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Lampes à fluorescence à deux culots – Prescriptions de performance

Double-capped fluorescent lamps –
Performance specifications

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

DOUBLE-CAPPED FLUORESCENT LAMPS – PERFORMANCE SPECIFICATIONS

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60081 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

This fifth edition cancels and replaces the fourth edition, published in 1984, amendment 1 (1987), amendment 2 (1988), amendment 3 (1992), amendment 4 (1993) and amendment 5 (1994). It constitutes a technical revision.

This consolidated version of IEC 60081 is based on the fifth edition (1997) [documents 34A/759/FDIS and 34A/778/RVD] and its amendment 1 (2000) [documents 34A/896/FDIS and 34A/907/RVD].

It bears the edition number 5.1.

Annexes A, B, C and D form an integral part of this standard.

Annexes E and F are for information only.

The committee has decided that the contents of the base publication and its amendment 1 will remain unchanged until 2003. At this date, the publication will be

- reconfirmed;
- withdrawn;
- · replaced by a revised edition, or
- amended.

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 pperation on a.c. mains frequencies;
- f) lamps having non-preheated cathodes, designed for operation on high frequency.

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 normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050(845):1987, International Electrotechnical Vocabulary (IEV) - Chapter 845: Lighting

- |-4 -

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.
- 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 – 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.

 $\label{eq:note_normalicity} \mbox{NOTE} - \mbox{ See also annex D on chromaticity co-ordinates}.$

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

The following information shall be marked on a lamp:

a) the nominal wattage or current;

NOTE - If necessary for proper identification, additional information should be added (for example the nominal lamp dimensions in millimetres).

b) a further identification which defines, with the aid of information made available by the manufacturer or responsible vendor, the electrical and photometric characteristics of a lamp.

1.6 Information for ballast and starter design

en. Oll Paris de la communicación de la commun 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 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.

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.

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-A-6-

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 resposible 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.

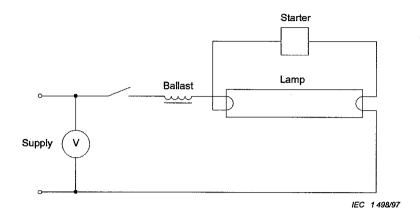


Figure A.1 – Circuit diagram for starting test for lamps for operating with starter

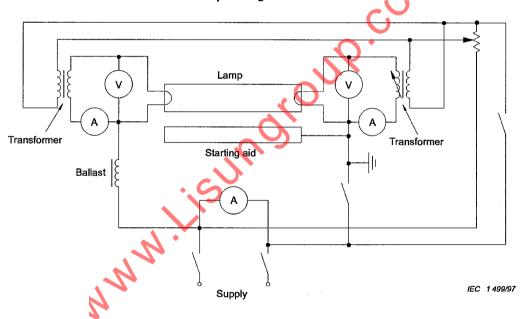


Figure A.2 – Circuit diagram for starting test for lamps with preheated cathodes for operation on starterless circuits

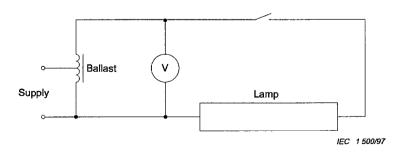


Figure A.3 – Circuit diagram for starting test for lamps with non-preheated cathodes

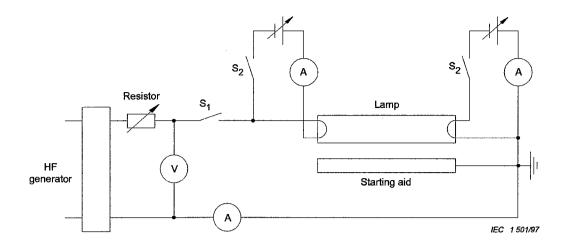


Figure A.4 – Circuit diagram for starting test for lamps with preheated cathodes for operation on high frequency

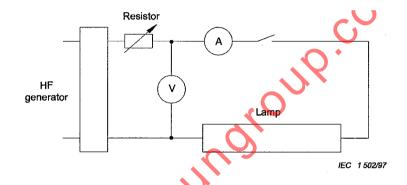


Figure A.5 – Circuit diagram for starting test for lamps with non-preheated cathodes for operation on high frequency

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 stabilization of the lamp. An appropriate stabilization time is 15 min.

NOTE — If a pre-warming position is used, from which the lamp is moved to the test position, a further stabilization period is necessary in the test position. The interruption of the supply should be as short as possible, and the additional stabilization period should be at least 5 min.

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-10 -

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.

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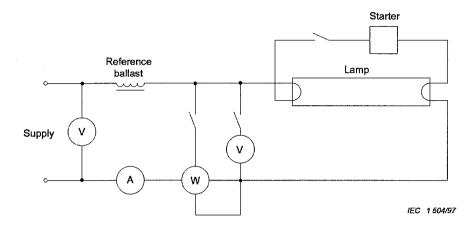


Figure B.1 – Circuit diagram for measurement of electrical and photometric characteristics for lamps with preheated cathodes

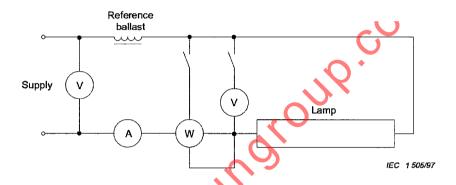


Figure B.2 – Circuit diagram for measurement of electrical and photometric characteristics for lamps with non-preheated cathodes

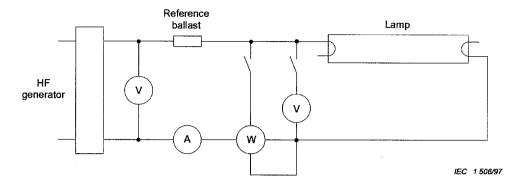


Figure B.3 – Circuit diagram for measurement of electrical and photometric characteristics for lamps for operation on high frequency

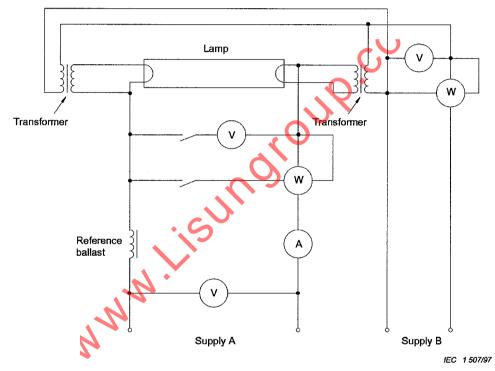


Figure B.4 – Circuit diagram for measurement of electrical and photometric characteristics for lamps with supplementary cathode heating

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 - In North America, a cycle of 3 h on, 20 min off is 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 coordinates 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"	$ au_{ extsf{c}}$	x	у
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

¹⁾ CIE 15-2: 1986, Colorimetry.

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

"Colour"	<i>g</i> ₁₁	<i>9</i> 12	<i>9</i> ₂₂
F 6500	86 × 10 ⁴	- 40 × 10 ⁴	45 × 10 ⁴
F 5000	56 × 10 ⁴	- 25 × 10 ⁴	28 × 10 ⁴
F 4000	39,5 × 10 ⁴	- 21,5 × 10 ⁴	26 × 10 ⁴
F 3500	38 × 10 ⁴	- 20 × 10 ⁴	25 × 10 ⁴
F 3000	39 × 10 ⁴	- 19,5 × 10 ⁴	27,5 × 10 ⁴
F 2700	44 × 10 ⁴	- 18,6 × 10 ⁴	27 × 10 ⁴

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

"Colour"	θ	а	Ь
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 coordinates 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	У
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		

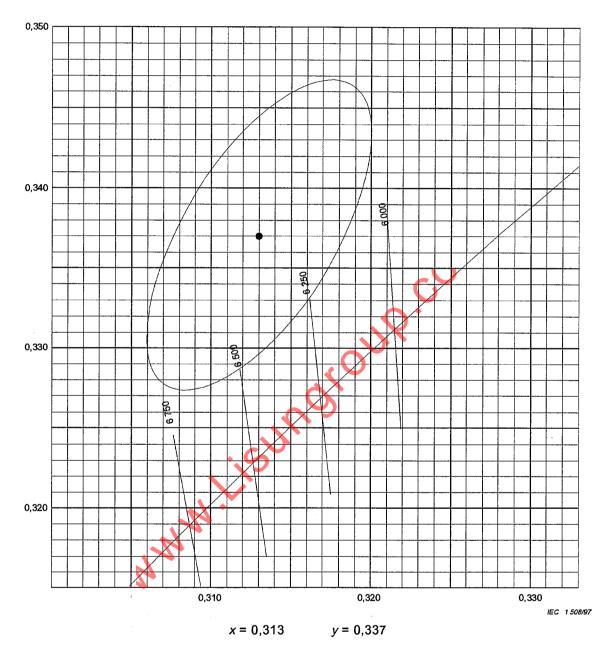


Figure D.1 – Tolerance area for standard "colour" F 6500

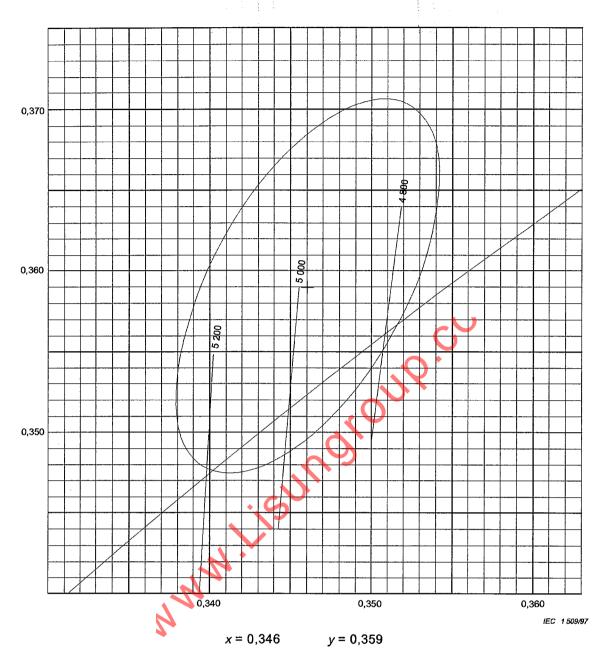


Figure D.2 - Tolerance area for standard "colour" F 5000

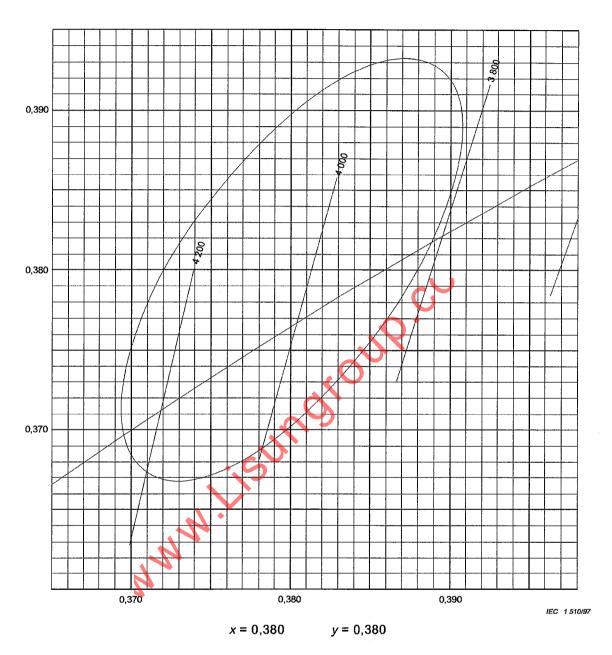


Figure D.3 – Tolerance area for standard "colour" F 4000

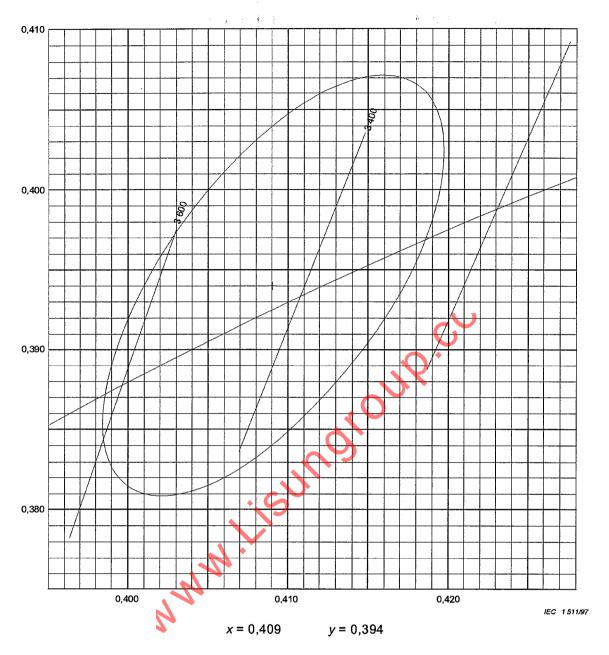


Figure D.4 - Tolerance area for standard "colour" F 3500

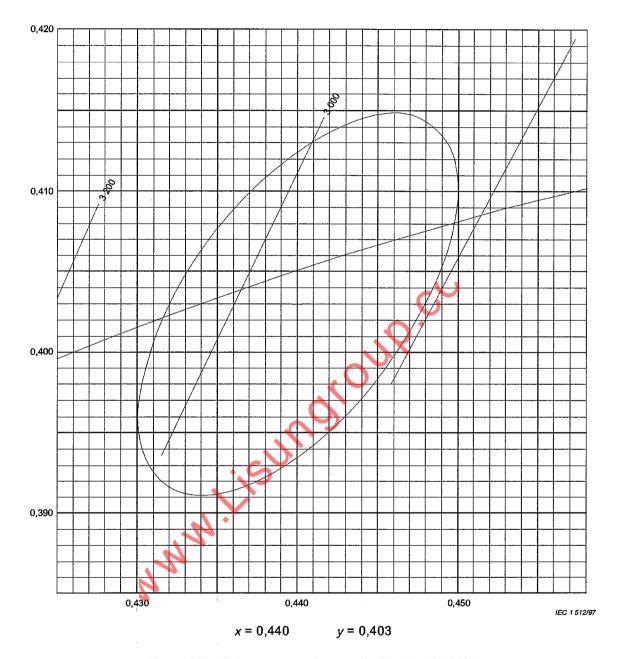


Figure D.5 - Tolerance area for standard "colour" F 3000

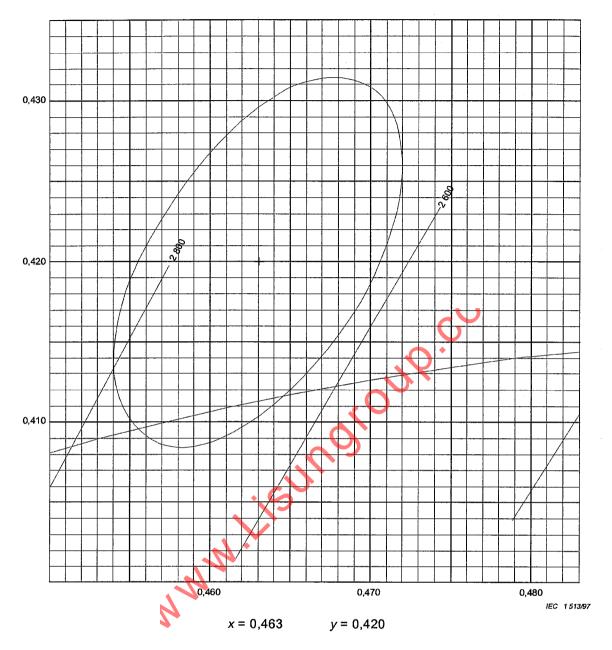


Figure D.6 - Tolerance area for standard "colour" F 2700

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.

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 of W4.3×8.5d.

