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SPECIFICATION FOR LUMINAIRES

PART I GENERAL REQUIREMENTS

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Indian Standard

SPECIFICATION FOR LUMINAIRES

PART I GENERAL REQUIREMENTS

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SPECIFICATION FOR LUMINAIRES

PART I GENERAL REQUIREMENTS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 20 October 1982, after the draft finalized by the Illuminating Engineering Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard (Part I) is one of the series of Indian Standards which deal with luminaires. This series consists of the following parts:

Part I General requirements,

Part II Constructional requirements,

Part III Screw and screwless terminals,

Part IV Methods of tests, and

Part V Particular requirements.

0.3 In general, Parts I, II, III and IV of this standard cover safety requirements for luminaires. The object of these parts is to provide a set of requirements and tests which are considered to be generally applicable to most types of luminaires and which can be called up as required by the detail specifications under Part V. Parts I, II, III and IV are thus not to be regarded as specifications by themselves for any type of luminaire, and their provisions apply only to particular types of luminaires to the extent determined by the appropriate section of Part V.

0.4 The sections of Part V, in making reference to any other parts of the standard, specify the extent to which that section is applicable and the order in which the tests are to be performed; they also include additional requirements as necessary. The order in which the clauses in Parts I, II, III and IV are numbered, therefore, has no particular significance as the order in which their provisions apply is determined for each type of luminaires or group of luminaires by the appropriate section of Part V. All sections of Part V are self-contained and therefore do not contain references to other sections of Part V.

0.5 A luminaire shall comply with a section of Part V. If, however, an appropriate section of Part V does not exist for a particular luminaire or group of luminaires, the nearest applicable section of Part V may be used as a guide to the requirements and tests.

0.6 This standard is intended to establish essential requirements of general nature and minimum standard for design and construction of lighting fittings in order to ensure their safe performance, good construction and high class of workmanship. This standard, therefore, along with other appropriate Parts of this standard, will ultimately replace IS : 1913 (Part I)-1978*.

0.7 In the preparation of this standard assistance has been derived from IEC Publication : 598-1-1979 : Luminaires Part I General requirements and tests, published by the International Electrotechnical Commission.

0.8 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This standard (Part I) specifies the general requirements for luminaires for use with tungsten filament, tubular fluorescent and other discharge lamps on supply voltage not exceeding 1 000 V.

2. DEFINITIONS

2.1 Luminaire — Apparatus which distributes, filters or transforms the light transmitted from one or more lamps and which includes all the parts necessary for supporting, fixing and protecting the lamps, but not the lamps themselves, and where necessary circuit auxiliaries together with the means for connecting them to the supply.

2.2 Main Part (of Luminaire) — That which is fixed to the mounting surface or is directly suspended from it or standing on it (it may or may not carry the lamps, lampholders and auxiliary gear).

NOTE — In luminaires for tungsten filament lamps, the part carrying the lampholder is normally the main part.

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*Specification for general and safety requirements for luminaires: Part I Tubular fluorescent lamps (*second revision*).

†Rules for rounding off numerical values (*revised*).

2.3 Ordinary Luminaire — A luminaire without special protection against dust or moisture.

2.4 General Purpose Luminaire — A luminaire which is not designed for a special purpose. Examples of general purpose luminaires are pendants, fixed luminaires for surface mounting and spotlights. Examples of special purpose luminaires are those for rough usage, photo and film applications and swimming pools.

2.5 Adjustable Luminaire — A luminaire, the main part of which can be turned or moved by means of joints, raising and lowering devices, telescopic tubes or other similar devices.

NOTE — An adjustable luminaire may be fixed or portable.

2.6 Basic Luminaire — The smallest number of assembled parts that can satisfy the requirements of any of the sections of Part IV of this standard.

2.7 Combination Luminaire — A luminaire consisting of a basic luminaire in combination with one or more parts which may be replaced by other parts, or used in a different combination with other parts and changed either by hand or with the use of tools.

2.8 Fixed Luminaire — A luminaire which cannot easily be moved from one place to another, either because the fixing is such that the luminaire can be removed only with the aid of a tool, or because it is intended for use out of easy reach.

NOTE — Ceiling luminaires and pendants are examples of luminaires intended for use out of easy reach. In general, fixed luminaires are designed for permanent connections to the supply by means of terminals with screw clamping, but connections may be made by means of a plug and socket outlet.

