares lead currents: $I_{LH}^2 + I_{LL}^2 = X_2 - Y_2 I_D$				A^2			X_2 A^2	0,022
							Y_2 A	-0,047
$I_{LL\ max}$; $I_{LH\ max}$				A			0,105	0,140
Substitution resistor for each cathode for testing dimming requirements:					R_{Test1}		Ω	100
					R_{Test2}		Ω	115
Lamp substitution resistor at n % of the test current	n =	10 %	R_{10}	Ω	Min.			13 000
					Max.			24 000
		30 %	R_{30}	Ω	Nominal			4 700
		60 %	R_{60}	Ω	Nominal			2 000
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s								
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\ t_s$				J			Q_{min} (J)	0,50
							P_{min} (W)	0,35
Voltage across each cathode for $E(t) < E_{min}$				V			Max.(r.m.s.)	11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements							Ω	54
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\ t_s$				J			Q_{max} (J)	1,00
							P_{max} (W)	0,70
Substitution resistor for each cathode, for testing maximum cathode preheat requirements							Ω	68
Open circuit voltage across lamp (with starting aid)		Non-ignition voltage		$t \le t_s$			Max.(r.m.s.)	210
		Ignition voltage		$t > t_s$ (+10 °C)			Min.(r.m.s.)	380
				$t > t_s$ (-15 °C)			Min.(r.m.s.)	470
Substitution resistor range for each cathode, for testing open circuit voltage requirements							Ω	54 ... 162

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-14-L/P-G5-16/550

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
14	HF starterless	Preheated	G5	16 × 550

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
549,0	553,7	556,1	563,2	17,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	6	0,210	2	230	0,1

Electrical characteristics					
Frequency kHz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A
		Rated	Minimum	Maximum	
20 - 26	14,0	86	76	96	0,165

The maximum luminous flux shall be obtained at an ambient temperature between 34 °C and 38 °C.

Chromaticity coordinates: see D.2, annex D.

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Cathode characteristics			
Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,160	40	30	50

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

LCOS: FDH-14-L/P-G5-16/550

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	14	167	0,170	500

Information for high frequency ballast design				
Frequency kHz				≥ 20
Current in any lead to cathodes			A	Max. 0,220
Lamp operating current			A	Min. 0,130
				Max. 0,205
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s				
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\, t_s$			J	Q_{min} (J) 0,9
				P_{min} (W) 0,8
Voltage across each cathode for $E(t) < E_{min}$			V	Max.(r.m.s.) 11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements				Ω 30
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\, t_s$			J	Q_{max} (J) 1,8
				P_{max} (W) 1,5
Substitution resistor for each cathode, for testing maximum cathode preheat requirements				Ω 40
Open circuit voltage across lamp	V	Non-ignition voltage	$t \le t_s$	Max.(r.m.s.) 130
		Ignition voltage	$t > t_s$ (+10 °C)	Min.(r.m.s.) 230
			$t > t_s$ (-15 °C)	Min.(r.m.s.) 275
Voltage to starting aid	V	Non-ignition voltage	$t \le t_s$	Max.(peak) *
		Ignition voltage	$t > t_s$	Min.(peak) *
Substitution resistor range for each cathode, for testing open circuit voltage requirements				Ω 30.....90
Starting requirements without cathode preheating, for starting times t_s < 0,1 s				
Open circuit voltage across lamp			V	Min.(r.m.s.) *
Current through lamp substitution resistor			A	Min. *
Lamp substitution resistor				Ω *
Substitution resistor for each cathode				Ω *
Cathode current			A	Max. *

Typical characteristics for a lamp at 35 °C ambient temperature		
Lamp wattage W	Lamp voltage V	Lamp current A
13,7	82	0,170

* Under consideration

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-21-L/P-G5-16/850

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
21	HF starterless	Preheated	G5	16 × 850

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
849,0	853,7	856,1	863,2	17,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	6	0,210	2	350	0,1

Electrical characteristics					
Frequency kHz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A
		Rated	Minimum	Maximum	
20 - 26	20,6	126	116	136	0,165

The maximum luminous flux shall be obtained at an ambient temperature between 34 °C and 38 °C.