2.3 Lamp data sheets

2.3.1 List of lamp data sheets

1020 1030 1040 1060 2120 2215 2220 2230 2240 2315 2320 2340 2415 2420 2425 2430 2440 2520 2530 2540 2620 2640	wattage W 4 6 8 13 15 15 18 20 20 25 30 30 33 36 38 40 40 58 65 65 70	50 50 50 50 50 50 50 50 50 50 50 50 50 5	60 60 60 60 60 - 60 - 60 - 60	16 x 150 16 x 225 16 x 300 16 x 525 16 x 300 16 x 525 26 x 450 26 x 550 26 x 600 32 x 600 38 x 600 38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200 26 x 1050	G5 G5 G5 G13 G13 G13 G13 G13 G13	Starter	High frequency Starterless Starterless Starterless Starterless	Preheated
1030 1040 1060 2120 2215 2220 2230 2240 2315 2320 2340 2415 2420 2425 2430 2440 2520 2530 2540 2620 2640	6 8 13 15 15 18 20 25 30 30 33 36 38 40 40 58 65 70	50 50 50 50 50 50 50 50 50 50 50 50 50 5	60 60 60 60 60 - 60 - 60 - 60 - 60	16 x 225 16 x 300 16 x 525 26 x 450 26 x 550 26 x 600 32 x 600 38 x 600 38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200	G 5 G 5 G 13 G 13 G 13 G 13 G 13 G 13	Starter	- - Starterless Starterless Starterless - -	Preheated
1040 1060 2120 2215 2220 2230 2240 2315 2320 2340 2415 2420 2425 2430 2445 2420 2520 2530 2540 2640	8 13 15 15 18 20 25 30 30 33 36 38 40 40 58 65 65	50 50 50 50 50 50 50 50 50 50 50 50 50	60 60 60 60 60 60 60 -	16 x 300 16 x 525 26 x 450 26 x 550 26 x 600 32 x 600 38 x 600 38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200	G 5 G 13 G 13 G 13 G 13 G 13 G 13 G 13	Starter Starter Starter Starter Starterless Starter Starter Starter Starter Starter Starter	- Starterless Starterless Starterless - - -	Preheated Preheated Preheated Preheated Preheated Preheated Preheated Preheated Preheated
1060 2120 2215 2220 2230 2240 2315 2320 2340 2415 2420 2425 2430 2440 2520 2530 2540 2640	13 15 15 18 20 20 25 30 33 36 38 40 40 58 65 70	50 50 50 50 50 50 50 50 50 50 50 50 50	60 60 60 60 60 - 60 - 60 - 60	16 x 525 26 x 450 26 x 550 26 x 600 32 x 600 38 x 600 38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200	G 5 G 13 G 13 G 13 G 13 G 13 G 13	Starter Starter Starterless Starter Starter Starter Starter Starter	Starterless Starterless - -	Preheated Preheated Preheated Preheated Preheated Preheated Preheated
2120 2215 2220 2230 2240 2315 2320 2340 2415 2420 2425 2430 2440 2520 2530 2540 2620 2640	15 15 18 20 20 25 30 30 33 36 38 40 40 58 65 70	50 50 50 50 50 50 50 50 50 50 50	60 60 60 60 60 60 60 60 60	26 x 450 26 x 550 26 x 600 32 x 600 38 x 600 38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200	G 13 G 13 G 13 G 13 G 13 G 13 G 13	Starter Starterless Starter Starter Starter Starter Starter Starter Starter	Starterless Starterless - -	Preheated Preheated Preheated Preheated Preheated Preheated Preheated
2215 2220 2230 2240 2315 2320 2415 2415 2420 2425 2430 2440 2520 2530 2540 2620 2640	15 18 20 20 25 30 30 33 36 38 40 40 58 65 70	50 50 50 50 50 50 50 50 50 50 50	60 60 60 60 60 60 60 60	26 x 550 26 x 600 32 x 600 38 x 600 38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200	G 13 G 13 G 13 G 13 G 13 G 13	Starterless Starter Starter Starter Starter Starter	Starterless Starterless - -	Preheated Preheated Preheated Preheated Preheated Preheated
2220 2230 2240 2315 2315 2320 2340 2415 2420 2425 2430 2440 2520 2530 2540 2640	18 20 20 25 30 30 33 36 38 40 40 58 65 70	50 50 50 50 50 50 50 50 50 50 50	60 60 - 60 - 60 - 60	26 x 600 32 x 600 38 x 600 38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200	G 13 G 13 G 13 G 13 G 13 G 13	Starter Starter Starter Starter Starter	Starterless	Preheated Preheated Preheated Preheated Preheated
2220 2230 2240 2315 2315 2320 2340 2415 2420 2425 2430 2440 2520 2530 2540 2640	20 20 25 30 30 33 36 38 40 40 58 65 70	50 50 50 50 50 50 50 50 50 50	60 60 - 60 - 60 -	32 x 600 38 x 600 38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200	G 13 G 13 G 13 G 13 G 13	Starter Starter Starter Starter	- - -	Preheated Preheated Preheated Preheated
2230 2240 2315 2320 2340 2415 2420 2425 2430 2440 2520 2530 2540 2620 2640	20 20 25 30 30 33 36 38 40 40 58 65 70	50 50 50 50 50 50 50 50 50 50	60 - 60 - 60 - 60	32 x 600 38 x 600 38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200	G 13 G 13 G 13 G 13 G 13	Starter Starter Starter Starter	- - - Starterless	Preheated Preheated Preheated
2240 2315 2320 2340 2415 2420 2425 2430 2440 2520 2530 2540 2620 2640	20 25 30 30 33 36 38 40 40 58 65 70	50 50 50 50 50 50 50 50 50	60 - 60 - 60 - 60	38 x 600 38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200	G 13 G 13 G 13 G 13	Starter Starter	- - Starterless	Preheated Preheated Preheated
2315 2320 2340 2415 2420 2425 2430 2440 2520 2530 2540 2620 2640	25 30 30 33 36 38 40 40 58 65	50 50 50 50 50 50 50 50	- 60 - 60 - - 60	38 x 970 26 x 900 38 x 900 26 x 1150 26 x 1200	G 13 G 13 G 13	Starter Starter	- Starterless	Preheated Preheated
2320 2340 2415 2425 2425 2430 2440 2520 2530 2540 2620 2640	30 30 33 36 38 40 40 58 65 65	50 50 50 50 50 50 50 50	- 60 - - 60	26 x 900 38 x 900 26 x 1150 26 x 1200	G 13 G 13	Starter	Starterless	Preheated
2340 2415 2420 2425 2430 2440 2520 2530 2540 2620 2640	30 33 36 38 40 40 58 65 65 70	50 50 50 50 50 50 50	- 60 - - 60	38 x 900 26 x 1150 26 x 1200	G 13			
2415 2420 2425 2430 2440 2520 2530 2540 2620 2640	33 36 38 40 40 58 65 65 70	50 50 50 50 50 50	60 - - 60	26 x 1150 26 x 1200				Preheated
2420 2425 2430 2440 2520 2530 2540 2620 2640	36 38 40 40 58 65 65 70	50 50 50 50 50	- 60	26 x 1200	G 3	Starterless	Starterless	Preheated
2425 2430 2440 2520 2530 2540 2620 2640	38 40 40 58 65 65 70	50 50 50 50	 60		G 13	Starter	Starterless	Preheated
2430 2440 2520 2530 2540 2620 2640	40 40 58 65 65 70	50 50 50	60					
2440 2520 2530 2540 2620 2640	40 58 65 65 70	50 50			G 13	Starter	Starterless	Preheated
2520 2530 2540 2620 2640	58 65 65 70	50		32 x 1200	G 13	Starter		Preheated
2530 2540 2620 2640	65 65 70		60	38 x 1200	G 13	Starter	- .	Preheated
2540 2620 2640	65 70	50	-	26 x 1500	G 13	Starter	Starterless	Preheated
2620 2640	70		-	32 x 1500	G 13	Starter	-	Preheated
2640		50	-	38 x 1500	G 13	Starter	-	Preheated
		50	60	26 x 1800	G 13	Starter	Starterless	Preheated
0000*	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	G5	Starterless	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Preheated, high resistance
3040	8	50	60	16 x 300	G5	Starterless /		Preheated, high resistance
4240	20	50	60	38 x 600	G 13	Starterless	_	Preheated, high resistance
4340	30	50	- 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
				38 x 1800	G 13			
4640	75	50	_			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		7 x 220	W4.3		Sans starter	Préchauffée
6040	8		k	7 x 320	W4.3		Sans starter	Préchauffée
6050	11		k	7 x 420	W4.3		Sans starter	Préchauffée
6060	13		K .	7 x 520	W4.3 W4.3		Sans starter	Préchauffée
	14	23 ≥2						
6520				16 x 550	G 5	-	Starterless	Preheated
6530	21	≥2		16 x 850	G 5	_	Starteriess	Preheated
6620	24	20		16 x 550	G 5	-	Starterless	Preheated
6640	28	≥ 2		16 x 1150	G5	-	Starterless	Preheated
6650	35	≥ 2	0 k	16 x 1450	G 5	-	Starterless	Preheated
6730	39		k	16 x 850	G5		Starterless	Preheated
6750	49	20		16 x 1450	G5		Starterless	Preheated
6840	54	20		16 x 1150	G5		Starterless	Preheated
6850	80	20		16 x 1450	G5		Starterless	Preheated
7220	16	≥ 2		26 x 600	G 13	_	Starterless	Preheated
7420	32	≥ 2		26 x 1200	G 13	_	Starterless	Preheated
7520	50	≥ 2		26 x 1500	G 13		Starterless	Preheated
							Statietiess	
8240	20	50	-	38 x 600	Fa6	Starterless	-	Non-preheated
8440	40	50	-	38 x 1200	Fa6	Starterless	- 1	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	≥ 2	0 k	26 x 1200	Fa6	_	Starterless	Non-preheated
9520	50	≥ 2		26 x 1500	Fa6	_	Starterless	Non-preheated

2.3.2 List of lamp data sheets in order of wattage

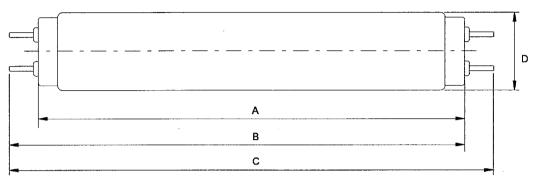
Sheet No. 60081-IEC-	Nominal wattage			Nominal dimensions	Сар	Ci	rcuit		
00001120	W	 -	łz	mm		AC mains	High frequency	Cathode type	
1020	4	50	60	16 x 150	G 5	Starter	·_	Preheated	
3020	4	50	60	16 x 150	G 5	Starterless	_	Preheated, high resistance	
1030	6	50	60	16 x 225	G 5	Starter	-	Preheated	
3030	6	50	60	16 x 225	G 5	Starterless	_	Preheated, high resistance	
6030	6		5	7 x 220		V4.3 x 8.5d	Starterless	Preheated	
1040	8	50	l 60	16 x 300	G5	Starter	-	Preheated	
3040	8	50	60	16 x 300	G 5	Starterless	_	Preheated, high resistance	
6040	8	2	5	7 x 320		V4.3 x 8.5d	Starterless	Preheated	
6050	11	2	25	7 x 420		V4.3 x 8.5d	Starterless	Preheated	
1060	13	50	60	16 x 525	G5	Starter	_	Preheated	
6060	13	2	25	7 x 520	ļ v	V4.3 x 8.5d	Starterless	Preheated	
6520	14	≥ 2	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		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	l -	38 x 600	Fa6	Starterless	- - -	Non-preheated	
6530	21		20 k	16 x 850	G 5	-	Starterless	Preheated	
6620	24	20	26	16 x 550	G5		Starterless	Preheated	
2315	25	50	-	38 x 970	G 13	Starter	-	Preheated	
6640	28		0 k	16 x 1150	G 5	-	Starterless	Preheated	
2320 2340	30 30	50 50	60	26 x 900	G 13	Starter	Starterless	Preheated	
4340	30	50 50	_	38 x 900 38 x 900	G 13 G 13	Starter	-	Preheated	
5340	30	50	60	38 x 900	G 13	Starterless	- 1	Preheated, high resistance	
7420	32	_	0 k	26 x 1200	G 13	Starterless	Starterless	Preheated, low resistance Preheated	
9420	32		0 k	26 x 1200	Fa6		Starterless	Non-preheated	
2415	33	50	60	26 x 1150	G 13	Starter	Statteriess	Preheated	
6650	35		0 k	16 x 1450	G 5	Statter	Starterless	Preneated Preheated	
2420	36	50	O K	26 x 1200	G 13	Starter			
2425	38	50	_	26 x 1050	G 13	Starter Starter	Starterless Starterless	Preheated	
6730	39	20	26	16 * 850	G 5	Starter	Starterless	Preheated Preheated	
8640	39	20	60	38 x 1200	Fa8	Starterless	Statieness	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	1	Preheated, low resistance	
8440	40	50	_	38 x 1200	Fa6	Starterless	_	Non-preheated	
6750	49	20	26	16 x 1450	G 5		Starterless	Preheated	
7520	50	≥2	0 k	26 x 1500	G 13	_	Starterless	Preheated	
9520	50	≥ 2		26 x 1500	Fa6	-	Starterless	Non-preheated	
6840	54	20	26	16 x 1150	G 5		Starterless	Preheated	
8740	57	7	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	- 1	Preheated	
2540	65	50	- 1	38 x 1500	G 13	Starter	-	Preheated	
4540	65	50	- 1	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 75	50	-	38 x 1800	G 13	Starter	-	Preheated	
4640	75 75	50	-	38 x 1800	G 13	Starterless	-	Preheated, high resistance	
8840	75 80	-	60	38 x 2400	Fa8	Starterless	-	Non-preheated	
2660* 4660*	80 80	50	_	38 x 1500	G 13	Starter	-	Preheated	
6850	80	50 20		38 x 1500	G 13	Starterless	- Ctorto-lane	Preheated, high resistance	
2670*	85	20 50	26	16 x 1450 38 x 1800	G 5	Startor	Starterless	Preheated Probested	
4670*	85 85	50 50	-	38 x 1800	G 13 G 13	Starter Starterless	_	Preheated Preheated, high resistance	
5840	85	50		38 x 2400	G 13	Starterless Starterless	-	Preheated, low resistance	
5970	87	-	60	38 x 1800	R17d	Starterless		Preheated, low resistance Preheated, low resistance	
2840	100	50	-	38 x 2400	G 13	Starter	_ 1	Preheated, low resistance 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	
				33 / 2100	- 10	0.11.011000		. rondatos, mgn roddianos	
* Mainly into	* Mainly intended for replacement purposes.								

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 1 514/97

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

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

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

C = overall length of the lamp between pin ends

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

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.

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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 Texte français au verso French text overleaf Publication CEI 60081 IEC Publication 60081 60081-IEC-02-2

Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w	,			mm
4	With starter	Preheated	G5	16 × 150

	Dimensions						
		mm					
А	В		С	D			
Max.	Min.	Max.	Max.	Max.			
135,9	140,6	143,0	150,1	16,0			

	Starting ch	aracteristics	
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time
Hz	v	V	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	А			
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.

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Page 2

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

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

Information for ballast design							
Frequency			50	60			
Preheat cathode current	Α	Min.	0,144	0,144			
		Max.	0,275	0,275			
Open circuit voltage across starter	٧	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	٧	Max. (r.m.s.)	68	68			

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

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Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
6	With starter	Preheated	G5	16 × 225

	Dimensions						
		mm					
А	В		С	D			
Max.	Min.	Max.	Max.	Max.			
212,1	216,8	219,2	226,3	16,0			

	Starting characteristics						
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time				
Hz	V	N	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	А		
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.

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Page 2

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

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

Information for	ballast desig	n		
Frequency		Hz	50	60
Preheat cathode current	А	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	9 v	Max. (r.m.s.)	68	68

Information for starter design				
Pulse voltage	Non-reclosure voltage			
v. 10 ·	v			
Minimum	Maximum			
250	70			

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Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
8	With starter	Preheated	G5	16 × 300

Dimensions						
mm						
А		В	С	D		
Max.	Min.	Max.	Max.	Max.		
288,3	293,0	295,4	302,5	16,0		

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

Electrical characteristics						
Frequency	cy Rated wattage Voltage (r.m.s.) at lamp terminals					Rated preheat current
Hz	w	Rated	Minimum	A	Α	
50	7,1	56	48	0,145	0,205	
60	7,2	57	48	64	0,145	0,205

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

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Page 2

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

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

Information for ballast design						
Frequency	50	60				
Preheat cathode current	А	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	٧	Max. (r.m.s.)	68	68		

Information for starter design				
Pulse voltage	Non-reclosure voltage			
v. 10 ·	V			
Minimum	Maximum			
250	70			

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Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w			_	mm
13	With starter	Preheated	G5	16 × 525

Dimensions						
mm						
Α		С	D			
Max.	Min.	Max.	Max.	Max.		
516,9	521,6	524,0	531,1	16,0		

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

		Elec	trical characteris	tics		
Frequency	Rated wattage	Voltage	(r.m.s.) at lamp t	erminals	Rated lamp current	Rated preheat current
Hz	w	Rated	Minimum	Maximum	A	А
50	13	95	85	105	0,165	0,225
60	13	94	*	*	0,165	0,225

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

* Under consideration.