2.9 Portable Luminaire — A luminaire which can easily be moved from one place to another while connected to the supply.

NOTE — Laminaire for wall mounting provided with a non-detachable flexible cable or cord and a plug for supply connection and luminaires which may be fixed to their support by means of a wing screw, a clip or a hook so that they can easily be removed from their support by hand, are considered to be portable luminaires.

2.10 Recessed Luminaire — A luminaire intended by the manufacturer to be fully or partly recessed into a mounting surface. The term applies both to luminaires for operation in enclosed cavities and to luminaires for mounting through a surface such as a suspended ceiling.

2.11 Rated Voltage — The supply voltage or voltages assigned to the luminaire by the manufacturer.

2.12 Nominal Current — The current at the supply terminals when the luminaire has stabilized in normal use at the rated voltage and frequency.

2.13 Rated Wattage — The number and rated wattage of the lamps for which the luminaire is designed.

2.14 Non-detachable Flexible Cable or Cord — A flexible cable or cord which can be removed from the luminaire only with the aid of a tool.

2.15 Live Part — A conductive part which may cause an electric shock in normal use. The neutral conductor shall, however, be regarded as a live part.

2.16 Basic Insulation — Insulation applied to live parts to provide basic protection against electric shock.

NOTE — Basic insulation does not necessarily include insulation used exclusively for functional purposes.

2.17 Supplementary Insulation — Independent insulation applied in addition to basic insulation in order to provide protection against electric shock in the event of a failure of basic insulation.

2.18 Double Insulation — Insulation comprising both basic insulation and supplementary insulation.

2.19 Reinforced Insulation — A single insulation system applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation.

NOTE — The term 'insulation system' does not imply that the insulation must be one homogeneous piece. It may comprise several layers which can not be tested singly as supplementary or basic insulation.

2.20 Class 0 Luminaire (Applicable to Ordinary Luminaires Only) — A luminaire in which protection against electric shock relies upon basic insulation; this implies that there are no means for the connection of accessible conductive parts, if any, to the protective conductor in the fixed wiring of the installation, reliance in the event of a failure of the basic insulation being placed upon the environment.

NOTE 1 — Class 0 luminaires may have either an enclosure of insulating material which forms a part of the whole of the basic insulation or a metal enclosure which is separated from live parts by at least basic insulation.

NOTE 2 — If a luminaire with an enclosure of insulating material has provision for earthing internal parts, it is Class I.

NOTE 3 — Class 0 luminaires may have parts with double insulation or reinforced insulation.

2.21 Class I Luminaire — A luminaire in which protection against electric shock does not rely on basic insulation only, but which includes an additional safety precaution in such a way that means are provided for the connection of accessible conductive parts to the protective (earthing) conductor in the fixed wiring of the installation in such a way that accessible conductive parts cannot become live in the event of a failure of the basic insulation.

NOTE — For a luminaire intended for use with the flexible cord or cable, this provision includes a protective conductor as a part of the flexible cord or cable and a three pin plug which can be introduced into a socket outlet with earthing contact.

2.22 Class II Luminaire — A luminaire in which protection against electric shock does not rely on basic insulation only, but in which additional safety precautions such as double insulation or reinforced insulation are provided, there being no provision for protective earthing or reliance upon installation conditions.

NOTE 1 — Such a luminaire may be of one of the following types:

a) A luminaire having a durable and substantially continuos enclosure of insulating material which envelopes all metal parts with the exception of small parts, such as nameplates, screws and rivets which are isolated from live parts by insulation at least equivalent to reinforced insulation Such a luminaire is called an insulation-encased Class II luminaire.

b) A luminaire having a substantially continuous enclosure of metal, in which double insulation is used throughout except for those parts where reinforced insulation is used because the application of double insulation is manifestly impracticable. Such a luminaire is called a metal-encased Class II luminaire.

c) A luminaire which is a combination of types (a) and (b).

NOTE 2 — The enclosure of an insulation-encased Class II luminaire may form a part of the whole of the supplementary insulation or the reinforced insulation.

NOTE 3 — If earthing is provided to assist starting, but is not connected to an accessible metal part, the luminaire may still be deemed to be of Class II. Lamp caps shells and starting stripes on lamps are not regarded as accessible metal parts unless the tests show them to be live parts.

NOTE 4 — If a luminaire with double insulation and/or reinforced insulation throughout has an earthing terminal or an earthing contact, it is Class I construction. However, a fixed Class II luminaire intended for looping-in may have an internal terminal for maintaining the electrical continuity of an earthing conductor not terminating in the luminaire, provided that the terminal is insulated from accessible metal parts by Class II insulation.

