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Indian Standard

IS 10322 (Part 5/Sec 3) : 2026
IEC 60598-2-3 : 2002 +AMD1 :
2011 CSV

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अनुभाग 3 सड़क और गली के प्रकाश के लिए प्रदीपक
(दूसरा पुनरीक्षण)

Luminaires

Part 5 Particular Requirements
Section 3 Luminaires for Road and Street
Lighting
(Second Revision)

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मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG

NEW DELHI - 110002

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NATIONAL FOREWORD

This Indian Standard (Part 5/Sec 3) (Second Revision) which is identical to IEC 60598-2-3 : 2002 + AMD 1 : 2011 CSV 'Luminaires — Part 2-3: Particular requirements — Luminaires for road and street lighting' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Illumination Engineering and Luminaires Sectional Committee and approval of the Electrotechnical Division Council.

This standard was first published in year 1987 and subsequently revised in year 2012 to align it with the IEC 60598-2-3 : 2002. This revision has been undertaken to align it with IEC 60598-2-3 : 2002 + AMD 1 : 2011 CSV.

This revision includes the following significant technical change with respect to the previous version:

- a) References to IS 10322 (Part 1) have been updated.

This standard covers the requirements of safety and photometric requirements of luminaires for road and street lighting.

This standard is one among the series of Indian Standards which deals with luminaires. This series consists of the following parts and sections:

Part 1	General requirements
Part 5	Particular requirements,
Sec 1	Fixed general purpose luminaires
Sec 2	Recessed luminaires
Sec 4	Portable general purpose luminaires
Sec 5	Flood lights
Sec 6	Handlamps
Sec 7	Lighting chains
Sec 8	Luminaires for emergency lighting
Sec 18	Luminaires for swimming pools and similar applications

This standard is to be read in conjunction with IS 10322 (Part 1) 'Luminaires: Part 1 General requirements'. For the sake of convenience, the clauses of this standard correspond to those of IS 10322 (Part 1), instead of reproducing full text of each clause; reference to relevant clauses of IS 10322 (Part 1) has been given.

The text of the IEC standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appears referring to this standard, they should be read as 'Indian Standard'; and
- b) Comma (,) has been used as a decimal marker, while in Indian Standards the current practice is to use a point (.) as the decimal marker.

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Indian Standard
LUMINAIRES
PART 5 PARTICULAR REQUIREMENTS
SECTION 3 LUMINAIRES FOR ROAD AND STREET LIGHTING
(Second Revision)

3.1 Scope

This part of IEC 60598 specifies requirements for

- luminaires for road, street lighting and other public outdoor lighting applications;
- tunnel lighting;
- column-integrated luminaires with a minimum total height above normal ground level of 2,5 m;

and for use with electrical lighting sources on supply voltages not exceeding 1 000 V.

NOTE Column integrated luminaires with a total height below 2,5 m are under consideration.

3.1.1 Normative references

The normative references listed in Section 0 of IEC 60598-1 apply to this part as well as the following reference:

IEC 60068-3-76:1997, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60364-7-714, 1996, *Electrical installations of buildings – Part 7: Requirements for special installations or locations – Section 714: External lighting installations*

IEC 62262: 2002, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

3.2 General test requirements

The provisions of Section 0 of IEC 60598-1 apply.

The tests described in each appropriate section of Part 1 shall be carried out in the order listed in this section of Part 2.

In order to facilitate testing, and due to the dimensions of the sample, it is allowed to make use of the appropriate parts of the luminaire only (this is mainly applicable to column-integrated luminaires).

3.3 Definitions

For the purposes of this section, the definitions of Section 1 of IEC 60598-1 apply together with the following definitions.

3.3.1

span wire

wire between main supports which carries the weight of the complete installation.

NOTE This may include several luminaires, supply cables and a stay wire.