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Page 2

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

		Reference bal	last characteristics		
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor
Hz	w	V	Α	Ω	
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 st	tarter design
Pulse voltage	Non-reclosure voltage
V	V
Minimum	Maximum
400	140

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Page 1

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

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

		Dimensions		
		mm		
Α	В		С	D
Max.	Min.	Max.	Max.	Max.
437,4	442,1	444,5	451,6	28,0

	Starting ch	aracteristics	
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time
Hz	v	N. T.	s
50	110/120	103,5	30
60	110/120	103,5	30

		Elec	ctrical characteris	stics		
Frequency	Rated wattage	Voltage	(r.m.s.) at lamp t	terminals	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.

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

		Reference ball	ast characteristics		
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor
Hz	w	٧	A	Ω	
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	or starter design
Pulse voltage	Non-reclosure voltage
NN N	v
Minimum	Maximum
250	70

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DOUBLE-CAPPED FLUORESCENT LAMP

Page 3

				ILCOS:	: FD-15	-E-G13-26
	Information for high fre	equency ballast desig	n		· · · · · · · · · · · · · · · · · · ·	
	Typical lamp of	characteristics				
Frequency	Lamp wattage Lamp voltage		Lamp curr		rent	
kHz	W	V			0,310	
≥ 20	13,5	45			0,310	
Current in any lead to cathodes			A	Max.		*
Lamp operating current			А	Min.		*
			-	Max.		*
			C			
	Current contro	lled preheating) •			
Minimum preheat current i_k (A) to $i_k = (a/t_e + i_m^2)^{0.5}$	emission time $t_{\rm e}$ (s)	07		а		0,130
				i _m (A)		0,260
Maximum preheat current	4	A	t ≤ (),4		1,400
		•	0,4 < t	< 2,0	1,580) - 0,450 <i>t</i>
	.5		t ≥ 2	2,0	(0,680
Open circuit voltage across lamp		v [t ≤ t _e	Max.	(r.m.s.)	*
	. 4		<i>t</i> > <i>t</i> _e	Min. (r.m.s.)	*
Voltage to starting aid		V	t ≤ t _e	Мах.	(peak)	•
			$t > t_{\rm e}$	Min.	(peak)	*
Substitution resistor for each catl	node				Ω	12,5*
	Voltage contro	lled preheating				
		*				
Open circuit voltage across lamp	Without p	oreheating		V Min. ('r m s \	*
Current through lamp substitution resistor			V Wiiii. (1.111.5.)			*
Lamp substitution resistor	1 10010[0]	·····		A M	ıπ. Ω	*
Substitution resistor for each cath	node				Ω	*
Cathode current				A M	ax.	*
* Under consideration.						
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Page 1

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

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

Dimensions mm						
Max.	Min.	Max.	Max.	Max.		
549,0	553,7	556,1	563,2	28,0		

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

	Electrical characteristics									
Frequency	Rated wattage	Volta	ge (r.m.s.) at lamp ter V	Rated lamp current	Rated preheat current					
Hz	w	Rated	Minimum	Maximum	 A	Α				
50	15	57	50	64	0,300	0,450				
60	_	1	-	-	-	-				

Chromaticity coordinates: see D.2, annex D.

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Page 2

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

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

Information for ballast design						
Frequency		Hz	50	60		
Preheat cathode current	А	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	٧	Max. (r.m.s.)	68	-		

Information fo	r starter design
Pulse voltage	Non-reclosure voltage
V	V
Minimum	Maximum
800	70
NNNLISU	

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		UBLE-CAPPED FL	UORESCENT	LAMP			_	_
		DATA S	HEET				P	age 3
'						ILCOS	: FD-1	5-E-G13-
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Information for high-free	quency ballast des	ign				
		T						
Frequency		Typical lamp cl	Lamp vo	ltage		Lamr	curre	
kHz		W Wattage	V	maye		Lain	A	ıı
≥ 20		13	52			0	,245	
Current in any lead to o	athodos			A		lax.		0.050
Lamp operating current				A A		nax. ∕∕lin.		0,650
camp operating current	·			^		Max.		*
		41.0			I		<u> </u>	
		Current controlle	ed preheating	7				···
Minimum preheat curre	nt ik (A) to emission	time t _e (s)		•		а		0,240
$i_{\rm k} = (a/t_{\rm e} + i_{\rm m}^2)^{0.5}$		11 a.T.	<u> </u>			(A)		0,315
Maximum preheat curre	ant			t ≤ 0.		<u> </u>	1,80	
		•		0,4 < t · t ≥ 2		2,	0,90),300 t
Open circuit voltage ac	ross lamn		V	t ≥ 2,		Max. (r.m		270
open enedic venage as	, coo lamp)	t > t _e		Min. (r.m.		280
Voltage to starting aid			v	t ≤ t _e		Max. (pea		*
		.5	_	<i>t</i> > <i>t</i> _e		Min. (pea		*
Substitution resistor for	each cathode				1		Ω	12,5*
	1	•	, <u></u>					
	1/1	Voltage controlle						
	\overline{n}	*						
	N							
Open circuit voltage ac	mee lamp	Without pre	eheating	v I	Min (rn	\ T		*
Open chicult voltage ac				·	Min. (r.n Min.			*
Current through lamp s				A				
Current through lamp s	tor			A		Ω		*
Current through lamp s	tor			A	Max	Ω		*

Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
· w				mm
18	With starter	Preheated	G13	26 × 600

	Dimensions							
mm								
Α	В		С	D				
Max.	Min.	Max.	Max.	Max.				
589,8	594,5	596,9	604,0	28,0				

	Starting characteristics							
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time					
Hz	V	N. T.	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	Α	A				
50	18	57	50	64	0,370	0,550				
60	-	<u>-</u>	_		-					

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

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Page 2

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

	Reference ballast characteristics						
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor		
Hz	w	V	А	Ω			
50	20	127	0,370	270	0,12		
60	-	_	_	-	_		

Information for ballast design					
Frequency		Hz	50	60	
Preheat cathode current	А	Min.	0,333	_	
		Max.	0,800	_	
Open circuit voltage across starter	V	Min. (r.m.s.)	103,5	_	
Open circuit voltage across lamp	₹ 0 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	Non-reclosure voltage		
v N	V		
Minimum	Maximum		
800	70		

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Page 3

				ILCOS	S: FD-18	-E-G13-26
	Information for high fre	equency ballast desig	n			
	Typical lamp o	characteristics				
Frequency	Lamp wattage	Lamp voltage		Li	amp curi	rent
kHz	W	V			Α	
≥ 20	16	55		<u> </u>	0,290	
Current in any lead to cathod	des		Α	Max.		0,650
Lamp operating current			Α	Min.		*
			ļ	Max.		*
44000			C	<u> </u>		
	Current contro	lled preheating) .			
Minimum preheat current i_k ($i_k = (alt_e + i_m^2)^{0.5}$	A) to emission time $t_{\rm e}$ (s)	0)		а		0,240
			H			
				i _m (A))	0,315
Maximum preheat current		A	t ≤			0,315 1,800
Maximum preheat current		A .	t ≤ 0,4 <	0,4		
Maximum preheat current	الى:	A		0,4 t < 2,0	2,000	1,800
	lamp	A V	0,4 <	0,4 t < 2,0 2,0	2,000	1,800) - 0,560 <i>t</i>
	lamp		0,4 < t ≥	0,4 f < 2,0 2,0 Max	2,000	1,800) - 0,560 <i>t</i> 0,900
Open circuit voltage across l	lamp		0,4 < t ≥ t ≤ t _e	0,4 f < 2,0 2,0 Max Min.	2,000	1,800 0 - 0,560 <i>t</i> 0,900 270
Open circuit voltage across l	lamp	V	$0,4 < t \ge t \le t_e$ $t > t_e$	0,4 f < 2,0 2,0 Max Min.	2,000 (r.m.s.)	1,800 0 - 0,560 t 0,900 270 280
Open circuit voltage across l Voltage to starting aid	MMIN	V	$0,4 < t \le t$	0,4 f < 2,0 2,0 Max Min.	2,000 (r.m.s.) (r.m.s.)	1,800 0 - 0,560 t 0,900 270 280
Open circuit voltage across l Voltage to starting aid	n cathode	V	$0,4 < t \le t$	0,4 f < 2,0 2,0 Max Min.	2,000 (r.m.s.) (r.m.s.)	1,800 0 - 0,560 t 0,900 270 280 *
Open circuit voltage across l Voltage to starting aid	cathode Voltage contro	V	$0,4 < t \le t$	0,4 f < 2,0 2,0 Max Min.	2,000 (r.m.s.) (r.m.s.)	1,800 0 - 0,560 t 0,900 270 280 *
Open circuit voltage across l Voltage to starting aid	voltage contro	V V	$0,4 < t \le t$	0,4 f < 2,0 2,0 Max Min.	2,000 (r.m.s.) (r.m.s.)	1,800 0 - 0,560 t 0,900 270 280 *
Open circuit voltage across l Voltage to starting aid Substitution resistor for eac	Voltage contro Without p	V V	$0,4 < t \le t$	0,4 f < 2,0 2,0 Max Min. Max	2,000 (r.m.s.) (r.m.s.)	1,800 0 - 0,560 t 0,900 270 280 *
Open circuit voltage across l Voltage to starting aid Substitution resistor for each	Voltage contro Without p	V V	$0,4 < t \le t$	0,4 f < 2,0 2,0 Max Min. Max V Min.	2,000 (r.m.s.) (r.m.s.) . (peak)	1,800 0 - 0,560 t 0,900 270 280 * 12,5*
Open circuit voltage across I Voltage to starting aid Substitution resistor for each Open circuit voltage across I	Voltage contro Without p	V V	$0,4 < t \le t$	0,4 f < 2,0 2,0 Max Min. Max V Min.	2,000 (r.m.s.) (r.m.s.) (peak) Ω	1,800 0 - 0,560 t 0,900 270 280 * * 12,5*
Maximum preheat current Open circuit voltage across I Voltage to starting aid Substitution resistor for each Open circuit voltage across I Current through lamp substit Lamp substitution resistor for each	Voltage contro Without p	V V	$0,4 < t \le t$	0,4 f < 2,0 2,0 Max Min. Max V Min.	2,000 (r.m.s.) (r.m.s.) (peak) Ω (r.m.s.)	1,800 0 - 0,560 t 0,900 270 280 * * 12,5*

Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
20	With starter	Preheated	G13	32 × 600

	:	Dimensions		
		mm		
A		В	С	D
Max.	Min.	Max.	Max.	Max.
589,8	594,5	596,9	604,0	34,1

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

	Electrical characteristics							
Frequency	Rated wattage	ated wattage Voltage (r.m.s.) at lamp terminals				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.

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Page 2

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

Reference ballast characteristics						
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor	
Hz	. w	V	А	Ω		
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	Α	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	٧	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	Non-reclosure voltage				
v	V				
Minimum	Maximum				
800	70				

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Page 1

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

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

		Dimensions		
		mm		
Α	В		С	D
Max.	Min.	Max.	Max.	Max.
589,8	594,5	596,9	604,0	40,5

	Starting characteristics						
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time				
Hz	v	V	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	Α .	А	
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.

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Page 2

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

Reference ballast characteristics							
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor		
Hz	w	V	А	Ω			
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	Α	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	Non-reclosure voltage				
v	V				
Minimum	Maximum				
250	70				

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Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
25	With starter	Preheated	G13	38 × 970

	Dimensions		
	mm		
В		С	D
Min.	Max.	Max.	Max.
974,7	977,1	984,2	40,5
	Min.	B Min. Max.	mm B C Min. Max. Max.

	Starting characteristics						
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time				
Hz	v	v	s				
50	220	198	30				
60	- 0	-	_				

	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.

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Page 2

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

	Reference ballast characteristics							
Frequency	Frequency Nominal wattage Rated voltage Calibration current Voltage/current ratio Power							
Hz	w	V	Α	Ω				
50	25	220	0,290	605	0,10			
60	-	-	-	-	-			

Information for ballast design					
Frequency		Hz	50	60	
Preheat cathode current	А	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	Non-reclosure voltage		
v	V		
Minimum	Maximum		
400	140		

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Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
30	With starter	Preheated	G13	26 × 900

	Dimensions						
	mm						
Α	В		С	D			
Max.	Min.	Max.	Max.	Max.			
894,6	899,3	901,7	908,8	28,0			

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

Electrical characteristics						
Frequency	Rated wattage	Voltage	(r.m.s.) at lamp t 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.

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Page 2

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

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

Information fo	r ballast desiç	ŋn		
Frequency		Hz	50	60
Preheat cathode current	Α	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	٧	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	Non-reclosure voltage			
V	V			
Minimum	Maximum			
400	140			

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DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET						Page 3		
<u> </u>					IL	cos	: FD-30)-E-G13-26
· · · · · · · · · · · · · · · · · · ·	Înf	ormation for high fre	equency ballast design	n				
			, , ,					
		Typical lamp o	haracteristics	-			.	
Frequency Lamp wattage Lamp voltage Lamp current						rent		
kHz		W V A						
≥ 20		24	95				0,260	1
Current in any lead	to cathodes			А		Max.		0,630
Lamp operating cur						Min.	\dashv	*
Lamp operating cur	ent			۱			+	*
			*			Max.		
			114					
		Current control	led preheating					
Minimum preheat coing $i_k = (a/t_e + i_m^2)^{0.5}$	urrent i _k (A) to emis	sion time $t_{\rm e}$ (s)				a		0,240
		.0	9		i	_m (A)		0,310
Maximum preheat c	urrent		А	<i>t</i> ≤	0,4			1,600
	•	./2	Γ	0,4 < 1	f < 2,	,0	1,810	0 - 0,525 <i>t</i>
			Ī	<i>t</i> ≥ :	2,0			0,760
Open circuit voltage	across lamp		V	t ≤ t _e		Max. ((r.m.s.)	*
	N			t > t _e		Min. (r.m.s.)	*
Voltage to starting a	aid		V	t ≤ t _e		Мах.	(peak)	*
	7.			<i>t</i> > <i>t</i> _e		Min. ((peak)	*
Substitution resisto	r for each cathode						Ω	12,5
		Voltage control	led preheating					
		*						
		Without p	reheating				***	
Open circuit voltage across lamp					r.m.s.)	*		
Current through lamp substitution resistor A Min.						*		
Lamp substitution re	esistance						Ω	*
Substitution resisto	r for each cathode						Ω	*
Cathode current					Α	Ma	ax.	*

Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
30	With starter	Preheated	G13	38 × 900

Dimensions							
	mm						
Α	В		С	D			
Max.	Min.	Max.	Max.	Max.			
894,6	899,3	901,7	908,8	40,5			

Starting characteristics						
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time			
Hz	V		s			
50	220	198	30			
60	-	<u> </u>	_			

	Electrical characteristics							
Frequency	Rated wattage	Voltage	(r.m.s.) at lamp t	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.

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Page 2

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

Reference ballast characteristics							
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor		
Hz	w	V	А	Ω			
50	30	220	0,405	460	0,10		
60	-	_	_	_	_		

Information for	ballast desig	n		
Frequency		Hz	50	60
Preheat cathode current	А	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	Non-reclosure voltage			
v. 0 **	V			
Minimum	Maximum			
400	140			

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Page 1

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

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

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

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

		E	lectrical characteristics			
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	Rated preheat current
Hz	l w	Rated	Minimum	Maximum	Α	A
50	33	103	93	113	0,380	0,570
60	-	_			_	_
	N	M.				

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Page 2

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

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

Information for ballast design						
Frequency	Hz 50			60		
Preheat cathode current	Α	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	-		

·	
Info	ormation for starter design
Pulse voltage	Non-reclosure voltage
V	v
Minimum	Maximum
800	140
NNNILIS	

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DOUBLE-CAPPED FLUORESCENT LAMP Page 3 **DATA SHEET** ILCOS: FD-33-E-G13-26/1150 Information for high-frequency ballast design Typical lamp characteristics Lamp wattage Lamp voltage V Lamp current Frequency kHz W 30 103 0,304 ≥ 20 Max. Current in any lead to cathodes Α 0,750 Ā Min. Lamp operating current Мах. Current controlled preheating Minimum preheat current i_k (A) to emission time t_e (s) 0,340 а $i_k = (a/t_e + i_m^2)^{0.5}$ 0,300 i_m (A) Maximum preheat current Ã 1,900 t≤0,4 0.4 < t < 2.02,150 - 0,630 t 0,900 t ≥ 2,0 290* Open circuit voltage across lamp t≤t_e Max. (r.m.s.) *t* > *t*_e Min. (r.m.s.) 330* t ≤ t_e 410* Voltage to starting aid Max. (peak) *t* > *t*_e Min. (peak) 465* Substitution resistor for each cathode 10* Voltage controlled preheating Without preheating Open circuit voltage across lamp 800 Min. (r.m.s.) Current through lamp substitution resistor Min. 0,200 Lamp substitution resistor 1000 Ω Substitution resistor for each cathode 2 Ω Cathode current Max. 2,200

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Publication CEI 60081 IEC Publication 60081

Under consideration.