Chromaticity coordinates: see D.2, annex D.

Cathode characteristics			
Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,160	40	30	50

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DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-21-L/P-G5-16/850

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	21	246	0,170	725

Information for high frequency ballast design					
Frequency kHz				kHz	≥ 20
Current in any lead to cathodes			A	Max.	0,220
Lamp operating current			A	Min.	0,130
				Max.	0,205
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s					
Minimum cathode preheat energy (J) : $E_{min} = Q + P\ t_s$				Q (J)	0,9
				P (W)	0,75
Maximum cathode preheat energy (J) : E_{max} = F x E_{min}				F	1,75
Voltage across each cathode for $E(t) < E_{min}$			V	Max.(r.m.s.)	10
Substitution resistor for each cathode, for testing cathode preheat requirements				Ω	30
Open circuit voltage across lamp	V	Non-ignition voltage	$t \le t_s$	Max.(r.m.s.)	200
		Ignition voltage	$t > t_s$ (+10 °C)	Min.(r.m.s.)	340
			$t > t_s$ (-15 °C)	Min.(r.m.s.)	390
Voltage to starting aid	V	Non-ignition voltage	$t \le t_s$	Max.(peak)	*
		Ignition voltage	$t > t_s$	Min.(peak)	*
Substitution resistor range for each cathode, for testing open circuit voltage requirements				Ω	30.....90
Starting requirements without cathode preheating, for starting times t_s < 0,1 s					
Open circuit voltage across lamp			V	Min.(r.m.s.)	*
Current through lamp substitution resistor			A	Min.	*
Lamp substitution resistor				Ω	*
Substitution resistor for each cathode				Ω	*
Cathode current			A	Max.	*
Typical characteristics for a lamp at 35 °C ambient temperature					
Lamp wattage W		Lamp voltage V		Lamp current A	
20,7		123		0,170	

* Under consideration

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-24-L/P-G5-16/550

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
24	HF starterless	Preheated	G5	16 × 550

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
549,0	553,7	556,1	563,2	17,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	6	0,440	2	250	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
kHz	W	Rated	Minimum	Maximum	A
20 - 26	22,5	77	69	85	0,295

The maximum luminous flux shall be obtained at an ambient temperature between 34 °C and 38 °C.

Chromaticity coordinates: see D.2, annex D.

Cathode characteristics			
Test current	Resistance of each cathode Ω		
A	Rated	Minimum	Maximum
0,350	12	9	15

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DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-24-L/P-G5-16/550

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	24	150	0,300	250

Information for high frequency ballast design					
Frequency kHz				kHz	≥ 20
Current in any lead to cathodes	A			Max.	0,450*
Lamp operating current	A			Min.	0,260
				Max.	0,425
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s					
Minimum cathode preheat energy (J) : $E_{min} = Q + P\ t_s$				Q (J)	1,5
				P (W)	0,9
Maximum cathode preheat energy (J) : E_{max} = F x E_{min}				F	1,75
Voltage across each cathode for $E(t) < E_{min}$	V			Max.(r.m.s.)	10
Substitution resistor for each cathode, for testing cathode preheat requirements				Ω	8
Open circuit voltage across lamp	V	Non-ignition voltage	$t \le t_s$	Max.(r.m.s.)	130
		Ignition voltage	$t > t_s$ (+10 °C)	Min.(r.m.s.)	280
			$t > t_s$ (-15 °C)	Min.(r.m.s.)	350
Voltage to starting aid	V	Non-ignition voltage	$t \le t_s$	Max.(peak)	*
		Ignition voltage	$t > t_s$	Min.(peak)	*
Substitution resistor range for each cathode, for testing open circuit voltage requirements				Ω	8.....24
Starting requirements without cathode preheating, for starting times t_s < 0,1 s					
Open circuit voltage across lamp	V			Min.(r.m.s.)	*
Current through lamp substitution resistor	A			Min.	*
Lamp substitution resistor				Ω	*
Substitution resistor for each cathode				Ω	*
Cathode current	A			Max.	*
Typical characteristics for a lamp at 35 °C ambient temperature					
Lamp wattage W		Lamp voltage V		Lamp current A	
22,5		75		0,300	

* Under consideration

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-28-L/P-G5-16/1150

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
28	HF starterless	Preheated	G5	16 × 1150

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1149,0	1153,7	1156,1	1163,2	17,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	6	0,210	2	375	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
kHz	W	Rated	Minimum	Maximum	A
20 - 26	27,9	166	149	183	0,170

The maximum luminous flux shall be obtained at an ambient temperature between 34 °C and 38 °C.