3.3.2

suspension wire

wire attached to the span wire and carrying the weight of the luminaire

3.3.3

stay wire

tensioned wire between main supports to limit lateral and rotary movement of the suspended luminaires

3.3.4

column-integrated luminaires

lighting systems formed with a luminaire integrated in a lighting column fixed in the ground

3.3.5

reflective or decorative external part of a column-integrated luminaire

device reflecting the light in a fixed direction or with a decorative purpose, mounted outside the lamp compartment generally at the top of the column-integrated luminaire

NOTE Such devices are referred to in this standard as "external parts".

3.3.6

lighting column

support intended to hold one or more luminaires, consisting of one or more parts: a post, possibly an extension piece, and if necessary a bracket. It does not include columns for catenary lighting

3.3.7

nominal height of a column-integrated luminaire

distance between the centre line of the point of entry of the external part and the intended ground level, for column-integrated luminaires planted in the ground, or the bottom of the flange plate, for column-integrated luminaires with a flange plate

3.3.8

door opening of a column-integrated luminaire

opening in the column of a column-integrated luminaire for access to electrical equipment

3.3.9

cable entry slot of a column integrated luminaire

opening in the part of a column-integrated luminaire below ground for the cable entry

3.3.10

connection box of a column integrated luminaire

box containing terminal blocks: protecting devices allowing the connection of a column-integrated luminaire to the mains and the looping of electricity supply cables

3.3.11

tunnel luminaires

luminaires for lighting tunnels which are mounted direct or on frames to the wall or ceiling of the tunnel

3.4 Classification of luminaires

Luminaires shall be classified in accordance with the provisions of Section 2 of IEC 60598-1.

NOTE Luminaires for road and street lighting are normally suitable for one or more of the following modes of installation:

- a) on a pipe (bracket) or the like;
- b) on a mast (column) arm;
- c) on a post top;

- d) on span or suspension wires;
- e) on a wall.

3.5 Marking

The provisions of Section 3 of IEC 60598-1 apply. In addition, the following information shall be provided in the instruction leaflet supplied with the luminaire:

- a) design attitude (normal operating position);
- b) weight including control gear if any;
- c) overall dimensions;
- d) if intended for mounting more than 8 m above ground level, the maximum projected area subjected to wind force (see 3.6.3.1);
- e) the range of cross-sectional areas of suspension wires suitable for the luminaire, if applicable;
- f) suitability for use indoors provided the 10 °C, allowed for the effects of natural air movement, has not been deducted from measured temperature (see 3.12.1);
- g) dimensions of the compartment in which the connection box is placed;
- h) the torque setting in newton metres to be applied to any bolts or screws which fix the luminaire to its support;
- i) maximum mounting height relevant to the selected method for protection against the falling of glass particles.

3.6 Construction

The provisions of Section 4 of IEC 60598-1 apply together with the requirements of 3.6.1 to 3.6.5.

3.6.1 All luminaires shall have protection against ingress of moisture of at least IPX3, except for tunnel-lighting luminaires and glazing of column-integrated luminaires with an open-sided external part, for which IPX5 is required.

For column-integrated luminaires, door opening included, the IP classification shall be as follows:

- 1) parts below 2,5 m: IP3X (see IEC 60364-7-714)
- 2) parts above 2,5 m: IP2X (when the external part is open-sided, the IP classification of the glazing shall be 5X)

3.6.2 Luminaires for suspension on span wires shall be fitted with clamping devices for this purpose and the range of span-wire sizes for which the clamping devices are suitable shall be stated in the instruction leaflet supplied with the luminaire. The device shall clamp the span wire to prevent movement of the luminaire with respect to the span wire.

The suspension devices shall not damage the span wire during installation and during normal use of the luminaire.

Compliance is checked by inspection after fitting the luminaire to the smallest and largest span wires in the range stated by the luminaire manufacturer.

NOTE Care should be taken to avoid electrolytic corrosion between the clamping device and the span wire.