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Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
36	With starter	Preheated	G13	26 × 1200

		Dimensions			
		mm			
А	В		С	D	
Max.	Min.	Max.	Max.	Max.	
1199,4	1204,1	1206,5	12 13,6	28,0	

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

	•	Elec	ctrical characteris	tics		
Frequency	Frequency Rated wattage Voltage (r.m.s.) at lamp terminals			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.

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Page 2

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

	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	-	_	-	-	_				

Information for ballast design						
Frequency	Hz	50	60			
Preheat cathode current	Α	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	r design
Pulse voltage	Non-reclosure voltage
V	V
Minimum	Maximum
800	140

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DOUBLE-CAPPED FLUORESCENT LAMP

DATA SHEET							Page 3	
 					ILCO	s : FD-36	S-E-G13-26/1	
	Infor	mation for high freq	uency ballast desig	jn				
		Typical lamp ch	aracteristics					
Frequency	Lamp	wattage	Lamp voltage	1		Lamp cu	rrent	
kHz		w	v			Α		
≥ 20		32	102		0,320			
Current in any lead	to cathodes			Α	Ma	x.	0,750	
Lamp operating cu					Mi		*	
	···			ر ا	Ma		*	
			- (0)					
		Current controlle	ed preheating					
Minimum preheat current i_k (A) to emission time t_e (s) $a_k = (a/t_e + i_m^2)^{0.5}$							0,340	
	<i>i</i> _m (A)						0,300	
Maximum preheat current A					<i>t</i> ≤ 0,4		1,900	
	.	13		0,4 <	t < 2,0	2,15	2,150 - 0,630 t	
				t≥	2,0		0,900	
Open circuit voltag	e across lamp		V	$t \leq t_{\epsilon}$, М	ax. (r.m.s.)	290*	
	N			$t > t_e$, Mi	n. (r.m.s.)	330*	
Voltage to starting	aid		V	$t \leq t_{\epsilon}$, Ma	ax. (peak)	410*	
	•			t > t _e Mi		in. (peak)	465*	
Substitution resisto	or for each cathode					Ω	10*	
		Voltage controlle	ed preheating				·	
		*						
		Without pre	heating					
Open circuit voltag	Open circuit voltage across lamp			V Min. (r.m.s.)		800		
Current through lar	np substitution resistor				Α	Min.	0,200	
Lamp substitution (esistor					Ω	1000	
Substitution resisto	r for each cathode					Ω	2	
Cathode current					Α	Мах.	2,200	
* Under considera	tion.							

Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
38	With starter	Preheated	G13	26 × 1050

Dimensions						
mm						
Α	В		С	D		
Max.	Min.	Max.	Max.	Max.		
1047,0	1051,7	1054,1	1061,2	28,0		

	Starting characteristics						
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time				
Hz	V	O V	s				
50	220	198	30				
60	_	<u>O</u> -					

	Electrical characteristics								
Frequency	Rated wattage	Voltage	(r.m.s.) at lamp t	Rated lamp current	Rated preheat current				
Hz	w	Rated	Minimum	Maximum] A	A			
50	38,5	104	94	114	0,430	0,650			
60	- N	_	_	_	-	_			

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

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Page 2

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

	Reference ballast characteristics							
Frequency Nominal wattage Rated voltage Calibration current Voltage/current ratio Power fa								
Hz	w	V	А	Ω				
50	40	220	0,430	390	0,10			
60	-	_	-	· <u> </u>	_			

Information for ballast design						
Frequency	Hz	50	60			
Preheat cathode current	А	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	Non-reclosure voltage			
V	V			
Minimum	Maximum			
800	140			

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Page 3

	DATA	SHEET			
			II	_COS: FD-38	3-E-G13-26
	Information for high fr	oguanov hallast dogia			
	Information for high fr	equency banast desig	Ju		
	Turical laws	ah awa atawiati aa			
	-T	characteristics			
Frequency kHz	Lamp wattage W	Lamp voltage V		Lamp cı A	ırrent
≥ 20	32	105		0,31	0
				1	0.750
Current in any lead to cath	odes	•	A	Max.	0,750
Lamp operating current			A .	Min.	*
				Max.	*
	······································		<u> </u>		
	Current contro	olled preheating) •		
Minimum preheat current i_0 $i_k = (a/t_e + i_m^2)^{0.5}$	$t_{\rm e}$ (A) to emission time $t_{\rm e}$ (s)			а	0,340
				i _m (A)	0,350
Maximum preheat current		A	<i>t</i> ≤ 0,4		1,900
			0,4 < t < 2	2,0 2,15	50 - 0,630
	.6		<i>t</i> ≥ 2,0		0,900
Open circuit voltage across	s lamp	V	t ≤ t _e	Max. (r.m.s.)	240*
			<i>t</i> > <i>t</i> _e	Min. (r.m.s.)	230*
Voltage to starting aid		V	$t \le t_{\rm e}$	Max. (peak)	340*
	'W		t > t _e	Min. (peak)	325*
Substitution resistor for ea	ch cathode			Ω	10*
	Voltage contro	lled preheating			
		*			
	Without p	preheating			
Open circuit voltage across			V	Min. (r.m.s.)	800
Current through lamp subs	titution resistor		Α	Min.	0,200
_amp substitution resistor				Ω	1000
Substitution resistor for each	ch cathode			Ω	2
					

Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
40	With starter	Preheated	G13	32 × 1200

		Dimensions		
		mm		
А	В		С	D
Max.	Min.	Max.	Max.	Max.
1199,4	1204,1	1206,5	1213,6	34,1
	1201,1	1200,0	,,,	U-7, 1

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

	Electrical characteristics							
Frequency	Rated wattage	Voltage	(r.m.s.) at lamp t	Rated lamp current	Rated preheat current			
Hz	W	Rated	Minimum	Maximum	A	А		
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.

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Page 2

ILCOS: FD-40-E-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 current	A Min.		0,387	0,387	
		Max.	0,904	0,904	
Open circuit voltage across starter	٧	Min. (r.m.s.)	180	180	
Open circuit voltage across lamp	٧	Max. (peak)	400	400	
Substitution resistor for both cathodes in series		Ω	40	40	
Voltage across starter with lamp operating	٧	Max. (r.m.s.)	128	128	

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

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Page 1

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

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

Dimensions					
mm					
Α	В		С	D	
Max.	Min.	Max.	Max.	Max.	
1199,4	1204,1	1206,5	1213,6	40,5	

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

Electrical characteristics						
Frequency	Rated wattage	Voltage	(r.m.s.) at lamp t V	Rated lamp current	Rated preheat current	
Hz	w	Rated	Minimum	Maximum	А	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.

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Page 2

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

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

Information f	or ballast desig	gn		
Frequency		50	60	
Preheat cathode current	А	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	<u> </u>	Ω	40	40
Voltage across starter with lamp operating	V	Max. (r.m.s.)	128	128

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

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Page 1

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

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

		Dimensions		
		mm		
Α	В		С	D
Max.	Min.	Max.	· Max.	Max.
1500,0	1504,7	1507,1	1514,2	28,0

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

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

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

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Page 2

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

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	
Preheat cathode current	А	Min.	0,603	-	
		Max.	1,410	-	
Open circuit voltage across starter	٧	Min. (r.m.s.)	198		
Open circuit voltage across lamp	٧	Max. (peak)	400	_	
Substitution resistor for both cathodes in series		Ω	25	-	
Voltage across starter with lamp operating	٧	Max. (r.m.s.)	132	-	

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

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DOUBLE-CAPPED FLUORESCENT LAMP Page 3 **DATA SHEET** ILCOS: FD-58-E-G13-26/1500 Information for high frequency ballast design Typical lamp characteristics Frequency Lamp wattage Lamp voltage Lamp current kHz W Α 111 0,455 ≥ 20 Current in any lead to cathodes Max. 1,100 Lamp operating current Min. Max. Current controlled preheating Minimum preheat current i_k (A) to emission time t_e (s) 0,390 $i_{\rm k} = (a/t_{\rm e} + i_{\rm m}^2)^{0.5}$ 0,350 i_m (A) Maximum preheat current 2,900 $t \leq 0.4$ 0,4 < t < 2,03,300 - 0,970 t 1,350 $t \ge 2,0$ Open circuit voltage across lamp $t \le t_e$ Max. (r.m.s.) 295* 335* $t > t_{\rm e}$ Min. (r.m.s.) 420* Voltage to starting aid Max. (peak) $t \le t_e$ 475* $t > t_{\rm e}$ Min. (peak) 8* Substitution resistor for each cathode Voltage controlled preheating Without preheating Min. (r.m.s.) 800 Open circuit voltage across lamp Min. 0,250 Current through lamp substitution resistor 800 Lamp substitution resistor 2 Ω Substitution resistor for each cathode Max. 3,000 Cathode current * Under consideration. Texte français au verso French text overleaf Publication CEI 60081 IEC Publication 80081 60081-IEC-2520-1

Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
65	With starter	Preheated	G13	32 × 1500

	Dimensions					
	mm					
А	В		С	D		
Max.	Min.	Max.	Max.	Max.		
1500,0	1504,7 1507,1 1514,2 34,1					

Starting characteristics					
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time		
Hz	V		s		
50	220	198	30		
60	_	<u> </u>	-		

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V Rated lamp current 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.

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DOUBLE-CAPPED FLUORESCENT LAMP DATA SHEET

Page 2

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

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		
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	Non-reclosure voltage	
v N	V	
Minimum	Maximum	
900	140	

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Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
65	With starter	Preheated	G13	38 ×1500

Dimensions						
mm						
А	В		С	D		
Max.	Min.	Min. Max.		Max.		
1500,0	1504,7	1507,1	1514,2	40,5		

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

Electrical characteristics							
Frequency	Rated wattage	Voltage	(r.m.s.) at lamp t	Rated lamp current	Rated preheat current		
Hz	w	Rated	Minimum	Maximum	Α	A	
50	64	110	100	120	0,670	1,000	
60	-		_	_	-	_	

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

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Page 2

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

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

Information for ballast design						
Frequency		Hz	50	60		
Preheat cathode current	А	Min	0,603	-		
		Max.	1,410	-		
Open circuit voltage across starter	V	Min. (r.m.s.)	198	_		
Open circuit voltage across lamp	₹ O 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 st	arter design
Pulse voltage	Non-reclosure voltage
v.19	V
Minimum	Maximum
400	140

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Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
70	With starter	Preheated	G13	26 × 1800

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

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

	Electrical characteristics								
Frequency	Rated wattage	Voltage	(r.m.s.) at lamp t	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.

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Page 2

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

Reference ballast characteristics							
Frequency Nominal wattage Rated voltage Calibration current Voltage/current ratio Power fa							
Hz	w	V	А	Ω			
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	А	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	4 Ov	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	Non-reclosure voltage			
v N	V			
Minimum	Maximum			
900	170			

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DOUBLE-CAPPED FLUORESCENT LAMP

Page 3

	DATA S	SHEET				J
				ILCOS: F	D-70-	E-G13-26
	Information for high free	quency ballast desig	ın			.
	Typical lamp cl	haracteristics				-
Frequency kHz	Lamp wattage W	Lamp voltage V		Lan	np cun	rent
≥ 20	60	129			0,470	
Current in any lead to cat	hodes		А	Max.		1,160
Lamp operating current			А	Min.		*
				Max.		*
			C			
	Current controll	ed preheating) *			
Minimum preheat current $i_k = (alt_e + i_m^2)^{0.5}$	$i_{\rm k}$ (A) to emission time $t_{ m e}$ (s)	0)		а		0,800
				i _m (A)		0,400
Maximum preheat current		A	<i>t</i> ≤ 0,4	4	3	3,100
			0,4 < t <	2,0	3,500) - 1,030 <i>t</i>
	.60		t ≥ 2,0)	1	1,450
Open circuit voltage acros	ss lamp	V	t ≤ t _e	Max. (r.	m.s.)	410*
		ļ	t > t _e	Min. (r.	m.s.)	465*
Voltage to starting aid	1/4	v	t ≤ t _e	Max. (oeak)	580*
	1/4	Ī	t > t _e	Min. (p	eak)	660*
Substitution resistor for ea	ach cathode			I 	Ω	8*
NAMES .	Voltage controlle	ed preheating				
	*					
	Without pre	eheating				
Open circuit voltage acros	ss lamp			/ Min. (r.	m.s.)	*
Current through lamp sub	stitution resistor		P	Mir	1.	*
Lamp substitution resistor					Ω	*
Substitution resistor for ea	ach cathode				Ω	*
Cathode current			Α	Ma:	K	*
* Under consideration.						
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ILCOS: FD-75-E-G13-38/1800

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

	Dimensions					
		mm				
А	В		С	D		
Max.	Min.	Max.	Max.	Max.		
1763,8	1768,5	1770,9	1778,0	40,5		

Starting characteristics							
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time				
Hz	v	v	s				
50	240	216	30				
60 .	- 7	_	_				

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

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

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

	Reference ballast characteristics							
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor			
Hz	l w	V	A	Ω				
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			
Preheat cathode current	А	Min.	0,570		
		Max.	1,410	_	
Open circuit voltage across starter	٧.	Min. (r.m.s.)	216	_	
Open circuit voltage across lamp	٧	Max. (peak)	400	_	
Substitution resistor for both cathodes in series	3 C	Ω	25		
Voltage across starter with lamp operating	V	Max. (r.m.s.)	160	_	

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

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Page 1

Mainly intended for replacement purposes.

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
80	With starter	Preheated	G13	38 × 1500

		Dimensions		
		mm		
Α	В		С	D
Max.	Min.	Max.	Max.	Max.
1500,0	1504,7	1507,1	1514,2	40,5

	Starting ch	aracteristics	
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time
Hz	V	V	s
50	240	198	30
60	-	-	_

	Electrical characteristics						
Frequency	requency Rated wattage Voltage (r.m.s.) at lamp terminals					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.

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

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

Information for	r ballast desiç	gn		
Frequency		Hz	50	60
Preheat cathode current	Α	Min.	0,790	_
		Max.	1,830	-
Open circuit voltage across starter	٧	Min. (r.m.s.)	198	_
Open circuit voltage across lamp	٧	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 starte	er design
Pulse voltage	Non-reclosure voltage
V	V
Minimum	Maximum
400	140

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Page 1

Mainly intended for replacement purposes.

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

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

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

	Starting characteristics						
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time				
Hz	v	V	s				
50	240	216	30				
60	-0	· -	-				

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	Α
50	84	120	110	130	0,800	1,300
60	-	_				

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

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

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

Information fo	r ballast desig	gn		
Frequency		Hz	50	60
Preheat cathode current	А	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	Non-reclosure voltage			
v	V			
Minimum	Maximum			
800	170			

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions	
w				mm	
100	With starter	Preheated	G13	38 × 2400	

	Dimensions							
		mm						
Α	В		С	D				
Max.	Min.	Max.	Max.	Max.				
2374,3	2379,0	2381,4	2388,5	40,5				

	Starting characteristics						
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time				
Hz	v	V	s				
50	240	220	30				
60	-0	-	_				

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	Voltage (r.m.s.) at lamp terminals V			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.

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Page 2

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

Reference ballast characteristics							
Frequency Nominal wattage Rated voltage Calibration current Voltage/current ratio Power factor							
Hz	w	V	Α	Ω			
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	٧	Min. (r.m.s.)	216	-			
Open circuit voltage across lamp	٧	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	Non-reclosure voltage			
V	V			
Minimum	Maximum			
900	170			

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Mainly intended for replacement purposes.