2.23 Class III Luminaire — A luminaire in which protection against electric shock relies on supply at safety extra-low voltage (SELV) and in which voltages higher than those of SELV are not generated.

NOTE — A Class III luminaire need not be provided with means for protective earthing.

2.24 Rated Maximum Ambient Temperature — The temperature assigned to a luminaire by the manufacturer to indicate the highest sustained temperature in which the luminaire may be operated under normal conditions.

Symbol : t_a .

NOTE — This does not preclude temporary operation at a temperature not exceeding (t_a + 10)°C.

2.25 Rated Maximum Operating Temperature (of a Capacitor) — The highest permissible temperature which may occur at any place on the outer surface of the capacitor under normal operating conditions.

Symbol : t_c.

2.26 Rated Maximum Operating Temperature (of a Winding) — The operating temperature of a ballast winding which gives an expectancy of 10 years' continuous service (at that temperature).

Symbol : t_w.

2.27 Ballast — A unit inserted between the supply and one or more discharge lamps which by means of inductance, capacitance or resistance, singly or in combination, serves mainly to limit the current of the lamp(s) to the required value.

It may also include means for transforming from the supply voltage and arrangements which help to provide starting voltage and preheating current, prevent cold starting, reduce stroboscopic effect, correct the power factor and suppress radio interference.

2.28 Independent Ballast — A ballast consisting of one or more separate elements so designed that it or they, can be mounted separately outside a luminaire with protection according to its marking and without any additional enclosure.

2.29 Built in Ballast — A ballast generally designed to be built into a luminaire but incapable of being mounted outside a luminaire without special precautions.

2.30 Integral Lampholder — A part of a luminaire which supports the lamp and provides electrical contact with it and which is designed as part of the luminaire.

2.31 Starter — A device other than a manually-operated switch which closes or opens the preheating circuit of a fluorescent or discharge lamp for the purpose of starting the lamp.

NOTE — A different device known as an ignitor is used for starting high-pressure discharge lamps but it is not defined at present.

2.32 Ballast Compartment — That part of the luminaire in which the ballast is intended to be mounted.

2.33 Translucent Cover — The light transmitting parts of the luminaire which may also protect the lamps and other component parts. This term includes diffusers, lens panels and similar light-control elements.

2.34 Supply Cable — A cable which is part of the fixed installation to which the luminaire is connected.

NOTE — Supply cables may be brought into the luminaire and connected to terminals, including terminals of lampholders, switches and the like.

2.35 Appliance Coupler — A means enabling a flexible cable to be connected at will to the luminaire. It consists of two parts: a connector provided with contact tubes which is the part integral with or designed to be attached to the flexible cable connected to the supply: an appliance inlet, provided with contact pins, which is the part incorporated in or fixed to the luminaire, or designed to be fixed to it.

2.36 External Wiring — Wiring generally outside the luminaire but delivered with it.

NOTE 1 — External wiring may be used for connecting the luminaire to the supply, to other luminaires, or to any external ballast.

NOTE 2 — External wiring is not necessarily outside the luminaire for its full length.

2.37 Internal Wiring — Wiring generally inside the luminaire and delivered with it, which forms the connection between terminals for external wiring or supply cables and terminals of lampholders, switches and similar components.

NOTE — Internal wiring is not necessarily inside the luminaire for its full length.

2.38 Normally Flammable Material — Material having an ignition temperature of at least 200°C and which will not deform or weaken at this temperature.

Examples : Wood and materials based on wood of more than 2 mm thickness.

NOTE — The ignition temperature and the resistance of normally flammable materials to deformation or weakening are based on widely accepted values determined during a test period of 15 min.

2.39 Readily Flammable Material — Material which cannot be classified as either normally flammable or non-combustible.

Examples : Wood fibre and materials based on wood of up to 2 mm thickness.

2.40 Non-combustible Material — Material incapable of supporting combustion.

NOTE — For the purpose of this standard, materials such as metal, plaster and concrete are regarded as non-combustible materials.

2.41 Safety Extra-Low Voltage (SELV) — A voltage which does not exceed 50 V ac rms or 70 V dc (*see* Note) between conductors, or between any conductor and earth, in a circuit which is isolated from the supply mains by means such as a safety isolating transformer or converter with separate windings.

NOTE — The voltage limit should not be exceeded either at full load or no load but it is assumed, for the purpose of this definition, that any transformer or converter is operated at its rated supply voltage.