3.6.3 The means for attaching the luminaire or external part to its support shall be appropriate to the weight of the luminaire or external part. The connection shall be designed to withstand wind speeds of 150 km/h on the projected surface of the assembly without undue deflection.

Fixings which carry the weight of the luminaire or external part and internal accessories shall be provided with means to prevent the dislodgement of any part of the luminaire or external part by vibration, either in service or during maintenance.

Parts of luminaires or external parts which are fixed other than with at least two devices, for example, screws or equivalent means of sufficient strength, shall have such extra protection as to prevent those parts falling and endangering persons, animals and surroundings, should a fixing device fail under normal conditions.

Compliance is checked by inspection and, for mast-arm or post-top mounted luminaires or external parts, by the test of 3.6.3.1.

The wind-force test is not required to be performed on tunnel luminaires.

NOTE In considering the possible effects of vibration, the luminaire should be studied in conjunction with the lamp and the column with which it may be used.

3.6.3.1 Static load test for mast-arm or post-top mounted luminaires or external parts

The luminaire or external part is mounted in such a way that the most critical surface is loaded.

The most critical surface is determined by calculating the highest value of $Cd \times S$

where

Cd is the drag coefficient;

S is the area of the surface to be loaded (m^2).

The drag coefficient depends on the shape of the surface. For luminaires or external parts for which the Cd is not measured, the value of 1,2 shall be taken.

NOTE 1 See Annex A for measurement of Cd .

The means of attachment shall be secured in accordance with the manufacturer's instructions.

A constant evenly distributed load is applied for 10 min on the most critical surface.

NOTE 2 See Figure 1 for methods of equal distribution of the load. In cases where bags are used, these can be filled with sand, lead shot or small balls.

The load shall be equal to

$$F = 1/2 Rh \times S \times Cd \times V^2 \text{ (N)}$$

where

Rh is equal to $1,225 \text{ kg/m}^3$ (air volumic mass);

V is the wind speed (m/s).

The wind speeds relevant to the mounting heights of luminaires or external parts shall be

$V = 45 \text{ m/s}$ (163 km/h) for heights up to 8 m ;

$V = 52 \text{ m/s}$ (188 km/h) for heights between 8 m and 15 m ;

$V = 57 \text{ m/s}$ (205 km/h) for heights of more than 15 m .

NOTE 3 In some countries, the wind speed is determined by national rules (for example, Japan).

The drag coefficient is 1,2 (or the exact value measured in Annex A).

After the test, there shall be no visible failure impairing the safety, no permanent deformation from the attachment which exceeds a slope of more than 2 cm/m, and no rotation around the point of attachment.

3.6.4 If the use of a single lampholder does not ensure the correct position of the lamp, an adequate supporting device shall be provided.

For adjustable lampholders or optical parts, suitable reference marks shall be provided.

Compliance is checked by inspection.

3.6.5 In order to reduce the risk of injury caused by breaking glass, the following requirements, in relation to the intended mounting height of the luminaire, are applicable.

When luminaires are installed below 5 m, no additional requirements are requested on glass covers.

For tunnel luminaries, the requirements of 3.6.5.1 apply without exception.

When luminaires are installed above 5 m, glass covers shall be:

- a) constituted with a glass that fractures into small pieces, or
- b) constituted with a glass having a high impact shock resistance, or
- c) protected by any means to retain glass fragments in case of breakage (e.g. guard, film coating).

Compliance is checked:

- for a) by test and inspection according to 3.6.5.1;
- for b) by test and inspection according to 3.6.5.2;
- for c) by inspection.

The luminaire manufacturer shall declare to the testing laboratory the method of protection used.

3.6.5.1 Protection by the use of glass that fractures into small pieces

Preconditioning of the luminaire and glass cover before testing is not required.

For flat glass, the glass component is supported over the whole area to ensure that particles will not be scattered upon fragmentation and that movement of the particles is prevented. Shatter the glass with a centre punch at a point 30 mm from the mid-point of one of the longer edges of glass towards the centre.