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
125	With starter	Preheated	G13	38 × 2400

	Dimensions						
	mm						
А	В		С	D			
Max.	Min.	Max.	Max.	Max.			
2374,3	2374,3 2379,0 2381,4 2388,5 40,5						

	Starting characteristics						
Frequency	Ballast rated voltage	Test voltage (r.m.s.)	Starting time				
Hz	v	V	s				
50	240	220	30				
60	-0	_	-				

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

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

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

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

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

Information for ballast design						
Frequency		Hz	50	60		
Preheat cathode current	Α	Min.	0,800	_		
		Max.	1,970	-		
Open circuit voltage across starter	V	Min. (r.m.s.)	216	_		
Open circuit voltage across lamp	٧	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 start	er design
Pulse voltage	Non-reclosure voltage
v	V
Minimum	Maximum
800	180

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Page 1

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

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

Dimensions						
mm						
А	В		С	D		
Max.	Min.	Max.	Max.	Max.		
135,9	140,6 143,0 150,1 16,0					

	Starting characteristics									
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time				
Hz	w	٧	mm	V	٧	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				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	each cathode				
		Rated	Minimum			
High resistance	8,0	70	50			

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Page 2

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

Reference ballast characteristics								
Frequency Nominal wattage Rated voltage Calibration current Voltage/current ratio Power fac								
Hz	w	V	А	Ω				
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	Y-	Min. (r.m.s.)	120	120			
		Max. (r.m.s.)	165	165			
Starting capacitor	UF	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.

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Page 1

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

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

		Dimensions		
		mm		
Α	В		С	D
Max.	Min.	Max.	Max.	Max.
212,1	216,8	219,2	226 3	16,0

	Starting characteristics								
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time			
Hz	w	٧	mm	٧	٧	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	e (r.m.s.) at lamp ter	minals	Rated lamp current		
Hz	w	Rated	Minimum	Maximum	A		
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.)	Resistance of each cathode Ω			
		Rated	Minimum		
ligh resistance	8,0	70	50		

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Page 2

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

	Reference ballast characteristics							
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor			
Hz	w	V	A	Ω				
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	· Y	Min. (r.m.s.)	130	130			
		Max. (r.m.s.)	180	180			
Starting capacitor	ΟμF	Min.	*	0,008			
		Max.	*	0,060			
Substitution resistor for each cathode		Ω	70	70			
Voltage to starting aid	٧	Min. (peak)	400	400			
Current in any lead to cathodes	Α	Max.	*	*			

* Under consideration.

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Page 1

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

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

	Dimensions					
mm						
А	В		С	D		
Max.	Min.	Max.	Max.	Max.		
288,3	293,0	295,4	302,5	16,0		

	Starting characteristics							
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time		
Hz	w	V	mm	V	٧	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	Voltage (r.m.s.) at lamp terminals V				
Hz	W	Rated	Minimum	Maximum	Α		
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			

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Page 2

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

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

Information for	ballast desig	gn		
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	Y	Min. (r.m.s.)	140	140
	1	Max. (r.m.s.)	190	190
Starting capacitor	ŲF	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	Α	Max.	*	*

* Under consideration.

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60081-IEC-3040-1

Page 1

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

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

		Dimensions			
		mm			
Α	В		С	D	
Max.	Min.	Max.	Max.	Max.	
589,8	594,5	596,9	604.0	40,5	

·		,	Starting characte	ristics		
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time
Hz	w	V	mm	ν	V	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				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 ch	aracteristics	
Cathode	Test voltage (r.m.s.) V	Resistance of each cathode Ω	
		Rated	Minimum
High resistance	8,0	20	14

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Page 2

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

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

Information for ballast desi	gn		
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	Min. (r.m.s.)	180	180
<u> </u>	Max. (peak)	345	345
Substitution resistor for each cathode	Ω	19	19
Voltage to starting	Min. (peak)	*	*
Current in any lead to cathodes	Max.	0,650	0,650
NNN. LISUIT.			

* Under consideration.

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Page 1

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

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

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

			Starting characte	ristics		
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time
Hz	w	V	mm	V	V	s
50	30	220	13	8,0	205	10
60	-	4,6		-	_	

	Electrical characteristics					
Frequency	Rated wattage	Voltag	e (r.m.s.) at lamp te V	rminals	Rated lamp current	
Hz	w	Rated	Minimum	Maximum	A	
50	29,5	81	71	91	0,405	
60		_	_	-	_	

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

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

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Page 2

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

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

Information for	ballast desi	gn		
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	-
NNN. isu				

* Under consideration.

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Page 1

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

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

	Dimensions -							
, mm								
A	В		С	D				
Max.	Min.	Max.	Max.	Max.				
1199,4	1204,1	1206,5	1213,6	40,5				

	Starting characteristics								
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time			
Hz	w	٧	mm	V	٧	s			
50	40	220	13	8,0	205	10			
60	40	220	13	8,0	205	10			

Electrical characteristics							
Frequency	Rated wattage	Voltage	Rated lamp current				
Hz	w 💋	Rated	Minimum	Maximum	A		
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.)	Resistance of each cathode Ω				
		Rated	Minimum			
High resistance	8,0	20	14			

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Page 2

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

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

Information fo	r ballast desi	gn			
Frequency Hz 50					
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	C	Ω	19	19	
Voltage to starting	V	Min. (peak)	*	*	
Current in any lead to cathodes	O A	Max.	0,750	0,750	
NNWLISU					

* Under consideration.

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Page 1

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

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

		Dimensions		
		mm		
Α	В		С	D
Max.	Min.	Max.	Max.	Max.
1500,0	1504,7	1507,1	1514,2	40,5

	Starting characteristics								
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time			
Hz	w	٧	mm	v	V	s			
50	65	220	13	8,0	220	10			
60	-	- 6) -	-		_			

		Electrical ch	aracteristics		
Frequency	Rated wattage	Voltage	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.

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Page 2

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

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				
Preheat cathode voltage V	Min. (r.m.s.)	6,5	-				
	Max. (r.m.s.)	1 1,0	_				
Open circuit voltage across lamp	Min. (r.m.s.)	220	_				
	Max. (peak)	475	_				
Substitution resistor for each cathode	Ω	11	_				
Voltage to starting aid	Min. (peak)	*	_				
Current in any lead to cathodes	Max.	1,100	_				
NNN.lisulli							

* Under consideration.

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

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

		Dimensions		
		mm		
Α	E	3	С	D
Max.	Min.	Max.	Max.	Max.
1763,8	1768,5	1770,9	1778,0	40,5

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

	Electrical characteristics						
Frequency	Rated wattage	Voltage	Rated lamp current				
Hz	w (Rated	Minimum	Maximum	Α		
50	75	130	120	140	0,670		
60	_	_	-	_	-		

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

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

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

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

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

Information for ballast des	ign		
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	Min. (peak)	*	_
Current in any lead to cathodes	Max.	1,100	_
NWW.Lisu.			

* Under consideration.

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Mainly intended for replacement purposes.

· ILCOS: FD-80-L/P/H-G13-38/1500

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w	:			mm
80	Starterless	Preheated, high resistance	G13	38 × 1500

		Dimensions					
	mm						
Α	В		С	D			
Max.	Min.	Max.	Max.	Max.			
1500,0	1504,7	1507,1	1514,2	40,5			

	Starting characteristics								
Frequency	Ballast, nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time			
Hz	w	٧	· mm	٧	V	s			
50	80	240	13	8,0	220	10			
60	-	-, C	O -	-	_	_			

	Electrical characteristics						
Frequency	Rated wattage	Voltag	Rated lamp current				
Hz	W	Rated	Minimum	Maximum	Α		
50	76	99	89	109	0,870		
60	_	_	_	-	_		

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

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

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

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

Information for	ballast desig	gn		
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	>	Min. (peak)	*	-
Current in any lead to cathodes	А	Max.	1,600	-
NNNLISU				

* Under consideration.

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Page 1

Mainly intended for replacement purposes.

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

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

	Dimensions							
	mm							
Α	В		С	D				
Max.	Min.	Max.	Max.	Max.				
1763,8	1768,5	1770,9	1778,0	40,5				

	Starting characteristics							
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time		
Hz	w	٧	mm	V	V	s		
50	85	240	13	8,0	250	10		
60	-	-, C	-	-	-			

	Electrical characteristics						
Frequency	Rated wattage	Voltage	Rated lamp current				
Hz	w	Rated	Minimum	Maximum	A		
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		

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

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

Information for ballast desi	gn		
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	Min. (peak)	*	_
Current in any lead to cathodes	Max.	1,300	-
NNN.LISUIT.			

* Under consideration.

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Page 1

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

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

	Dimensions				
	mm				
В		В		С	D
Min.	Max.	Max.	Max.		
2379,0	2381,4	2388,5	40,5		
	Min.	mm B Min. Max.	mm B C Min. Max. Max.		

	Starting characteristics							
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time		
Hz	w	٧	mm	V	V	s		
50	125	240	13	8,0	315	10		
60	_	-4,65	_	-	-	_		

	Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals V			Rated lamp current		
Hz	W	Rated	Minimum	Maximum	Α		
50	123	149	134	164	0,940		
60	_	_	<u>-</u>	_	_		

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

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

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

	Reference ballast characteristics							
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor			
Hz	w	V	А	Ω				
50	125	350	0,940	300	0,06			
60	_	-	_	-				

Information for balla	st desi	gn		
Frequency	Hz	50	60	
Preheat cathode voltage	٧	Min. (r.m.s.)	6,5	_
		Max. (r.m.s.)	11,0	_
Open circuit voltage across lamp	٧	Min. (r.m.s.)	315	_
		Max. (peak)	*	_
Substitution resistor for each cathode		Ω	11	_
Voltage to starting aid	٧	Min. (peak)	*	_
Current in any lead to cathodes	А	Max.	1,600	
NNNLISUN				

* Under consideration.

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

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

Dimensions						
mm .						
Α	В		С	D		
Max.	Min.	Max.	Max.	Max.		
589,8	594,5	596,9	604,0	34,1		

	Starting characteristics							
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time		
Hz	· w	V	mm	V	V	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	Α	
B.1	50	19	58	52	64	0,360	
B.1	60	19	58	52	64	0,360	
B.2	60	*	Ħ	*	*	*	

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

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

* Under consideration.

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Page 2

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

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

Information for ballast o	lesiç	gn		
Frequency	Hz		50	60
Preheat cathode voltage	٧	Min. (r.m.s.)	3,05	3,05
		Max. (r.m.s.)	5,5	5,5
Open circuit voltage across lamp	٧	Min. (r.m.s.)	180	180
		Max. (peak)	345	345
Substitution resistor for each cathode		Ω	9	9
Voltage to starting aid	٧	Min. (peak)	*	*
Current in any lead to cathodes	Α	Max.	0,650	0,650
NNN.isuli				

* Under consideration.

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Page 1

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
20	Starterless	Preheated, low resistance	G13	38 × 600

		Dimensions		
		mm		
Α	В		С	D
Max.	Min.	Max.	Max.	Max.
589,8	594,5	596,9	604,0	40,5

			Starting characte	eristics		
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time
Hz	w	٧	mm	V	٧	s
50	40	220	13	3,05	180	10
60	40	220	13	3,05	180	10

		. 11.	Electrical chara	cteristics		
Test method	Frequency	Rated wattage	wattage Voltage (r.m.s.) at lamp terminals			
Annex	Hz	w	Rated	Minimum	Maximum	Α
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		
		Rated	Minimum	
Low resistance	3,6	10	7	

* Under consideration.

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

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

Information for b	allast desig	gn .		
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	٧	Min. (r.m.s.)	180	180
		Max. (peak)	345	345
Substitution resistor for each cathode	C	Ω	9	9
Voltage to starting aid	٧	Min. (peak)	*	*
Current in any lead to cathodes	A	Max.	0,650	0,650
NWW.Lisul				

* Under consideration.

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

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

	Dimensions		
	mm		
В		С	D
Min.	Max.	Max.	Max.
899,3	901,7	908,8	40,5
	Min.	mm B Min. Max.	mm B C Min. Max. Max.

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

	Electrical characteristics								
Test method	Frequency	Rated wattage	Voltag	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	athode Test voltage (r.m.s.)		f each cathode			
		Rated	Minimum			
Low resistance	3,6	10	7			

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Page 2

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

	Reference ballast characteristics							
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor			
Hz	w	V	Α	Ω				
50	30	220	0,405	460	0,10			
60	*	*	. •	*	*			

Information for b	pallast desig	gn		
Frequency		Hz	50	60
Preheat cathode voltage	٧	Min. (r.m.s.)	3,05	3,05
		Max. (r.m.s.)	5,5	5,5
Open circuit voltage across lamp	٧	Min. (r.m.s.)	205	205
		Max. (peak)	420	420
Substitution resistor for each cathode		Ω	9	9
Voltage to starting aid	٧	Min. (peak)	*	•
Current in any lead to cathodes	Ą	Max.	0,750	0,750
NNN.LISU!	•			

* Under consideration.

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

Nominal wattage Circuit		Cathode	Сар	Nominal dimensions	
w	<u> </u>			mm	
40	Starterless	Preheated, low resistance	G13	32 × 1200	

		Dimensions			
		mm			
Α	В		С	D	
Max.	Min.	Max.	Max.	Max.	
1199,4	1204,1	1206,5	1213,6	34,1	

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

			Electrical chara	cteristics		
Test method	Frequency	Rated wattage	Voltag	Rated lamp current		
Annex	Hz	w	Rated	Minimum	Maximum	Α
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		

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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 b	allast desig	gn	·	
Frequency	50	60		
Preheat cathode voltage	٧	Min. (r.m.s.)	3,05	3,05
		Max. (r.m.s.)	5,5	5,5
Open circuit voltage across lamp	٧	Min. (r.m.s.)	205	205
		Max. (peak)	420	420
Substitution resistor for each cathode	C	Ω	9	9
Voltage to starting aid	٧	Min. (peak)	*	*
Current in any lead to cathodes	O A	Max.	0,750	0,750
NNN.LISUN	•			

* Under consideration.

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

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

	Dimensions			
	mm			
В		С	D	
Min.	Max.	Max.	Max.	
1204,1	1206,5	1213,6	40,5	
	Min.	B Min. Max.	mm B C Min. Max. Max.	

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

	Electrical characteristics							
Test method	Frequency	Rated wattage	Voltag	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.)	Resistance of each cathode				
		Rated	Minimum			
Low resistance	3,6	10	7			

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Page 2

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

	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	or ballast desig	gn		
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
NNNLISU				

* Under consideration.

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

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

		Dimensions						
	mm							
Α		В		D				
Max.	Min.	Max.	Max.	Max.				
1500,0	1504,7	1507,1	1514,2	40,5				

	Starting characteristics							
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time		
Hz	w	٧	mm	V	V	s		
50	65	220	13	3,05	220	10		
60	_		\	_	-	-		

	Electrical characteristics							
Test method	Frequency	Rated wattage	Voltag	e (r.m.s.) at lamp	terminals	Rated lamp current		
Annex	Hz	w	Rated	Minimum	Maximum	Α		
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			

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

Reference ballast characteristics									
Frequency	Frequency Nominal wattage Rated voltage Calibration current Voltage/current ratio								
Hz	w	V	A	Ω					
50	65	220	0,670	240	0,10				
60	_	-	-	_	_				

Information for ballast design							
Frequency		Hz	50	60			
Preheat cathode voltage	٧	Min. (r.m.s.)	3,05	_			
		Max. (r.m.s.)	5,5	-			
Open circuit voltage across lamp	٧	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	А	Max.	1,100	_			
NNN. ISUN							

* Under consideration.

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

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

Dimensions							
mm							
Α	E	3	С	D			
Max.	Min.	Min. Max.		Max.			
2374,3	2379,0	2381,4	2388,5	40,5			

	Starting characteristics								
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time			
Hz	w	٧	mm	V	V	s			
50	85	240	13	3,05	325	10			
60		-	<u> </u>	_	ı	-			

	Electrical characteristics								
Test method	Frequency	Rated wattage	Voltag	Voltage (r.m.s.) at lamp terminals V					
Annex	Hz	w	Rated Minimum Maximum						
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.)		of each cathode				
		Rated	Minimum				
Low resistance	3,6	6	4				

* Under consideration.

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

	Reference ballast characteristics								
Frequency Nominal wattage Rated voltage Calibration current Voltage/current ratio									
Hz	w	V	A	Ω					
50	85	350	0,550	480	0,06				
60	_	-	-	_	_				

Information for ballast design							
Frequency		Hz	50	60			
Preheat cathode voltage	٧	Min. (r.m.s.)	3,05	_			
		Max. (r.m.s.)	5,5	_			
Open circuit voltage across lamp	٧	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	Α	Max.	*	_			
NNN. isultisulti							

* Under consideration.