Chromaticity coordinates: see D.2, annex D.

Cathode characteristics			
Test current	Resistance of each cathode Ω		
A	Rated	Minimum	Maximum
0,160	40	30	50

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DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-28-L/P-G5-16/1150

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	28	329	0,170	950

Information for high frequency ballast design				
Frequency kHz			kHz	≥ 20
Current in any lead to cathodes	A		Max.	0,220
Lamp operating current	A		Min.	0,130
			Max.	0,205
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s				
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\, t_s$	J		Q_{min} (J)	0,9
			P_{min} (W)	0,8
Voltage across each cathode for $E(t) < E_{min}$	V		Max.(r.m.s.)	11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements			Ω	30
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\, t_s$	J		Q_{max} (J)	1,8
			P_{max} (W)	1,5
Substitution resistor for each cathode, for testing maximum cathode preheat requirements			Ω	40
Open circuit voltage across lamp V		Non-ignition voltage $t \le t_s$	Max.(r.m.s.)	240
		Ignition voltage $t > t_s$ (+10 °C)	Min.(r.m.s.)	425
		Ignition voltage $t > t_s$ (-15 °C)	Min.(r.m.s.)	530
Voltage to starting aid V		Non-ignition voltage $t \le t_s$	Max.(peak)	*
		Ignition voltage $t > t_s$	Min.(peak)	*
Substitution resistor range for each cathode, for testing open circuit voltage requirements			Ω	30.....90
Starting requirements without cathode preheating, for starting times t_s < 0,1 s				
Open circuit voltage across lamp	V		Min.(r.m.s.)	*
Current through lamp substitution resistor	A		Min.	*
Lamp substitution resistor			Ω	*
Substitution resistor for each cathode			Ω	*
Cathode current	A		Max.	*

Typical characteristics for a lamp at 35 °C ambient temperature		
Lamp wattage W	Lamp voltage V	Lamp current A
27,8	167	0,170

* Under consideration

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-35-L/P-G5-16/1450

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
35	HF starterless	Preheated	G5	16 × 1450

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1449,0	1453,7	1456,1	1463,2	17,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	6	0,210	2	450	0,1

Electrical characteristics					
Frequency kHz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A
		Rated	Minimum	Maximum	
20 - 26	35,5	205	185	225	0,175

The maximum luminous flux shall be obtained at an ambient temperature between 34 °C and 38 °C.

Chromaticity coordinates: see D.2, annex D.

Cathode characteristics			
Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,160	40	30	50

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DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-35-L/P-G5-16/1450

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	35	413	0,170	1 200

Information for high frequency ballast design						
Frequency kHz					kHz	≥ 20
Current in any lead to cathodes				A	Max.	0,220
Lamp operating current				A	Min.	0,130
					Max.	0,205
Starting requirements with cathode preheating, for starting times $0,4\ s < t_s < 3,0\ s$						
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\ t_s$				J	Q_{min} (J)	0,9
					P_{min} (W)	0,8
Voltage across each cathode for $E(t) < E_{min}$				V	Max.(r.m.s.)	11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements					Ω	30
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\ t_s$				J	Q_{max} (J)	1,8
					P_{max} (W)	1,5
Substitution resistor for each cathode, for testing maximum cathode preheat requirements					Ω	40
Open circuit voltage across lamp	V	Non-ignition voltage	$t \le t_s$		Max.(r.m.s.)	275
		Ignition voltage	$t > t_s$ (+10 °C)		Min.(r.m.s.)	530
			$t > t_s$ (-15 °C)		Min.(r.m.s.)	700
Voltage to starting aid	V	Non-ignition voltage	$t \le t_s$		Max.(peak)	*
		Ignition voltage	$t > t_s$		Min.(peak)	*
Substitution resistor range for each cathode, for testing open circuit voltage requirements					Ω	30.....90
Starting requirements without cathode preheating, for starting times $t_s < 0,1$ s						
Open circuit voltage across lamp				V	Min.(r.m.s.)	*
Current through lamp substitution resistor				A	Min.	*
Lamp substitution resistor					Ω	*
Substitution resistor for each cathode					Ω	*
Cathode current				A	Max.	*