NOTE 1 A centre punch is a tool made of steel with a sharp point.

For formed glass, the glass component part shall be supported on all the surfaces (example of testing method could be the use of material like sand or a mould). The thickness of the material used as a support surface shall be more than 30 mm. The face of the glass shall be completely covered with an adhesive film in order to avoid any move of the broken particles. Shatter the glass (from the inside or the outside) with a centre punch in the middle of the glass cover.

Within 5 min of fracture, count the particles in a 50 mm square, located approximately at the centre of the area of the coarsest fracture but always within the confines of the glass.

Compliance: A glass is deemed to have passed the test if the number of particles in the 50 mm square is more than 40; glass splinters and pieces less than the full thickness of the

glass being excluded from the count. For glass of smaller size where a 50 mm × 50 mm area is not possible, the number of pieces necessary in the count is proportionately reduced. The size of the particles shall be less than 50 mm for all the dimensions.

In the count of the total number of particles in the 50 mm square, the particles in the centre of the square plus those at the edge shall be taken into account. In order to count particles at the edge of the square, it is recommended that all pieces intersected by two adjacent sides be included and all particles intersected by the two other sides be ignored (see Figure 2).

NOTE 2 A suitable method of counting the particles is to place a square of 50 mm side, of transparent material over the glass and mark a spot of ink as each particle within the square counted.

NOTE 3 When the test sample remains as one sheet, the fragmentation lines would normally be used to indicate fractures and the size and number of particles would thus be evaluated, unless reinforcing or a film were employed.

NOTE 4 Where possible, the area of measurement should not be within 30 mm of any edge, hole or machining of the glass or in a circle of 50 mm around the impact.

3.6.5.2 Protection by the use of high impact resistant glass

3.6.5.2.1 Glass covers shall have high mechanical strength.

The luminaire and glass cover shall be preconditioned by the thermal endurance test of 12.3 of IEC 60598-1.

The test is performed on one sample and on the external face (opposite side of the lamp) of the glass mounted on the luminaire.

The testing procedure shall be in accordance with the IEC 62262, and the test apparatus used is the pendulum hammer or vertical hammer according to IEC 60068-2-75.

Compliance: The glass shall not be broken after a shock with impact energy of 5 J (IK08).

3.6.5.2.2 Glass covers shall not break into large pieces.

Glass covers shall be tested according the same testing procedure as 3.6.5.1.

Compliance: A glass is deemed to have passed the test if the number of particles in the 50 mm square is more than 20, glass splinters and pieces less than the full thickness of the glass being excluded from the count. For glass of smaller size where a 50 mm × 50 mm area is not possible, the number of pieces necessary in the count is proportionately reduced. The size of the particles shall be less than 50 mm for all the dimensions.

3.6.6 The connection compartment of column-integrated luminaires shall provide adequate space within the door opening for

- the luminaire terminals;
- the protective devices;
- the termination and looping of electricity supply cables;
- the connection box (if any).

The compartment shall be provided with means for attaching such equipment. Where such means is of metal, it shall be of corrosion-resistant material or suitably protected against corrosion.

3.6.7 With regard to load calculation and verification of structural design by testing, column-integrated luminaires, except for their external part, shall comply with ISO standards, where available, otherwise regional or national standards, where applicable.

NOTE In Europe the EN 40, in Japan the JIL 1003 and in North America the ANSI C136 series apply

3.6.8 The door of a column-integrated luminaire shall be treated against corrosion in accordance with the treatment applied to the column-integrated luminaire.

Compliance is checked by inspection and by the test specified in 4.18 of Part 1.

The opening of the door shall be designed in such a way that only authorized persons will be able to open it.

A type test will be performed on a sample of the door. The test equipment shall be that used for the pendulum hammer, the vertical fall, spring-operated impact test apparatus specified in IEC 60068-2-75 or by other suitable means giving equivalent results. An impact energy of 5 Nm shall be applied three times.

Blows will be applied in the centre of the door on the largest side when the door has several facets.