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

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

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

	Starting characteristics								
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time			
Hz	w	V	um	V	V	s			
50	-	_	_	_	-	· -			
60	60		13	3,05	205	10			

	Electrical characteristics							
Test method	Frequency	Rated wattage	Volta	terminals	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.

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

Reference ballast characteristics						
Frequency	Nominal wattage	Rated voltage	Calibration current	Voltage/current ratio	Power factor	
Hz	w	V	A	Ω		
50	_	-		-	<u> </u>	
60	60	230	0,800	244	0,075	

Information f	for ballast desig	gn		
Frequency	50	60		
Preheat cathode voltage	V	Min. (r.m.s.)	_	*
		Max. (r.m.s.)	<u> </u>	•
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	А	Max.	_	
NNN.is				

* Under consideration.

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

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

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

	Starting characteristics							
	Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time	
	Hz	w	V	mm	V	V	s	
ĺ	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	
Аппех	НΣ	w	Rated	Minimum	Maximum	Α	
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.

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Page 2

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

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

Information for ballast design							
Frequency	Frequency Hz						
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 cathode	A	Max.		*			
NNN.lisul							

* Under consideration.

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

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
112	Starterless	Preheated, low resistance	R17d	38 × 2400

	Dimensions	
	mm ·	
С	С	
Min.	Max.	Max.
2380,4	2385,2	40,5

			Starting charact	eristics		
Frequency	Ballast nominal wattage	Ballast rated voltage	Starting aid distance	Cathode voltage (r.m.s.)	Open circuit voltage (r.m.s.)	Starting time
Hz	· w	V	um	V	V	s
50	-	-	Ì	_	_	_
60	112		13	3,05	315	10

		N	Electrical chara	cteristics		
Test method	Frequency	Rated wattage	Voltag	e (r.m.s.) at lamp t	terminals	Rated lamp current
Annex	HΣ	w	Rated	Minimum	Maximum	Α
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.

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Page 2

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

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

Information fo	r ballast desiç	gn		
Frequency		Hz	50	60
Preheat cathode voltage	V	Min. (r.m.s.)	_	3,05
		Max. (r.m.s.)	U -	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	А	Max.		*
NNN. isu				

* Under consideration.

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Page 1

ILCOS: FDH-6-L/P-W4.3×8.5d-7/220

Nominal wattage W	Circuit	Cathode	Сар	Nominal dimensions mm
6	HF starterless	Preheated	W4.3×8.5d	7×220

	Dimer	sions	
	mı	n	
	С	D .	
Min.	Max.	Max.	
217,3	219,3	7,0	

		Starting cha	aracteristics	- U	
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time
kHz	mm	· A	s	(r.in.s.)	s
25	12	0,120*	1,5	355	0,1

		Electrical cha	aracteristics**		
Frequency	Rated wattage W	Volta	age (r.m.s.) at lamp term V	ninals	Rated lamp current
N IZ	VV	Rated	Minimum	Maximum	,
25	5,0	51	46	56	0,100

Chromaticity coordinates: see D.2, annex D.

	1.	Cathode char	racteristics	
Test current			Resistance of each cathode	
	11		Ω	
A		Rated	Min.	Max.
0,060*	74	50*	40*	60*

- * Under consideration.
- ** Rated values of lamp characteristics at 25 kHz are to be multiplied by factor x_1 for wattage and voltage and x_2 for luminous flux in order to receive the respective values at $(47,5 \pm 2,5)$ kHz. The factors are based on unmodulated sine-wave voltage supply. Present value: $x_1 = 1,04$; values for x_2 are to be specified in the manufacturer's literature.

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60081-IEC-6030-1

Page 2

ILCOS: FDH-6-L/P-W4.3×8.5d-7/220

Reference ballast characteristics					
Frequency	Nominal wattage	Rated voltage	Calibration current	Resistance	
kHz	l w	V	Α	Ω	
25	6,0	220	0,100	1690	

Information for high-frequency ballast design				
Frequency		kHz	≥ 20	
Current in any lead to cathodes**	A	Max.	0,150*	
Lamp operating current	Α	Min.	0,090*	
		Max.	0,110*	

Current controlled p	reheating		
Minimum preheat current i_{k} (A) to emission time t_{e} (s)		а	0,01*
$i_{\rm k} = (a/t_{\rm e} + i_{\rm m}^2)^{0.5}$		i _m (A)	0,085*
Maximum preheat current	A ↑ 1≤0,4	0,2	200*
	0,4 < t < 2,0	0,220 -	0,050 t*
	t≥2,0	0,	120*
Open circuit voltage across lamp	V t≤t _e	Max. (r.m.s.)	200*
	t > t _e	Min. (r.m.s.)	355*
Substitution resistor for each cathode		Ω	85*

Voltage controlled preheating
•

Under consideration.

** In case a ballast is constructed so that an additional current flows through the cathode, this current is limited to 0,060 A.

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Page 1

ILCOS: FDH-8-L/P-W4.3×8.5d-7/320

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
W				mm
8	HF starterless	Preheated	W4.3×8.5d	7 × 320

		Dimensions		
		mm		
	0		D	
Min.	Max.		Max.	
318,9	320,9		7,0	

		Starting cha	aracteristics		
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time
kHz	mm	Α	s	(I.III.S.) V	s
25	12	0,120*	1,5	370	0,1

		Electrical cha	aracteristics**		
Frequency Rated wattage		Voltage (r.m.s.) at lamp terminals V		Rated lamp current	
MIZ	W	Rated	Minimum	Maximum	
25	7,8	79	71	87	0,100

Chromaticity coordinates: see D.2, annex D.

	Cathode ch	aracteristics	
Test current	1	Resistance of each cathode	
. 1		Ω	
Α	Rated	Min.	Max.
0,060*	50*	40*	60*

- * Under consideration.
- ** Rated values of lamp characteristics at 25 kHz are to be multiplied by factor x_1 for wattage and voltage and x_2 for luminous flux in order to receive the respective values at (47,5 ± 2,5) kHz. The factors are based on unmodulated sine-wave voltage supply. Present value: $x_1 = 1,04$; values for x_2 are to be specified in the manufacturer's literature.

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Page 2

ILCOS: FDH-8-L/P-W4.3×8.5d-7/320

	Reference ballast characteristics						
Frequency	Nominal wattage	Rated voltage	Calibration current	Resistance			
kHz	w	٧	Α	Ω			
25	8,0	220	0,100	1410			

Information for high-fi	requency ballast design		
Frequency		kHz	≥ 20
Current in any lead to cathodes**	A	Max.	0,150*
Lamp operating current	A	Min.	0,090*
		Max.	0,110*

Current controlled pr	eheating			
Minimum preheat current i_k (A) to emission time t_e (s)		~U	а	0,01*
$i_{\rm k} = (a/t_{\rm e} + i_{\rm m}^2)^{0.5}$		0	<u>і</u> п (А)	0,085*
Maximum preheat current	A	t ≤ 0,4		0,200*
		0,4 < t < 2,0	0,2	220 - 0,050 <i>t*</i>
		<i>t</i> ≥ 2,0		0,120*
Open circuit voltage across lamp	V	t≤t _e	Max. (r.m	.s.) 220*
		t > t _e	Min. (r.m.	s.) 370*
Substitution resistor for each cathode	,			Ω 85*

+.	Voltag	e controlled preheating

* Under consideration.

In case a ballast is constructed so that an additional current flows through the cathode, this current is limited to 0,060 A.

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60081-IEC-6040-1

DOUBLE-CAPPED FLUORESCENT LAMP DATA SHEET ILCOS: FDH-11-L/P-W4.3×8.5d-7/420 Nominal wattage Circuit Cathode Cap Nominal dimensions mm 11 HF starterless Preheated W4.3×8.5d 7 × 420

	Dimensions		
	mm		
		D	
Min.	Max.	Max.	
420,5	422,5	7,0	

		Starting cha	Tablonollos		
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time
kHz	mm	Α	s	(I.III.S.) V	s
25	12	0,120*	1,5	390	0,1

		Electrical ch	aracteristics**			
Frequency kHz	Rated wattage W	Volt	Voltage (r.m.s.) at lamp terminals V			
NI IZ	VV	Rated	Minimum	Maximum	1 ^	
25	10,8	C110	100	120	0,100	

	Cathode characteristics					
Test current	Resistance of each cathode					
	Ω .					
A	Rated	Min.	Max.			
0,060*	50*	40*	60*			

Chromaticity coordinates: see D.2, annex D.

- * Under consideration.
- ** Rated values of lamp characteristics at 25 kHz are to be multiplied by factor x_1 for wattage and voltage and x_2 for luminous flux in order to receive the respective values at (47,5 ± 2,5) kHz. The factors are based on unmodulated sine-wave voltage supply. Present value: $x_1 = 1,04$; values for x_2 are to be specified in the manufacturer's literature.

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60081-IEC-6050-1

Page 2

ILCOS: FDH-11-L/P-W4.3×8.5d-7/420

	Reference ballast characteristics						
Frequency	Nominal wattage	Rated voltage	Calibration current	Resistance			
kHz	w	V	Α	Ω			
25	11,0	277	0,100	1670			

Information for high-frequency ballast design						
Frequency		kHz	≥ 20			
Current in any lead to cathodes**	A	Мах.	0,150*			
Lamp operating current	А	Min.	0,090*			
	<u> </u>	Max.	0,110*			

Current controlled p	reheating		
Minimum preheat current i (A) to emission time t (s)	- U	а	0,01*
$i_{\rm k} = (alt_{\rm e} + i_{\rm m}^2)^{0.5}$		i _m (A)	0,085*
Maximum preheat current	A	0,2	200*
	0,4 < t < 2,0	0,220 -	· 0,050 t*
	t≥ 2,0	0,	120*
Open circuit voltage across lamp	V	Max. (r.m.s.)	250*
	t > t _e	Min. (r.m.s.)	390*
Substitution resistor for each cathode	9	Ω	85*

Voltage controlled preheating						
		*				

* Under consideration.

** In case a ballast is constructed so that an additional current flows through the cathode, this current is limited to 0,060 A.

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Page 1

ILCOS: FDH-13-L/P-W4.3×8.5d-7/520

Nominal wattage W	Circuit	Cathode	Сар	Nominal dimensions mm
13	HF starterless	Preheated	W4.3×8.5d	7 × 520

	Dimensions					
mm						
	С	D				
Min.	Max.	Max.				
522,1	524,1	7,0				

	Starting characteristics							
Frequency	Starting aid distance	Preheat current	Preheat time	open circuit voltage	Starting time			
kHz	mm	Α	s O	(r.m.s.) V	s			
25	12	0,120*	1,5	410	0,1			

Γ	Electrical characteristics**						
	Frequency kHz	Rated wattage W	Voltage (r.m.s.) at lamp terminals V			Rated lamp current	
	N. 12	VV	Rated	Minimum	Maximum	^	
Γ	25	13,3	136	122	150	0,100	

Cathode characteristics							
Test current	Test current Resistance of each cathode						
	11	Ω					
Α		Rated	Min.	Max.			
0,060*	74	50*	40*	60*			

Chromaticity coordinates: see D.2, annex D.

- Under consideration.
- ** Rated values of lamp characteristics at 25 kHz are to be multiplied by factor x_1 for wattage and voltage and x_2 for luminous flux in order to receive the respective values at (47.5 ± 2.5) kHz. The factors are based on unmodulated sine-wave voltage supply. Present value: $x_1 = 1,04$; values for x_2 are to be specified in the manufacturer's literature.

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Page 2

ILCOS: FDH-13-L/P-W4.3×8.5d-7/520

Reference ballast characteristics							
Frequency	Nominal wattage	Rated voltage	Calibration current	Resistance			
kHz	w	V	Α	Ω			
25	13,0	310	0,100	1740			

Information for high-frequency ballast design					
Frequency		kHz	≥ 20		
Current in any lead to cathodes**	A	Max.	0,150*		
Lamp operating current	A	Min.	0,090*		
		Max.	0,110*		

Current controlled preheating						
Minimum preheat current i (A) to emission time i (s)		а	*			
$i_{\rm k} = (a/t_{\rm e} + i_{\rm m}^2)^{0.5}$	G T	i _m (A)	0,085*			
Maximum preheat current	A ↑ 1≤0,4	0,	200*			
	0,4 < t < 2,0	0,220	- 0,050 <i>t</i> *			
	t≥2,0	0,	120*			
Open circuit voltage across lamp	V	Max. (r.m.s.)	270*			
	t > t _e	Min. (r.m.s.)	410*			
Substitution resistor for each cathode	9	Ω	85*			

Voltage controlled preheating						
		.*				

Under consideration.

** In case a ballast is constructed so that an additional current flows through the cathode, this current is limited to 0,060 A.

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Page 1

ILCOS: FDH-14-L/P-G5-16/550

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
W 14	HF starterless	Preheated	G5	mm 16 × 550

	Dimensions					
mm						
А	В		С	D		
Max.	Min.	Max.	Max.	Max.		
549,0	553,7	556,1	563,2	17,0		

			Starting characteristic	s	
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time
kHz	mm	Α	s	O'V'	s
20 - 26	6	0,210	2	230	0,1

	Electrical characteristics							
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals			Rated lamp current A			
kHz	W	Rated	Minimum	Maximum				
20 - 26	13,7	82	72	92	0,170			

Chromaticity coordinates: see D.2, annex D.

Ambient test temperature: 35 °C \pm 1 °C (for reference purposes)

Cathode characteristics						
Test current	-	Resistance of each cathode				
1	Ω					
Α •	Rated	Minimum	Maximum			
0,160	40	30	50			

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DOUBLE-CAPPED FLUORESCENT LAMP Page 2 **DATA SHEET** ILCOS: FDH-14-L/P-G5-16/550 Reference ballast characteristics Calibration current Frequency Nominal wattage Rated voltage Resistance W Α Hz Ω 14 500 20 - 26 167 0,170 Information for high-frequency ballast design Frequency kHz ≥ 20 Current in any lead to cathodes Мах. 0,220 Lamp operating current Min. 0,130 Max. 0,205 Current controlled preheating Minimum preheat current i_k (A) to emission time t_e (s) 0,030 $i_k = (a/t_e + i_m^2)^{0.5}$ <u>і</u>п (А) 0,160 Maximum preheat current t ≤ 0,4 0,400 0,4 < t < 2,00,440 - 0,095 t 0,250 *t* ≥ 2,0 Open circuit voltage across lamp 130 t≤t_e Max. (r.m.s.) t > t_e(+10 °C) Min. (r.m.s.) 230 t > t_e (-15 °C) Min. (r.m.s.) 275 Voltage to starting aid t ≤ t_e Max. (peak) t > t_e Min. (peak) Substitution resistor for each cathode 40 Voltage controlled preheating Without preheating Open circuit voltage across lamp Min (r.m.s.) 560 Current through lamp substitution resistor Min. 0,115 Lamp substitution resistor 1100 Substitution resistor for each cathode 9 Ω Cathode current Max. Under consideration.

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Page 1

ILCOS: FDH-21-L/P-G5-16/850

Nominal wattage W	Circuit	Cathode	Cap	Nominal dimensions
21	HF starterless	Preheated	G5	mm 16×850

	Dimensions					
. mm						
А		В		D		
Max.	Min.	Max.	Max.	Max.		
849,0	853,7	856,1	863,2	17,0		

	Starting characteristics							
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time			
kHz	mm	Α	s	, y	s			
20 - 26	6	0,210	2	350	0,1			

Electrical characteristics								
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals			Rated lamp current A			
kHz	W	Rated		Minimum	Maximum			
20 - 26	20,7	123	V	113	133	0,170		

Chromaticity coordinates: see D.2, annex D

Ambient test temperature: 35 °C ± 1 °C (for reference purposes)

Cathode characteristics						
Test current Resistance of each cathode						
7	Ω					
Α 😽	Rated	Minimum	Maximum			
0,160	40	30	50			

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60081-IEC-6530-2

60081 Amend. 1 @ IEC:2000 **DOUBLE-CAPPED FLUORESCENT LAMP** Page 2 **DATA SHEET** ILCOS: FDH-21-L/P-G5-16/850 Reference ballast characteristics Frequency Nominal wattage Rated voltage Calibration current Resistance Ω 20 - 26 21 246 0.170 725 Information for high-frequency ballast design Frequency kHz ≥ 20 Current in any lead to cathodes Max. 0,220 Lamp operating current Min. 0,130 Мах. 0,205 Current controlled preheating Minimum preheat current i_{e} (A) to emission time t_{e} (s) 0,030 $i_{\rm k} = (a/t_{\rm e} + i_{\rm m}^2)^{0.5}$ i₀ (A) 0,160 Maximum preheat current 0,400 t ≤ 0,4 0,4 < t < 2,0 0,440 - 0,095 t 0,250 *t* ≥ 2,0 Open circuit voltage across lamp Max. (r.m.s.) t ≤ t_e 200 t > t_e(+10 °C) Min. (r.m.s.) 340 t > t_e (-15 °C) Min. (r.m.s.) 390 Voltage to starting aid t≤t_a Max. (peak) t > t_e Min. (peak) Substitution resistor for each cathode 40 Voltage controlled preheating Without preheating Open circuit voltage across lamp ٧ Min. (r.m.s.) 600 Current through lamp substitution resistor Α Min. 0,130 Lamp substitution resistor 1315 Substitution resistor for each cathode Ω 9 Cathode current Max.