Typical characteristics for a lamp at 35 °C ambient temperature		
Lamp wattage W	Lamp voltage V	Lamp current A
34,7	209	0,170

* Under consideration

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-39-L/P-G5-16/850

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
39	HF starterless	Preheated	G5	16 × 850

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
849,0	853,7	856,1	863,2	17,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	6	0,440	2	350	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
kHz	W	Rated	Minimum	Maximum	A
20 - 26	38,0	118	108	128	0,325

The maximum luminous flux shall be obtained at an ambient temperature between 34 °C and 38 °C.

Chromaticity coordinates: see D.2, annex D.

Cathode characteristics			
Test current	Resistance of each cathode Ω		
A	Rated	Minimum	Maximum
0,350	12	9	15

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DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-39-L/P-G5-16/850

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	39	224	0,340	330

Information for high frequency ballast design				
Frequency kHz			kHz	≥ 20
Current in any lead to cathodes		A	Max.	0,450*
Lamp operating current		A	Min.	0,260
			Max.	0,425
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s				
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\, t_s$		J	Q_{min} (J)	1,5
			P_{min} (W)	0,9
Voltage across each cathode for $E(t) < E_{min}$		V	Max.(r.m.s.)	11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements			Ω	8,0
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\, t_s$		J	Q_{max} (J)	2,5
			P_{max} (W)	1,8
Substitution resistor for each cathode, for testing maximum cathode preheat requirements			Ω	10,5
Open circuit voltage across lamp V	Non-ignition voltage	$t \le t_s$	Max.(r.m.s.)	175
	Ignition voltage	$t > t_s$ (+10 °C)	Min.(r.m.s.)	350
		$t > t_s$ (-15 °C)	Min.(r.m.s.)	390
Voltage to starting aid V	Non-ignition voltage	$t \le t_s$	Max.(peak)	*
	Ignition voltage	$t > t_s$	Min.(peak)	*
Substitution resistor range for each cathode, for testing open circuit voltage requirements			Ω	8.....24
Starting requirements without cathode preheating, for starting times t_s < 0,1 s				
Open circuit voltage across lamp		V	Min.(r.m.s.)	*
Current through lamp substitution resistor		A	Min.	*
Lamp substitution resistor			Ω	*
Substitution resistor for each cathode			Ω	*
Cathode current		A	Max.	*

Typical characteristics for a lamp at 35 °C ambient temperature		
Lamp wattage W	Lamp voltage V	Lamp current A
38,0	112	0,340

* Under consideration

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-49-L/P-G5-16/1450

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
49	HF starterless	Preheated	G5	t6 × 1450

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1449,0	1453,7	1456,1	1463,2	17,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	6	0,330	2	450	0,1

Electrical characteristics					
Frequency kHz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current A
		Rated	Minimum	Maximum	
20 - 26	49,2	195	175	215	0,255

The maximum luminous flux shall be obtained at an ambient temperature between 34 °C and 38 °C.

Chromaticity coordinates: see D.2, annex D.

Cathode characteristics			
Test current A	Resistance of each cathode Ω		
	Rated	Minimum	Maximum
0,260	16,5	12,4	20,6

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DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-49-L/P-G5-16/1450