After the test, the sample shall show no damage, in particular :

- the locking device shall still be operational;
- no visible cracks shall be present on the sample;
- the level of IP protection shall not be reduced (see 3.6.1).

3.6.9 For column-integrated luminaires:

- the cable entry slot shall be not less than 50 mm × 150 mm;
- the cable path from the slot to the connection compartment shall be not less than 50 mm, and shall be free from obstructions, sharp edges, burrs, flashes and the like that might cause abrasion of the cables.

Compliance is checked by inspection and by measurements.

NOTE In the USA, the size of the cable entry slot has to be in accordance with ANSI C136.

3.7 Creepage distances and clearances

The provisions of Section 11 of IEC 60598-1 apply.

3.8 Provision for earthing

The provisions of Section 7 of IEC 60598-1 apply together with the requirements of 3.8.1.

3.8.1 The attachment of the fixed part of the terminal shall be designed and executed so as to prevent it from being rotated when the clamping part is moved.

Compliance is checked by inspection and by the mechanical tests specified in Sections 14 and 15 of Part 1.

3.9 Terminals

The provisions of Sections 14 and 15 of IEC 60598-1 apply.

Terminals for supply connection shall allow the connection of conductors having nominal cross-sectional areas according to Table 14.1 of Section 14 of IEC 60598-1, excluding the provision of supply cables with cross-sectional areas smaller than 1 mm².

Compliance is checked by fitting conductors of the smallest and largest cross-sectional areas specified.

3.10 External and internal wiring

The provisions of Section 5 of IEC 60598-1 apply together with the requirements of 3.10.1.

3.10.1 A luminaire for road and street lighting shall be provided with a cord anchorage such that the conductors for supply cables are relieved from strain where they are connected to the terminals, if, without the cord anchorage, the weight of the supply cables would exert a strain on the connections.

Compliance is checked by the relevant test of Section 5 of IEC 60598-1, but with a pull of 60 N and a torque of 0,25 Nm.

The values for the pull and the torque to be applied depend on the weight of the supply cables. In general, the specified values are adequate, but for luminaires intended to be mounted higher than 20 m and where the weight of the supply cables affecting the cord anchorage exceeds 4 kg a pull of 100 N and a torque of 0,35 Nm are applied.

3.11 Protection against electric shock

The provisions of Section 8 of IEC 60598-1 apply.

3.12 Endurance tests and thermal tests

The provisions of Section 12 of IEC 60598-1 apply together with the following.

3.12.1 When applying the limits given in the tables of Section 12 of IEC 60598-1, 10 °C shall be deducted from the temperatures measured on the luminaire in the test enclosure to allow for the effects of natural air movement which occur in the working environment of the luminaire.

Products intended for use outdoors only shall be tested at their declared $t_a \pm 5$ °C. 10 °C can then be deducted from the measured temperature after the test.

3.12.2 Luminaires with an IP classification greater than IP20 shall be subjected to the relevant tests of 12.4, 12.5 and 12.6 of Section 12 of IEC 60598-1 after the test(s) of 9.2 but before the test(s) of 9.3 of Section 9 of IEC 60598-1 specified in 3.13 of this section of IEC 60598-2.

3.12.3 Glass covers shall be used within the thermal limits declared by the glass manufacturer. Thermal limits shall include the minimum and maximum temperature and the maximum Δt allowed on the glass.

3.13 Resistance to dust and moisture

The provisions of Section 9 of IEC 60598-1 apply together with the following.