2.42 Working Voltage — The highest voltage (rms in case ac) which may occur across any insulation at rated supply volts, transients being neglected, in open circuit conditions or during normal operation.

2.43 Type Test — A test for the purpose of checking compliance of the design of a given product with the requirements of the relevant specification. Type test samples are selected in agreement with the manufacturer or responsible vendor.

2.44 Acceptance Test — Tests carried out on samples taken from a lot for the acceptance of the lot.

2.45 Routine Test — Tests carried out on each luminaire to check requirements which are likely to vary during production.

2.46 By Hand — Not requiring the use of a tool, coin or other object.

2.47 Terminal — That part of a luminaire or component which is necessary to make electrical connection to a conductor.

3. GENERAL TEST REQUIREMENTS

3.1 Tests according to Parts I, II, III and IV of this standard are type tests.

3.2 Except where specified otherwise luminaires shall be tested at an ambient temperature of 27 ± 2°C. The luminaires shall be tested 'as delivered' and as installed in normal use. The lamp (or lamps) is (are) not included except where essential for the test.

3.2.1 In general, the tests are made on a single sample luminaire or, where a range of similar luminaires is involved, on a single luminaire of each rated wattage in the range or on a representative selection from the

range as agreed upon with the manufacturer. This selection shall include the luminaire, together with any attachments, which represents the most unfavourable combination from the testing point of view.

3.2.2 Each sample luminaire shall withstand all the relevant tests. In order to reduce the time of testing and to allow for any tests which may be destructive, the manufacturer may submit additional luminaires or parts of luminaires provided that these are of the same materials as the original luminaire and that the results of the test are the same as if carried out on a single luminaire.

3.2.3 Combination luminaires are tested for safety requirements with that assemblage of parts which gives the most unfavourable result.

3.2.4 Certain parts of luminaires, such as joints, raising and lowering devices, may be tested separately provided that the design of these parts is such that their performance is not dependent upon the other parts of the luminaires.

3.2.5 Luminaires intended to be used with non-detachable flexible cable or cord are tested with the flexible cable or cord connected to the luminaire.

4. COMPONENTS OF LUMINAIRES

4.1 Components complying with the requirements of the relevant Indian Standard for those components and not requiring additional protection shall not be subjected to further testing or appraisal as part of a luminaire. Those components which rely upon the construction of the luminaire for electrical and mechanical safety shall be tested in accordance with the relevant clauses of this standard.

NOTE — Examples of components are lampholders, switches, transformers, ballasts, flexible cables and cords and plugs.

4.2 Luminaires cannot be regarded as meeting the requirements of this standard unless all internal wiring is complete.

5. CLASSIFICATION OF LUMINAIRES

5.1 Luminaires are classified according to the type of protection against electric shock, the degree of protection against ingress of dust and moisture and the material of the supporting surfaces.

5.2 Classification According to Type of Protection Against Electric Shock

5.2.1 Luminaires shall be classified according to the type of protection against electric shock provided, as Class 0, Class I, Class II and

Class III-(*see* definitions in **2**) Luminaires with a rated voltage in excess of 250 V shall not be classified as Class 0.

5.2.2 Luminaires shall have only a single classification. For example, for a luminaire with a built-in extra low voltage transformer with provision for earthing, the luminaire shall be classified as Class I and part of the luminaire shall not be classified as Class III even though the lamp compartment is separated by an arm from the transformer compartment.

5.3 Classification According to Degree of Protection Against Ingress of Dust and Moisture

5.3.1 Luminaires shall be classified in accordance with the ' IP number ' system of classification given in Appendix A.

5.3.2 Symbols for the degree of protection are given in Fig. 1.

5.3.3 Tests for the degrees of protection are given in Part IV of this standard.

NOTE 1 — Luminaires classified as watertight are not necessarily suitable for operation under water; pressure watertight luminaires should be used for such applications.

NOTE 2 — The IP numbers are the principal marking on luminaires but symbols may be used in addition to IP numbers if desired.

5.4 Classification According to Material of Supporting Surface for Which the Luminaire is Designed

5.4.1 Luminaires shall be classified according to whether they are primarily intended for direct mounting on normally flamable surfaces or are only suitable for mounting on non-combustible surfaces as follows:

Classification	*Symbol*
Luminaires suitable for direct mounting only on non-combustible surfaces	No symbol, but warning notice required (*see* **6**)
Luminaires without built-in ballasts or transformers suitable for direct mounting on normally flammable surfaces	No symbol
Luminaires with built-in ballasts or transformers suitable for direct mounting on normally flammable surfaces	Symbol (*see* Fig. 1)

NOTE — Readily flammable surfaces are not suitable for the direct mounting of luminaires.