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	49	390	0,255	765

Information for high frequency ballast design				
Frequency kHz			kHz	≥ 20
Current in any lead to cathodes		A	Max.	0,330
Lamp operating current		A	Min.	0,180
			Max.	0,295
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s				
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\, t_s$		J	Q_{min} (J)	1,1
			P_{min} (W)	0,9
Voltage across each cathode for $E(t) < E_{min}$		V	Max.(r.m.s.)	11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements			Ω	12,0
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\, t_s$		J	Q_{max} (J)	2,2
			P_{max} (W)	1,8
Substitution resistor for each cathode, for testing maximum cathode preheat requirements			Ω	16,0
Open circuit voltage across lamp	V Non-ignition voltage	$t \le t_s$	Max.(r.m.s.)	225
	Ignition voltage	$t > t_s$ (+10 °C)	Min.(r.m.s.)	450
		$t > t_s$ (-15 °C)	Min.(r.m.s.)	625
Voltage to starting aid	V Non-ignition voltage	$t \le t_s$	Max.(peak)	*
	Ignition voltage	$t > t_s$	Min.(peak)	*
Substitution resistor range for each cathode, for testing open circuit voltage requirements			Ω	12.....36
Starting requirements without cathode preheating, for starting times t_s < 0,1 s				
Open circuit voltage across lamp		V	Min.(r.m.s.)	*
Current through lamp substitution resistor		A	Min.	*
Lamp substitution resistor			Ω	*
Substitution resistor for each cathode			Ω	*
Cathode current		A	Max.	*

Typical characteristics for a lamp at 35 °C ambient temperature		
Lamp wattage W	Lamp voltage V	Lamp current A
49,3	191	0,260

* Under consideration

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-54-L/P-G5-16/1150

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
54	HF starterless	Preheated	G5	16 × 1 150

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1 149,0	1 153,7	1 156,1	1 163,2	17,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	6	0,720	2	520	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
kHz	W	Rated	Minimum	Maximum	A
20 - 26	54,1	120	110	130	0,455

The maximum luminous flux shall be obtained at an ambient temperature between 34 °C and 38 °C.

Chromaticity coordinates: see D.2, Annex D.

Cathode characteristics			
Test current	Resistance of each cathode Ω		
A	Rated	Minimum	Maximum
0,480	8	6	10

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FDH-54-L/P-G5-16/1150

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	54	235	0,460	255

Information for high frequency ballast design					
Frequency kHz				kHz	≥ 20
Current in any lead to cathodes			A	Max.	0,650
Lamp operating current			A	Min.	0,370
				Max.	0,625
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s					
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\, t_s$			J	Q_{min} (J)	2,2
				P_{min} (W)	1,0
Voltage across each cathode for $E(t) < E_{min}$			V	Max.(r.m.s.)	11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements				Ω	4,8
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\, t_s$			J	Q_{max} (J)	3,8
				P_{max} (W)	1,8
Substitution resistor for each cathode, for testing maximum cathode preheat requirements				Ω	6,5
Open circuit voltage across lamp V	Non-ignition voltage	$t \le t_s$		Max.(r.m.s.)	240
	Ignition voltage	$t > t_s$ (+10 °C)		Min.(r.m.s.)	520
		$t > t_s$ (-15 °C)		Min.(r.m.s.)	620
Voltage to starting aid V	Non-ignition voltage	$t \le t_s$		Max.(peak)	*
	Ignition voltage	$t > t_s$		Min.(peak)	*
Substitution resistor range for each cathode, for testing open circuit voltage requirements				Ω	4,8.....14,4
Starting requirements without cathode preheating, for starting times t_s < 0,1 s					
Open circuit voltage across lamp			V	Min.(r.m.s.)	*
Current through lamp substitution resistor			A	Min.	*
Lamp substitution resistor				Ω	*
Substitution resistor for each cathode				Ω	*
Cathode current			A	Max.	*
Typical characteristics for a lamp at 35 °C ambient temperature					
Lamp wattage W	Lamp voltage V			Lamp current A	
53,8	118			0,460	

* Under consideration

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-80-L/P-G5-16/1450

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
80	HF starterless	Preheated	G5	16 × 1 450

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1 449,0	1 453,7	1 456,1	1 463,2	17,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	6	0,765	2	580	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
kHz	W	Rated	Minimum	Maximum	A
20 - 26	79,8	152	137	167	0,530

The maximum luminous flux shall be obtained at an ambient temperature between 34 °C and 38 °C.

Chromaticity coordinates: see D.2, Annex D.