Under consideration.

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Page 1

ILCOS: FDH-24-L/P-G5-16/550

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
24	HF starterless	Preheated	G5	16 × 550

	Dimensions					
mm						
A	В		С	D		
Max.	Min.	Max.	Max.	Max.		
549,0	553,7	556,1	563,2	17,0		

	Starting characteristics							
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time			
kHz	mm	A [.]	s	N V	s			
20 - 26	6	0,440	2	250	0,1			

	Electrical characteristics							
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals			Rated lamp current			
kHz	w	Rated	Minimum	Maximum	A			
20 - 26	22,5	75	.67	83	0,300			

Chromaticity coordinates: see D.2, annex D.

Ambient test temperature: 35 °C \pm 1 °C (for reference purposes)

Cathode characteristics							
Test current Resistance of each cathode							
72	Ω						
Α \$	Rated	Minimum	Maximum				
0,350	12	9	15				

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60081-IEC-6620-1

DOUBLE-CAPPED FLUORESCENT LAMP Page 2 **DATA SHEET** ILCOS: FDH-24-L/P-G5-16/550 Reference ballast characteristics Rated voltage Nominal wattage Calibration current Resistance Frequency ٧ kHz W Α Ω 24 150 0,300 250 20-26 Information for high-frequency ballast design kHz Frequency ≥ 20 Current in any lead to cathodes Мах. 0,450* Lamp operating current Min. 0,260* Max. 0.425* Current controlled preheating Minimum preheat current ik (A) to emission time te (s) 0,190 а $i_k = (a/t_e + i_m^2)^{0.5}$ 0,330 <u>і</u>т (А) Maximum preheat current 0,900 *♦t* ≤ 0,4 0,4 < t < 2,00,972 - 0,181 t *t* ≥ 2.0 0,610 Open circuit voltage across lamp Max. (r.m.s.) 130 t≤t_e t > te(+10 °C) Min. (r.m.s.) 280 $t > t_{\rm e} (-15 \, ^{\circ}{\rm C})$ Min. (r.m.s.) 350 Voltage to starting aid t≤t_e Max. (peak) $t > t_{\rm e}$ Min. (peak) Substitution resistor for each cathode 12 Voltage controlled preheating Without preheating Open circuit voltage across lamp 560 Min. (r.m.s.) Current through lamp substitution resistor Min. 0,200 Lamp substitution resistor Ω 580 Substitution resistor for each cathode Ω 2,5 Cathode current Max. Under consideration. Texte français au verso French text overleaf Publication CEI 60081 IEC Publication 60081 60081-IEC-6620-1

Page 1

ILCOS: FDH-28-L/P-G5-16/1150

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
W				mm
28	HF starterless	Preheated	G5	16 × 1150

		Dimensions		
		mm		
Α	ï	В	С	D
Max.	Min.	Max.	Max.	Мах.
1149,0	1153,7	1156,1	1163,2	17,0

	Starting characteristics							
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time			
kHz	mm	Α	s	· v	s			
20 - 26	6	0,210	2	375	0,1			

Electrical characteristics						
Frequency	Rated wattage	Volta	ge (r.m.s.) at lamp ter V	minals	Rated lamp current	
kHz	w [Rated	Minimum	Maximum	Α	
20 - 26	27,8	167	150	184	0,170	

Chromaticity coordinates: see D.2, annex D.

Ambient test temperature: 35 °C ± 1 °C (for reference purposes)

	Cathode char	acteristics	
Test current		Resistance of each cathode	
1/2	Ω		
Α Ν	Rated	Minimum	Maximum
0,160	40	30	50

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Page 2

ILCOS: FDH-28-L/P-G5-16/1150

Reference ballast characteristics						
Frequency	Nominal wattage	Rated voltage	Calibration current	Resistance		
kHz	w	V	A	Ω		
20 - 26	28	329	0,170	950		

Information for hig	h-frequency ballast design		
Frequency	***************************************	kHz	≥ 20
Current in any lead to cathodes	A	Max.	0,220
Lamp operating current	A	Min.	0,130
	F	Max.	0,205

Current controlled	l preheating			
Minimum preheat current i_k (A) to emission time t_e (s)		~U	а	0,030
$i_{\rm k} = (a/t_{\rm e} + i_{\rm m}^2)^{0.5}$			i _m (A)	0,160
Maximum preheat current	A	r≤0,4	0,4	100
		0,4 < t < 2,0	0,440 -	0,095 t
		<i>t</i> ≥ 2,0	0,2	250
Open circuit voltage across lamp	7 V	t ≤ t _e	Max. (r.m.s.)	240
		t > t _e (+10 °C)	Min. (r.m.s.)	425
\sim	9	t > t _e (-15 °C)	Min. (r.m.s.)	5 30
Voltage to starting aid	V	t ≤ t _e	Max. (peak)	*
		t > t _e	Min. (peak)	*
Substitution resistor for each cathode			Ω	40

Voltage controlled preheating

*

Without pr	eheating		
Open circuit voltage across lamp	V	Min. (r.m.s.)	650
Current through lamp substitution resistor	Α	Min.	0,135
Lamp substitution resistor	'	Ω	1550
Substitution resistor for each cathode		Ω	9
Cathode current	Α	Max.	*

Under consideration.

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Page 1

ILCOS: FDH-35-L/P-G5-16/1450

1	Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
-	W				mm
	35	HF starterless	Preheated	G5	16 × 1450

	Dimensions					
	mm					
Α	1	В	С	D		
Max.	Min.	Max.	Max.	Max.		
1449,0	1453,7	1456,1	1463,2	17,0		

Starting characteristics					
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time
kHz	mm	Α	s	(V '	s
20 - 26	6	0,210	2	450	0,1

	Electrical characteristics						
Frequency	Rated wattage	Volta	Rated lamp current				
kHz	w	Rated	Minimum	Maximum	Α		
20 - 26	34,7	209	189	229	0,170		

Chromaticity coordinates: see D.2, annex D.

Ambient test temperature: 35 °C ± 1 °C (for reference purposes)

Cathode characteristics					
Test current	Test current Resistance of each cathode				
9	Ω				
Α •	Rated	Minimum	Maximum		
0,160	40	30	50		

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Page 2

ILCOS: FDH-35-L/P-G5-16/1450

	Reference ballast characteristics					
Frequency	Nominal wattage	Rated voltage	Calibration current	Resistance		
kHz	w	V	A	Ω		
20 - 26	35	413	0,170	1200		

Information for high-frequency ballast design						
Frequency		kHz	≥ 20			
Current in any lead to cathodes	А	Max.	0,220			
Lamp operating current	А	Min.	0,130			
		Max.	0,205			

Current controlled	preheating		3-70-A1	
Minimum preheat current i_k (A) to emission time t_e (s)		20	а	0,030
$i_{\rm k} = (a/t_{\rm e} + i_{\rm m}^2)^{0.5}$		O	i _m (A)	0,160
Maximum preheat current	Α	*t≤0,4	0,	400
		0,4 < t < 2,0	0,440	- 0,095 <i>t</i>
		<i>t</i> ≥ 2,0	0,	250
Open circuit voltage across lamp	V	t≤t _e	Max. (r.m.s.)	275
		t > t _e (+10 °C)	Min. (r.m.s.)	530
	9	t > t _e (-15 °C)	Min. (r.m.s.)	700
Voltage to starting aid	V	t ≤ t _e	Max. (peak)	*
. 5	Γ	t > t _e	Min. (peak)	*
Substitution resistor for each cathode			Ω	40

Voltage controlled preheating

*

Without pre	eheating		
Open circuit voltage across lamp	V	Min. (r.m.s.)	800
Current through lamp substitution resistor	A	Min.	0,140
Lamp substitution resistor		Ω	1800
Substitution resistor for each cathode		Ω	9
Cathode current	A	Max.	*

Under consideration.

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60081-IEC-6650-2

Page 1

IL.COS: FDH-39-L/P-G5-16/850

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
W				mm
39	HF starterless	Preheated	G5	16 × 850

		Dimensions		
		mm		
А	В		С	D
Max.	Min.	Max.	Max.	Max.
849,0	853,7	856,1	863,2	17,0

			Starting characteristic	s	
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time
kHz	mm	Α	s	V	s
20 - 26	6	0,440	2	350	0,1

Electrical characteristics						
Frequency	Rated wattage	Voltaç	ge (r.m.s.) at lamp ter V	Rated lamp current		
kHz	w	Rated	Minimum	Maximum	A	
20 - 26	38	112	102	122	0,340	

Chromaticity coordinates: see D.2, annex D.

Ambient test temperature: 35 °C \pm 1 °C (for reference purposes)

Cathode characteristics					
Test current	•	Resistance of each cathode			
, 13	Ω				
A	Rated	Minimum	Maximum		
0,350	12	9	15		

Texte français au verso French text overleaf

60081-IEC-6730-1

DOUBLE-CAPPED FLUORESCENT LAMP Page 2 **DATA SHEET** ILCOS: FDH-39-L/P-G5-16/850 Reference ballast characteristics Frequency Nominal wattage Rated voltage Calibration current Resistance kHz Ω 20 - 26 39 224 0.340 330 Information for high-frequency ballast design Frequency kHz ≥ 20 Current in any lead to cathodes Мах. 0,450* A Lamp operating current Α Min. 0,260 Мах. 0,425 Current controlled preheating Minimum preheat current i_k (A) to emission time t_e (s) 0,190 $i_{\rm k} = (a/t_{\rm e} + i_{\rm m}^2)^{0.5}$ in (A) 0,330 Maximum preheat current •t ≤ 0,4 0,900 0,4 < t < 2,0 0,972 - 0,181 t 0,610 *t* ≥ 2,0 Open circuit voltage across lamp t≤t_e Max. (r.m.s.) 175 t > te(+10 °C) Min. (r.m.s.) 350 t > t_e (-15 °C) Min. (r.m.s.) 390 Voltage to starting aid t≤t_e Max. (peak) t > t_e Min. (peak) Substitution resistor for each cathode 12 Voltage controlled preheating Without preheating Open circuit voltage across lamp Min. (r.m.s.) 600 Current through lamp substitution resistor A Min. 0,25 Lamp substitution resistor Ω 620 Substitution resistor for each cathode Ω 2.5 Cathode current Max. Under consideration.

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Page 1

ILCOS: FDH-49-L/P-G5-16/1450

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
49	HF starterless	Preheated	G5	16 × 1450

Dimensions					
mm					
А	В		С	D	
Max.	Min.	Max.	Max.	Max.	
1449,0	1453,7	1456,1	1463,2	17,0	

	Starting characteristics					
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time	
kHz	mm	Α	s	V	S	
20 - 26	6	0,330	2	450	0,1	

Electrical characteristics						
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals			Rated lamp current	
kHz	w	Rated	Minimum	Maximum	Α	
20 - 26	49,3	191	171	211	0,260	

Chromaticity coordinates: see D.2, annex D.

Ambient test temperature: 35 °C ± 1 °C (for reference purposes)

Cathode characteristics						
Test current	t current Resistance of each cathode					
114	Ω					
Α 🚫	Rated	Minimum	Maximum			
0,260	16,5	12,4	20,6			

Texte français au verso French text overleaf

60081-IEC-6750-1

DOUBLE-CAPPED FLUORESCENT LAMP Page 2 **DATA SHEET** ILCOS: FDH-49-L/P-G5-16/1450 Reference ballast characteristics Frequency Nominal wattage Rated voltage Calibration current Resistance ٧ kHz Ω 20 - 26 49 390 0,255 765 Information for high-frequency ballast design Frequency kHz ≥ 20 Current in any lead to cathodes Мах. 0,330 Lamp operating current Α Min. 0,180 0,295 Max. Current controlled preheating Minimum preheat current i_k (A) to emission time t_e (s) 0,100 а $i_k = (a/t_e + i_m^2)^{0.5}$ in (A) 0,190 Maximum preheat current 0,585 $t \le 0.4$ 0,4 < t < 2,00,650 - 0,160 t *t* ≥ 2,0 0,330 Open circuit voltage across lamp t≤t_e Max. (r.m.s.) 225 $t > t_{\rm e} (+10 \, ^{\circ}{\rm C})$ Min. (r.m.s.) 450 t > te (-15 °C) Min. (r.m.s.) 625 Voltage to starting aid Max. (peak) t≤t_e $t > t_{\rm e}$ Min. (peak) Substitution resistor for each cathode 16,5 Voltage controlled preheating Without preheating Open circuit voltage across lamp Min. (r.m.s.) 800 Current through lamp substitution resistor Min. 0,210 Lamp substitution resistor 1150 Ω Substitution resistor for each cathode Ω 3,5 Cathode current Мах. Under consideration. Texte français au verso French text overleaf Publication CEI 60081 IEC Publication 60081 60081-IEC-6750-1

Page 1

ILCOS: FDH-54-L/P-G5-16/1150

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
W				mm
54	HF starterless	Preheated	G5	16 × 1150

		Dimensions				
· mm						
A		В		D		
Max.	Min.	Max.	Max.	Мах.		
1149,0	1153,7	1156,1	1163,2	17,0		

			Starting characteristics	60	
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time
kHz	mm	Α	s	V V	s
20 - 26	6	0,720	2	520	0,1

	Electrical characteristics						
Frequency	Rated wattage	Voltag	ge (r.m.s.) at lamp ten	Rated lamp current			
kHz	w	Rated	Minimum	Maximum	A		
20 - 26	53,8	118	108	128	0,460		

Chromaticity coordinates: see D.2, annex D.

Ambient test temperature: 35 °C \pm 1 °C (for reference purposes)

Cathode characteristics					
Test current	Resistance of each cathode				
	Ω				
Α 🍑	Rated	Minimum	Maximum		
0,500	8	6	10		

Texte français au verso French text overleaf 60081-IEC-6840-1

DOUBLE-CAPPED FLUORESCENT LAMP Page 2 **DATA SHEET** ILCOS: FDH-54-L/P-G5-16/1150 Reference ballast characteristics Frequency Nominal wattage Rated voltage Calibration current Resistance kHz ٧ Ω 20 - 26 54 235 0,460 255 Information for high-frequency ballast design Frequency kHz ≥ 20 Current in any lead to cathodes Max. 0,650 Lamp operating current Min. 0,370 Max. 0.625 Current controlled preheating Minimum preheat current i_k (A) to emission time t_o (s) 0,450 а $i_k = (a/t_e + i_m^2)^{0.5}$ <u>і</u>п (А) 0,540 Maximum preheat current 1,400 **•***t* ≤ 0,4 0,4 < t < 2,01,525 - 0,313 t *t* ≥ 2,0 0,900 Open circuit voltage across lamp t≤t_e 240 Max. (r.m.s.) t > te(+10 °C) Min. (r.m.s.) 520 t > t_e (-15 °C) Min. (r.m.s.) 620 Voltage to starting aid t≤t_e Max. (peak) $t > t_e$ Min. (peak) Substitution resistor for each cathode 8 Voltage controlled preheating Without preheating Open circuit voltage across lamp $\overline{\mathsf{v}}$ Min. (r.m.s.) 800 Current through lamp substitution resistor Min. 0,340 Lamp substitution resistor 470 Substitution resistor for each cathode Ω 1,7 Cathode current Max. Under consideration. Texte français au verso French text overleaf Publication CEI 60081 IEC Publication 60081 60081-IEC-6840-1

Page 1

ILCOS: FDH-80-L/P-G5-16/1450

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
80	HF starterless	Preheated	G5	16 × 1450

	,	Dimensions		
		mm		
A	В		С	D
Мах.	Min.	Max.	Max.	Мах.
1449,0	1453,7	1456,1	1463,2	17,0

	Starting characteristics					
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time	
kHz	mm	Α	s	N Y	s	
20 - 26	6	0,765	2	580	0,1	

Electrical characteristics							
Frequency	Rated wattage	Voltage (r.m.s.) at lamp terminals			Rated lamp current		
kHz	w	Rated	Minimum	Maximum	A		
20 - 26	80	145	130	160	0,555		

Chromaticity coordinates: see D.2, annex D.