5.4.2 Requirements for luminaires classified as primarily intended for direct mounting on normally flammable surfaces are given in Part II and related tests in Part IV of this standard.

6. MARKING

6.1 Marking, Luminaires — The following information shall be distinctly and durably marked on the luminaire in a position where it can be seen during maintenance, if necessary after the removal of covers or similar components. Such information shall not be marked on screws, or on parts likely to be removed when the luminaire is being connected. The information specified in **6.1.2** and **6.1.8** may be marked on built-in ballasts, where these are provided, instead of on the luminaire itself. Details of symbols are shown in Fig. 1. The height of graphical symbols (excluding letters and numerals) shall be not less than 5 mm.

For combination luminaires where the type references or the rated inputs are different for different combinations, the main part and the alternative parts may be marked with a type reference or a rated input, as appropriate, provided that the type can be identified and the rated input of the complete unit may be established from a catalogue or a similar document.

6.1.1 Mark of origin (this may take the form of a trade-mark, manufacturer's identification mark or the name of the responsible vendor).

6.1.2 Rated voltage(s) in volts. Luminaires for tungsten filament lamps shall be marked only if the rated voltage is different from 250 V.

6.1.3 The rated maximum ambient temperature t_a, if other than 27°C (*see* Fig. 1).

NOTE — Exceptions to this general requirement may be specified in particular sections of Part V of this standard.

6.1.4 Symbol for Class II luminaire where applicable (*see* Fig. 1).

For portable luminaires provided with a non-detachable flexible cable or cord, the symbol for Class II construction, if applicable, shall be on the outside of the luminaire.

6.1.5 Symbol for Class III luminaire where applicable (*see* Fig. 1).

6.1.6 Marking (if applicable) with IP numbers for degree of protection against ingress of dust and moisture and, if desired, additional symbols (*see* Fig. 1 and the Appendix A). Where X is used in an IP

number in Fig. 1, it indicates a missing numeral in the example, but both the appropriate numerals shall be marked on the luminaire.

Marking of IP 20 on ordinary luminaires is not required.

6.1.7 Maker's model number or type reference.

6.1.8 Rated wattage of the lamp(s) in watts. Where the lamp wattage alone is insufficient, the number of lamps and the type shall also be given. Luminaires for tungsten filament lamps shall be marked with the maximum rated wattage and number of lamps.

Marking of maximum rated wattage is not required if luminaires for tungsten filament lamps having E 14 or B 15 lampholders comply with all the tests when fitted with lamps of 60 W.

Marking of maximum rated wattage for luminaires for tungsten filament lamps with more than one lampholder may be in the form:

'$n \times$ MAX . . . W', n being the number of lampholders.

6.1.9 Symbol (*see* Fig. 1), if applicable, for luminaires with built-in ballasts or transformers, suitable for direct mounting on normally flammable surfaces.

6.1.10 Information concerning special lamps, if applicable.

6.1.11 Symbol (*see* Fig. 1), if applicable, for luminaires for lamps of similar shape to 'cool beam' lamps but where the use of a 'cool beam' lamp might impair safety.

6.1.12 Terminations shall be clearly marked or otherwise identified to give a clear indication as to which termination should be connected to the live side of the supply, where necessary for saftey; or to ensure satisfactory operation. Earthing terminations shall be clearly indicated by the symbol shown in Fig. 1.

6.1.13 Symbol (*see* Fig. 1) for minimum distance from lighted objects, if applicable, for spot lights and the like. The distance marked shall be not less than the values shown below:

Rated Wattage (W)	*Minimum Distance* (m)
Up to and including 100	0·5
Over 100 up to and including 300	0·8
Over 300 up to and including 500	1·0

The distance is measured on the optical axis of the luminaire from that part of the luminaire or lamp which is nearest to the lighted object.

The symbol for minimum distance and explanation of its meaning shall also be given either on the luminaire or in the instructions with the luminaire.

6.2 Additional Information — In addition to the above marking, all details which are necessary to ensure proper installation use and maintenance shall be given either on the luminaire or on built-in ballasts or in the manufacturer's instructions provided with the luminaire, for instance:

1) For combination luminaires, the permissible ambient temperature, the class of protection or the protection against ingress of dust and moisture of an alternative part if not at least equal to that of the basic luminaire.

2) Nominal frequency in hertz.