Cathode characteristics			
Test current	Resistance of each cathode Ω		
A	Rated	Minimum	Maximum
0,525	7,0	5,25	8,75

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-80-L/P-G5-16/1450

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	80	290	0,550	260

Information for high frequency ballast design			
Frequency kHz		kHz	≥ 20
Current in any lead to cathodes	A	Max.	0,715
Lamp operating current	A	Min.	0,440
		Max.	0,670
Starting requirements with cathode preheating, for starting times 0,4 s < t_s < 3,0 s			
Minimum cathode preheat energy : $E_{min} = Q_{min} + P_{min}\, t_s$	J	Q_{min} (J)	2,2
		P_{min} (W)	1,0
Voltage across each cathode for $E(t) < E_{min}$	V	Max.(r.m.s.)	11
Substitution resistor for each cathode, for testing minimum cathode preheat requirements		Ω	4,5
Maximum cathode preheat energy : $E_{max} = Q_{max} + P_{max}\, t_s$	J	Q_{max} (J)	4,2
		P_{max} (W)	1,9
Substitution resistor for each cathode, for testing maximum cathode preheat requirements		Ω	6,0
Open circuit voltage across lamp V — Non-ignition voltage	$t \le t_s$	Max.(r.m.s.)	250
Ignition voltage	$t > t_s$ (+10 °C)	Min.(r.m.s.)	580
	$t > t_s$ (-15 °C)	Min.(r.m.s.)	750
Voltage to starting aid V — Non-ignition voltage	$t \le t_s$	Max.(peak)	*
Ignition voltage	$t > t_s$	Min.(peak)	*
Substitution resistor range for each cathode, for testing open circuit voltage requirements		Ω	4,5.....13,5
Starting requirements without cathode preheating, for starting times t_s < 0,1 s			
Open circuit voltage across lamp	V	Min.(r.m.s.)	*
Current through lamp substitution resistor	A	Min.	*
Lamp substitution resistor		Ω	*
Substitution resistor for each cathode		Ω	*
Cathode current	A	Max.	*

Typical characteristics for a lamp at 35 °C ambient temperature		
Lamp wattage W	Lamp voltage V	Lamp current A
80,0	145	0,555

* Under consideration

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-16-L/P-G13-26/600

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
16	HF starterless	Preheated	G13	26 × 600

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
589,8	594,5	596,9	604,0	28,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	19	0,510	2	200	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
kHz	W	Rated	Minimum	Maximum	A
20 - 26	16	64	58	70	0,255

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Test current	Resistance of each cathode Ω		
A	Rated	Minimum	Maximum
0,510	15	10	*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-16-L/P-G13-26/600

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	16	128	0,255	250

Information for high frequency ballast design					
Frequency				kHz	≥ 20
Current in any lead to cathodes	A			Max.	0,450
Lamp operating current	A			Min.	*
				Max.	*
Current controlled preheating					
Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$				a	0,200
				i_m (A)	0,250
Maximum preheat current	A	$t \leq 0,4$			1,600
		$0,4 < t < 2,0$			1,800 - 0,500 t
		$t \geq 2,0$			0,800
Open circuit voltage across lamp	V	$t \leq t_e$		Max. (r.m.s.)	230
		$t > t_e$		Min. (r.m.s.)	200
Voltage to starting aid	V	$t \leq t_e$		Max. (peak)	*
		$t > t_e$		Min. (peak)	*
Substitution resistor for each cathode				Ω	10
Voltage controlled preheating					
*					

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-32-L/P-G13-26/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
32	HF starterless	Preheated	G13	26 × 1200

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1199,4	1204,1	1206,5	1213,6	28,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	19	0,510	2	240	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
kHz	W	Rated	Minimum	Maximum	A
20 - 26	32	128	118	138	0,255

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Test current	Resistance of each cathode Ω		
A	Rated	Minimum	Maximum
0,510	15	10	*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-32-L/P-G13-26/1200