Ambient test temperature: 35 °C ± 1 °C (for reference purposes)

Cathode characteristics							
Test current	Resistance of each cathode						
	Ω						
A \$ 7	Rated	Minimum	Maximum				
0,550	7,0	5,25	8,75				

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DOUBLE-CAPPED FLUORESCENT LAMP Page 2 **DATA SHEET** ILCOS: FDH-80-L/P-G5-16/1450 Reference ballast characteristics Nominal wattage Rated voltage Calibration current Frequency Resistance kHz Ω 20 - 26 80 290 0,552 260 Information for high-frequency ballast design Frequency kHz ≥ 20 Current in any lead to cathodes Мах. 0,715 Lamp operating current A Min. 0,440 Мах. 0,670 Current controlled preheating Minimum preheat current i_k (A) to emission time t_e (s) 0,510 а $i_k = (a/t_e + i_m^2)^{0.5}$ 0,570 i_m (A) Maximum preheat current 1,400 $t \le 0,4$ 0,4 < t < 2,0 1,525 - 0,313 t 0,900 t ≥ 2,0 Open circuit voltage across lamp t≤t_e Max. (r.m.s.) 250 t > t₆(+10 °C) Min. (r.m.s.) 580 t > t_e (-15 °C) Min. (r.m.s.) 750 Voltage to starting aid t≤t_e Max. (peak) *t* > *t*_e Min. (peak) Substitution resistor for each cathode 7,0 Voltage controlled preheating Without preheating Open circuit voltage across lamp V Min. (r.m.s.) 800 Current through lamp substitution resistor Min. 0.425 Lamp substitution resistor 445 Ω Substitution resistor for each cathode Ω 1,5 Cathode current Α Max. Under consideration. Texte français au verso French text overleaf Publication CEI 60081 IEC Publication 60081 60081-IEC-6850-1

Page 1

ILCOS: FDH-16-L/P-G13-26/600

Nominal wattage	Circuit	Cathode	Сар	Nominal dimensions
w				mm
16	HF starterless	Preheated	G13	26 × 600

	Dimensions						
mm							
Α	В		С	D			
Max.	Min.	Max.	Max.	Max.			
589,8	594,5	596,9	604,0	28,0			

	Starting characteristics							
Frequency	Starting aid distance	Preheat current	Preheat time	Open circuit voltage (r.m.s.)	Starting time			
kHz	mm	, A ,	s	V	s			
20 - 26	19	0,510	2	200	0,1			

	··-···································	Electrical cl	naracteristics			
Frequency	Rated wattage	Voltag	Voltage (r.m.s.) at lamp terminals			
kHz	W	Rated	Minimum	Maximum	Α	
20 - 26	16	64	58	70	0,255	

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

	Cathode characteristics						
Test current	Test current Resistance of each cathode						
	Ω						
Α	Rated	Minimum	Maximum				
0,510	15	10	*				

* Under consideration.

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60081-IEC-7220-1

Page 2

ILCOS: FDH-16-L/P-G13-26/600

	Reference ballast characteristics							
Frequency	Nominal wattage	Rated voltage	Calibration current	Resistance				
kHz	W	V	A	Ω				
20 - 26	16	128	0,255	250				

Information for high frequency b	allast desig	n				
Frequency			k⊦	lz	≥ 20	
Current in any lead to cathodes		А	Max.		0,450	
Lamp operating current		Α	Min.		*	
			Max.		*	
Current controlled prehe	ating	c:)			
Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (alt_e + i_m^2)^{0.5}$. •).	а		0,200	
	_ <i>O</i> ,		i _m (A)		0,250	
Maximum preheat current	А	<i>t</i> ≤ 0,4		1,600		
		0,4 <	< 2,0	1,800	0 - 0,500 t	
	t ≥ 2		2,0		0,800	
Open circuit voltage across lamp	٧	t ≤ t _e	Max.	(r.m.s.)	230	
		t > t _e	Min. (r.m.s.)	200	
Voltage to starting aid	V	t ≤ t _e	Max.	(peak)	*	
	Ī	<i>t</i> > <i>t</i> _e	Min.	(peak)	*	
Substitution resistor for each cathode				Ω	10	
		***		<u>-</u>		
Voltage controlled prehe	ating				****	
*						

* Under consideration.

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60081-IEC-7220-1

60081 © IEC:1997 **DOUBLE-CAPPED FLUORESCENT LAMP** Page 1 **DATA SHEET** ILCOS: FDH-32-L/P-G13-26/1200 Nominal wattage Circuit Cathode Сар Nominal dimensions W mm 32 HF starterless Preheated G13 26 × 1200 **Dimensions** mm Α В С D Max. Max. Min. Max. Max. 1199,4 1204,1 1206,5 1213,6 28,0 Starting characteristics Starting aid Preheat current Preheat time Open circuit voltage Frequency Starting time distance (r.m.s.) kHz mm Α 20 - 26 19 0,510 2 240 0,1 Electrical characteristics Rated wattage Rated lamp Voltage (r.m.s.) at lamp terminals Frequency current kHz Rated Minimum Maximum Α 20 - 26 128 118 138 0,255 Chromaticity co-ordinates: see D.2, annex D. Cathode characteristics Test current Resistance of each cathode Α Rated Minimum Maximum 0,510 15 10

* Under consideration.

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60081-IEC-7420-1

Page 2

ILCOS: FDH-32-L/P-G13-26/1200

	Reference ballast characteristics							
Frequency	Nominal wattage	Rated voltage	Calibration current	Resistance				
kHz	w	V	A	Ω				
20 - 26	32	256	0,255	500				

Information for high frequency ballast	desig	ın				
Frequency				kHz	<u>. </u>	≥ 20
Current in any lead to cathodes		A		Max.		0,450
Lamp operating current		Α		Min.		*
			ı	Max.		*
Current controlled preheating		C	J			
Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (a/t_e + i_m^2)^{0.5}$	C) .		а		0,200
	7.		i _r	_n (A)		0,250
Maximum preheat current	Α	<i>t</i> ≤ 0,4			1,600	
		0,4 <	: t < 2,	0	1,800) - 0,500 <i>t</i>
	-) t		<i>t</i> ≥ 2,0		0,800	
Open circuit voltage across lamp	٧	t ≤ t	e	Max. (r.	.m.s.)	280
	Ī	t > t	e	Min. (r.	.m.s.)	240
Voltage to starting aid	V	t ≤ t	e	Max. (p	oeak)	*
	Ī	t > t	e	Min. (p	eak)	*
Substitution resistor for each cathode					Ω	10
N			_			
Voltage controlled preheating						
•						

* Under consideration.

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60081-IEC-7420-1

DOUBLE-CAPPED FLUORESCENT LAMP Page 1 DATA SHEET ILCOS: FDH-50-L/P-G13-26/1500 Nominal wattage Cathode Circuit Сар Nominal dimensions W mm 50 HF starterless Preheated G13 26×1500 Dimensions mm Α В С D Max. Max. Min. Max. Max. 1500,0 1507,1 1504,7 1514,2 28,0 Starting characteristics Preheat time Frequency Starting aid Preheat current Open circuit voltage Starting time distance (r.m.s.) kHz mm 20 - 26 19 0,640 2 280 0,1 Electrical characteristics Rated wattage Voltage (r.m.s.) at lamp terminals Rated lamp Frequency current kHz Rated Minimum Maximum Α 20 - 26 142 132 152 0,355 Chromaticity co-ordinates: see D.2, annex D. Cathode characteristics Test current Resistance of each cathode Ω Rated Minimum Maximum Α 7 0,640 10 * Under consideration. Publication CEI 60081 IEC Publication 60081 Texte français au verso French text overleaf 60081-IEC-7520-1

Page 2

ILCOS: FDH-50-L/P-G13-26/1500

	Reference ballast characteristics							
Frequency	Nominal wattage	Rated voltage	Calibration current	Resistance				
kHz	W	V	A	Ω				
20 - 26	50	284	0,355	400				

Information for high frequency t	allast desig	jn			
Frequency		*****	k	Hz	≥ 20
Current in any lead to cathodes		А	Max.		0,600
Lamp operating current		Α	Min.		*
			Max.		*
Current controlled prehe	eating				
Minimum preheat current i_k (A) to emission time t_e (s) $i_k = (alt_e + i_m^2)^{0.5}$. ().	а		0,310
			i _m (A)		0,320
Maximum preheat current	А	t ≤	0,4		2,200
		0,4 <	t < 2,0	2,50	0 - 0,750 <i>t</i>
		t≥	2,0		1,000
Open circuit voltage across lamp	V	<i>t</i> ≤ <i>t</i> _e	Max.	(r.m.s.)	320
		<i>t</i> > <i>t</i> _e	Min.	(r.m.s.)	280
Voltage to starting aid	V	t ≤ t _e	Max.	(peak)	*
	ļ	<i>t</i> > <i>t</i> _e	Min.	(peak)	*
Substitution resistor for each cathode	, , , , , , , , , , , , , , , , , , ,		!	Ω	7
N					
Voltage controlled prehe	ating				
*					

* Under consideration.

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60081-IEC-7520-1

ILCOS: FD-20-L/N-Fa6-38/600

Nominal wattage W	Circuit	Cathode	Сар	Nominal dimensions mm
20	Starterless	Non-preheated	Fa6	38 × 600

	Dimensions mm	
С		D
Min.	Max.	Max.
606,5	611,0	40,5

	Starting characteristics	
Frequency	Open circuit voltage (r.m.s.)	Starting time
Hz	v	s
50	190	10
60		. -

Electrical characteristics							
Frequency	rcy Rated wattage Voltage (r.m.s.) at lamp terminals				Rated lamp current		
Hz	w	Rated	Minimum	Maximum	Α		
50	20	58	51	65	0,380		
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	Α	Ω			
50	20	127	0,370	270	0,12		
60		-	_	_	-		

Information for ballast design					
Frequency		Hz	50	60	
Open circuit voltage across lamp	t voltage across lamp V Min. (r.m.s.) 190 -				

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60081-IEC-8240-1

ILCOS: FD-40-L/N-Fa6-38/1200

Nominal wattage W	Circuit	Cathode	Сар	Nominal dimensions mm
40	Starterless	Non-preheated	Fa6	38 × 1200

Dimensions mm					
Min.	Max.	Max.			
1216,0	1220,5	40,5			

Starting characteristics						
Frequency	Open circuit voltage (r.m.s.)	Starting time				
Hz	V	s				
50	205	10				
60	- (0					

		Electrical	characteristics		
Frequency	Rated wattage	Voltag	Rated lamp current		
Hz	w	Rated	Minimum	Maximum	A
50	39,5	109	99	119	0,425
60	- 1	_	_	_	

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	Α	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	. —		

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60081-IEC-8440-1

60081 © IEC:1997 **DOUBLE-CAPPED FLUORESCENT LAMP DATA SHEET** ILCOS: FD-65-L/N-Fa6-38/1500 Nominal wattage Circuit Cathode Nominal dimensions Сар W mm 65 Starterless Non-preheated Fa6 38×1500 **Dimensions** mm С D Min. Max. Max. 1516,6 1521,1 40,5 Starting characteristics Open circuit voltage (r.m.s.) Starting time Frequency Hz 50 190 10 60 Electrical characteristics Frequency Rated wattage Voltage (r.m.s.) at lamp terminals Rated lamp current Hz W Rated **Minimum** Maximum Α 50 110 120 64 100 0,670 60 Chromaticity co-ordinates: see D.2, annex D. Reference ballast characteristics Nominal wattage Rated voltage Calibration Voltage/current Power factor Frequency current ratio Ηz W Α Ω 50 65 220 0,670 240 0,10 60 Information for ballast design Frequency Ηz 50 60 Min. (r.m.s.) 190 Open circuit voltage across lamp

60081-IEC-8540-1

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ILCOS: FD-39-L/N-Fa8-38/1200

Nominal wattage W	Circuit	Cathode	Сар	Nominal dimensions mm
39	Starterless	Non-preheated	Fa8	38 × 1200

	Dimensions					
		mm				
Α	В		С	D		
Max.	Min.	Max.	Max.	Max.		
1150,6	1153,7	1159,5	1168,4	40,5		

	Starting characteristics	
Frequency	Open circuit voltage (r.m.s.)	Starting time
Hz	V	s
50	- 0	
60	385	10

	Electrical characteristics						
Frequency	Rated wattage	Volta	Voltage (r.m.s.) at lamp terminals V				
Hz	w	Rated	Minimum	Maximum	Α		
50	_	1 + -	_		_		
60	39	100	90	110	0,425		

Chromaticity co-ordinates:

	Reference ballast characteristics					
Frequency Hz	Nominal wattage	Rated voltage V	Calibration current A	Voltage/current ratio	Power factor	
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.

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60081-IEC-8640-1

ILCOS: FD-57-L/N-Fa8-38/1800

Nominal wattage W	Circuit	Cathode	Сар	Nominal dimensions
57	Starterless	Non-preheated	Fa8	38 × 1800

	Dimensions						
	mm						
Α	В		С	D			
Max.	Min.	Max.	Max.	Max.			
1760,2	1763,3	1769,1	1778,2	40,5			

Starting characteristics						
Frequency	Open circuit voltage (r.m.s.)	Starting time				
Hz	V	. s				
50		· <u>-</u>				
60	475	10				

	Electrical characteristics							
Frequency	Frequency Rated wattage Voltage (r.m.s.) at lamp terminals							
Hz	w. U	Rated	Minimum	Maximum	Α			
50	.4	. <u>-</u>	_	_	<u>.</u>			
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		

Informatio	on for ballast de	sign		
Frequency		Hz	50	60
Open circuit voltage across lamp	V	Min. (r.m.s.)	_	475

* Under consideration.

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60081-IEC-8740-1

Page 1

ILCOS: FD-75-L/N-Fa8-38/2400

Nominal wattage W	Circuit	Cathode	Сар	Nominal dimensions mm
75	Starterless	Non-preheated	Fa8	38 × 2400

		Dimensions				
		mm				
Α	В		АВ		С	D
Max.	Min.	Max.	Max.	Max.		
2369,8	2372,9	2378,7	2387,6	40,5		

	Starting characteristics	3
Frequency	Open circuit voltage (r.m.s.)	Starting time
Hz	V	S
50	- 0	
60	565	10

		Electrical	characteristics			
Frequency	Rated wattage	Volta	Voltage (r.m.s.) at lamp terminals V			
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	Α	Ω		
50		_	_	_	_	
60	75	625	0,425	1280	0,075	

Infor	mation for ballast de	esign		······································
Frequency		Hz	50	60
Open circuit voltage across lamp	V	Min. (r.m.s.)		565

* Under consideration.

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60081-IEC-8840-1

ILCOS: FDH-32-L/N-Fa6-26/1200

Nominal wattage W	Circuit	Cathode	Сар	Nominal dimensions mm
32	HF starteriess	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.)	Starting time
20 - 26	800	0,1

	Electrical characteristics					
Frequency	Rated wattage	Voltage	Voltage (r.m.s.) at lamp terminals V			
kHz	w 🐧	Rated	Minimum	Maximum	Α	
20 - 26	32	102	92	112	0,320	

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

	Reference ballast characteristics				
Frequency	Nominal wattage	Rated voltage	Calibration current	Resistance	
kHz	W	V	A	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	Α	Min.	0,200
Lamp substitution resistor		Ω	1000
Lamp operating current	Α	· Min.	*
		Max.	*

* Under consideration.

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ILCOS: FDH-50-L/N-Fa6-26/1500

Nominal wattage W	Circuit	Cathode	Сар	Nominal dimensions mm
50	HF starterless	Non-preheated	Fa6	26 × 1500

	Dimensions	
	mm	
C	C	
Min.	Max.	Max.
1516,6	1521,1	28,0

	Starting characteristics	C
Frequency	Open circuit voltage (r.m.s.)	Starting time
kHz	V	S
20 - 26	800	0,1

		Electrical cl	naracteristics				
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.

	Refe	rence ballast character	ristics	
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	٧	Min. (r.m.s.)	800
Current through lamp substitution resistor	Α	Min.	0,250
Lamp substitution resistor		Ω	800
Lamp operating current	Α	Min.	*
		Max.	*

Under consideration.

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