3) Operating temperatures:

   a) The rated maximum operating temperature (of a winding) t_w in degrees Celsius.

   b) The rated maximum operating temperature (of a capacitor) t_c in degrees Celsius.

   c) The maximum temperature to which the insulation to supply cables and interconnecting cables will be subjected within the luminaire under the most unfavourable conditions of normal operation, if in excess of 90°C.

4) A warning notice that the luminaire is not suitable for mounting on a normally flammable surface.

5) A wiring diagram, except where the luminaire is suitable for direct connection to the mains supply.

6) Special conditions for which the luminaire, including the ballast, is suitable, for instance, whether or not the luminaire is intended for looping-in.

6.2.1 In addition, the manufacturer shall be prepared to supply information on the power factor and the supply current.

APPENDIX A

(*Clauses* 5.3.1 *and* 6.1.6)

EXPLANATION OF IP NUMBERS FOR DEGREES OF PROTECTION

A-1. The type of protection covered by this system of classification is as follows:

a) Protection of persons against contact with or approach to live parts and against contact with moving parts (other than smooth rotating shafts and the like) inside the enclosure and protection of the equipment against ingress of solid foreign bodies.

b) Protection of the equipment inside the enclosure against harmful ingress of water.

The designation to indicate the degrees of protection consists of the characteristic letters IP followed by two numerals (the ' characteristic numerals ') indicating conformity with the conditions stated in Tables 1 and 2 respectively. The first numeral indicates the degree of protection described under Item (a) and the second numeral the degree of protection described under Item (b).

TABLE 1 DEGREES OF PROTECTION INDICATED BY THE FIRST CHARACTERISTIC NUMERAL

First Characteristic Numeral	Degree of Protection	
	Short Description	Brief Details of Objects Which Will Be ' Excluded '
(1)	(2)	(3)
0	Non-protected	No special protection
1	Protected against solid objects greater than 50 mm	A large surface of the body, such as a hand (but no protection against deliberate access). Solid objects exceeding 50 mm in diameter.
2	Protected against solid objects greater than 12 mm	Fingers or similar objects not exceeding 80 mm in length. Solid objects exceeding 12 mm in diameter.
3	Protected against solid objects greater than 2·5 mm	Tools, wires, etc, of diameter or thickness greater than 2·5 mm. Solid objects exceeding 2·5 mm in diameter.
4	Protected against solid objects greater than 1·0 mm	Wires or strips of thickness greater than 1·0 mm. Solid objects exceeding 1·0 mm in diameter
5	Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment
6	Dust-tight	No ingress of dust

TABLE 2 DEGREES OF PROTECTION INDICATED BY THE SECOND CHARACTERISTIC NUMERAL

(*Clause* A-1)

SECOND CHARACTERISTIC NUMERAL	DEGREE OF PROTECTION	
	Short Description	Details of the Type of Protection Provided by the Enclosure
(1)	(2)	(3)
0	Non-protected	No special protection
1	Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2	Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position
3	Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect
4	Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect
5	Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect
6	Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities
7	Protected against the effects of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8	Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer

NOTE — Normally, this will mean that the equipment is hermetically sealed. However, with certain types of equipment it can mean that water can enter but only in such a manner that it produces no harmful effects.

FIGURE 1

Symbols

NOTE — The marking of the symbols corresponding to IP numbers is optional

Earthing terminal..... 

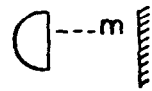
Amperes..... A
Frequency (Hertz)..... Hz
Volts V
Watts ..... W

Class II ..... 

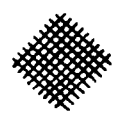
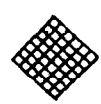
Class III ..... 

Rated maximum ambient temperature..... t_a...°C

Warning against the use of cool-beam lamps 

Minimum distance from lighted objects (metres) 

Luminaires with built-in ballasts or transformers suitable for direct mounting on normally flammable surfaces..... 

Ordinary ..... IP 20	No symbol	
Drip-proof ..... IPX 1		(One drop)
Rain-proof ..... IPX 3		(One drop in square)
Splash-proof ..... IPX 4		(One drop in triangle)
Jet-proof... ..... IPX 5		(Two triangles with one drop in each)
Watertight (immersible) ..... IPX 7		(Two drops)
Pressure-watertight (submersible) .... IPX 8		(Two drops followed by an indication of the maximum depth of submersion in metres
Proof against 1 mm diameter probe IP4X	No symbol	
Dust-proof IP5X		(A mesh without frame)
Dust-tight IP6X		(A mesh with frame)

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