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	32	256	0,255	500

Information for high frequency ballast design				
Frequency			kHz	≥ 20
Current in any lead to cathodes	A		Max.	0,450
Lamp operating current	A		Min.	*
			Max.	*
Current controlled preheating				
Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$			a	0,200
			i_m (A)	0,250
Maximum preheat current	A	$t \leq 0,4$		1,600
		$0,4 < t < 2,0$		1,800 - 0,500 t
		$t \geq 2,0$		0,800
Open circuit voltage across lamp	V	$t \leq t_e$	Max. (r.m.s.)	280
		$t > t_e$	Min. (r.m.s.)	240
Voltage to starting aid	V	$t \leq t_e$	Max. (peak)	*
		$t > t_e$	Min. (peak)	*
Substitution resistor for each cathode			Ω	10
Voltage controlled preheating				
*				

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-50-L/P-G13-26/1500

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
50	HF starterless	Preheated	G13	26 × 1500

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1500,0	1504,7	1507,1	1514,2	28,0

Starting characteristics					
Frequency kHz	Starting aid distance mm	Preheat current A	Preheat time s	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	19	0,640	2	280	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
kHz	W	Rated	Minimum	Maximum	A
20 - 26	50	142	132	152	0,355

Chromaticity co-ordinates: see D.2, annex D.

Cathode characteristics			
Test current	Resistance of each cathode Ω		
A	Rated	Minimum	Maximum
0,640	10	7	*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-50-L/P-G13-26/1500

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	50	284	0,355	400

Information for high frequency ballast design					
Frequency				kHz	≥ 20
Current in any lead to cathodes		A		Max.	0,600
Lamp operating current		A		Min.	*
				Max.	*
Current controlled preheating					
Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0,5}$				a	0,310
				i_m (A)	0,320
Maximum preheat current	A		$t \leq 0,4$		2,200
			$0,4 < t < 2,0$		2,500 - 0,750 t
			$t \geq 2,0$		1,000
Open circuit voltage across lamp	V		$t \leq t_e$	Max. (r.m.s.)	320
			$t > t_e$	Min. (r.m.s.)	280
Voltage to starting aid	V		$t \leq t_e$	Max. (peak)	*
			$t > t_e$	Min. (peak)	*
Substitution resistor for each cathode				Ω	7
Voltage controlled preheating					
*					

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-20-L/N-Fa6-38/600

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
20	Starterless	Non-preheated	Fa6	38 × 600

Dimensions mm		
C		D
Min.	Max.	Max.
606,5	611,0	40,5

Starting characteristics		
Frequency Hz	Open circuit voltage (r.m.s.) V	Starting time s
50	190	10
60	–	–

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	20	58	51	65	0,380
60	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

Reference ballast characteristics					
Frequency Hz	Nominal wattage W	Rated voltage V	Calibration current A	Voltage/current ratio Ω	Power factor
50	20	127	0,370	270	0,12
60	–	–	–	–	–

Information for ballast design				
Frequency Hz			50	60
Open circuit voltage across lamp V	Min. (r.m.s.)		190	–

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-39-L/N-Fa8-38/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
39	Starterless	Non-preheated	Fa8	38 × 1200

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1150,6	1153,7	1159,5	1168,4	40,5

Starting characteristics		
Frequency Hz	Open circuit voltage (r.m.s.) V	Starting time s
50	–	–
60	385	10

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	–	–	–	–	–
60	39	100	90	110	0,425

Chromaticity co-ordinates: *

Reference ballast characteristics					
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor
Hz	W	V	A	Ω	
50	–	–	–	–	–
60	39	430	0,425	930	0,075

Information for ballast design				
Frequency	Hz		50	60
Open circuit voltage across lamp	V	Min. (r.m.s.)	–	385

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-40-L/N-Fa6-38/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
40	Starterless	Non-preheated	Fa6	38 × 1200

Dimensions mm		
C		D
Min.	Max.	Max.
1216,0	1220,5	40,5

Starting characteristics		
Frequency Hz	Open circuit voltage (r.m.s.) V	Starting time s
50	205	10
60	–	–

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	39,5	109	99	119	0,425
60	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

Reference ballast characteristics					
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor
Hz	W	V	A	Ω	
50	40	220	0,430	390	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency	Hz		50	60
Open circuit voltage across lamp	V	Min. (r.m.s.)	205	–

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FD-65-L/N-Fa6-38/1500

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
65	Starterless	Non-preheated	Fa6	38 × 1500

Dimensions mm		
C		D
Min.	Max.	Max.
1516,6	1521,1	40,5

Starting characteristics		
Frequency Hz	Open circuit voltage (r.m.s.) V	Starting time s
50	190	10
60	–	–

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	64	110	100	120	0,670
60	–	–	–	–	–

Chromaticity co-ordinates: see D.2, annex D.

Reference ballast characteristics					
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor
Hz	W	V	A	Ω	
50	65	220	0,670	240	0,10
60	–	–	–	–	–

Information for ballast design				
Frequency	Hz		50	60
Open circuit voltage across lamp	V	Min. (r.m.s.)	190	–

DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET

ILCOS: FD-57-L/N-Fa8-38/1800

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
57	Starterless	Non-preheated	Fa8	38 × 1800

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
1760,2	1763,3	1769,1	1778,2	40,5

Starting characteristics			
Frequency Hz	Open circuit voltage (r.m.s.) V		Starting time s
50	–		–
60	475		10

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	–	–	–	–	–
60	57	149	134	164	0,425

Chromaticity co-ordinates: *

Reference ballast characteristics					
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor
Hz	W	V	A	Ω	
50	–	–	–	–	–
60	57	525	0,425	1100	0,075

Information for ballast design				
Frequency	Hz		50	60
Open circuit voltage across lamp	V	Min. (r.m.s.)	–	475

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

LCOS: FD-75-L/N-Fa8-38/2400

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
75	Starterless	Non-preheated	Fa8	38 × 2400

Dimensions mm				
A	B		C	D
Max.	Min.	Max.	Max.	Max.
2369,8	2372,9	2378,7	2387,6	40,5

Starting characteristics		
Frequency Hz	Open circuit voltage (r.m.s.) V	Starting time s
50	–	–
60	565	10

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
Hz	W	Rated	Minimum	Maximum	A
50	–	–	–	–	–
60	75	197	177	217	0,425

Chromaticity co-ordinates: *

Reference ballast characteristics					
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor
Hz	W	V	A	Ω	
50	–	–	–	–	–
60	75	625	0,425	1280	0,075

Information for ballast design				
Frequency	Hz		50	60
Open circuit voltage across lamp	V	Min. (r.m.s.)	–	565

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-32-L/N-Fa6-26/1200

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
32	HF starterless	Non-preheated	Fa6	26 × 1200

Dimensions mm		
C		D
Min.	Max.	Max.
1216,0	1220,5	28,0

Starting characteristics		
Frequency kHz	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	800	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
kHz	W	Rated	Minimum	Maximum	A
20 - 26	32	102	92	112	0,320

Chromaticity co-ordinates: see D.2, annex D.

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	32	204	0,320	318

Information for high frequency ballast design				
Frequency			kHz	≥ 20
Open circuit voltage across lamp	V	Min. (r.m.s.)		800
Current through lamp substitution resistor	A	Min.		0,200
Lamp substitution resistor			Ω	1000
Lamp operating current	A	Min.		*
		Max.		*

* Under consideration.

DOUBLE-CAPPED FLUORESCENT LAMP
DATA SHEET

ILCOS: FDH-50-L/N-Fa6-26/1500

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions mm
50	HF starterless	Non-preheated	Fa6	26 × 1500

Dimensions mm		
C		D
Min.	Max.	Max.
1516,6	1521,1	28,0

Starting characteristics		
Frequency kHz	Open circuit voltage (r.m.s.) V	Starting time s
20 - 26	800	0,1

Electrical characteristics					
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current
kHz	W	Rated	Minimum	Maximum	A
20 - 26	50	111	101	121	0,455

Chromaticity co-ordinates: see D.2, annex D.

Reference ballast characteristics				
Frequency kHz	Nominal wattage W	Rated voltage V	Calibration current A	Resistance Ω
20 - 26	50	222	0,455	244

Information for high frequency ballast design			
Frequency		kHz	≥ 20
Open circuit voltage across lamp	V	Min. (r.m.s.)	800
Current through lamp substitution resistor	A	Min.	0,250
Lamp substitution resistor		Ω	800
Lamp operating current	A	Min.	*
		Max.	*

* Under consideration.