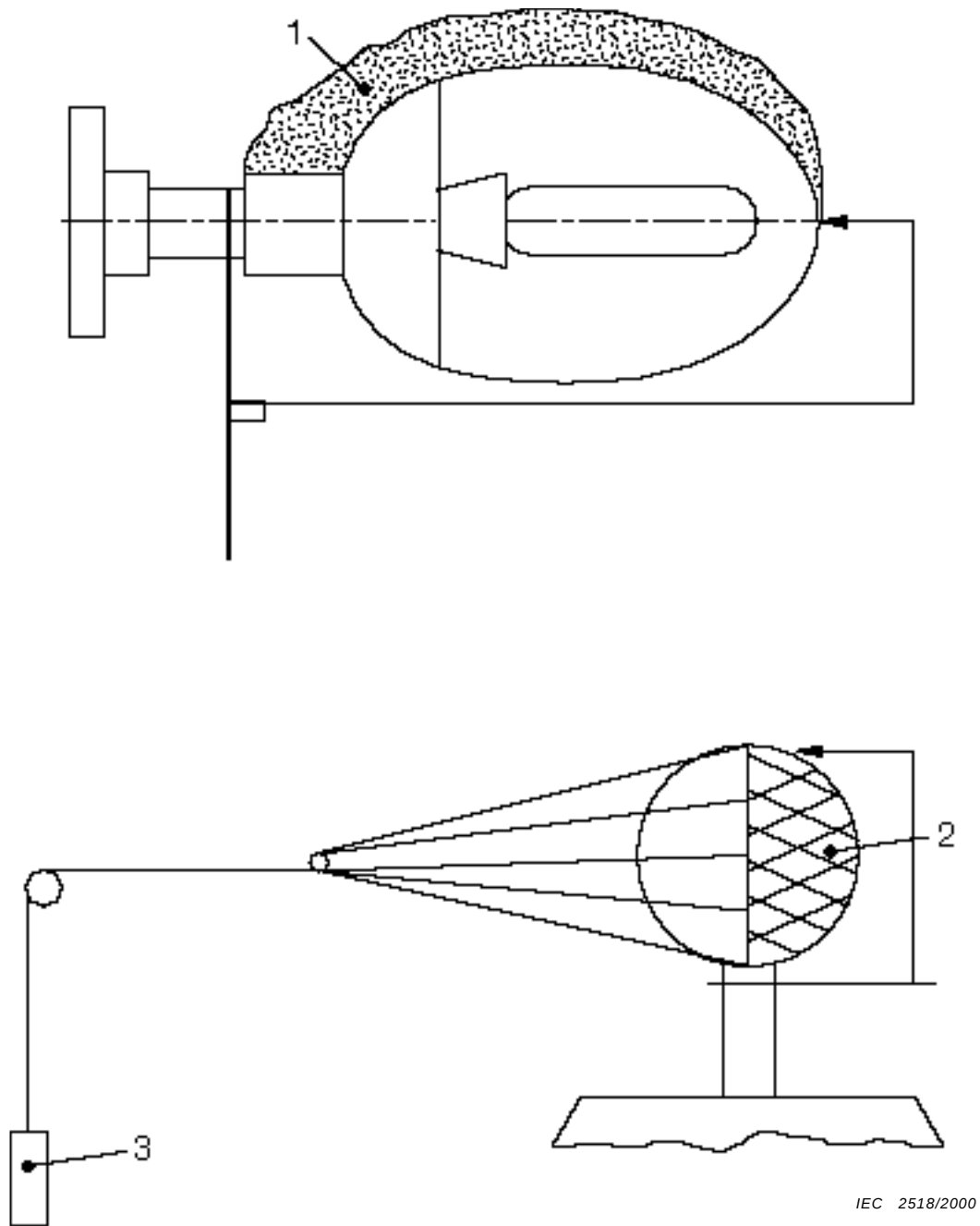
3.13.1 For luminaires with an IP classification greater than IP20 the order of the tests specified in Section 9 of IEC 60598-1 shall be as specified in 3.12 of this section of IEC 60598-2.

3.14 Insulation resistance and electric strength

The provisions of Section 10 of IEC 60598-1 apply.

3.15 Resistance to heat, fire and tracking

The provisions of Section 13 of IEC 60598-1 apply.



Key

- 1 Sandbag
- 2 Net
- 3 Weight

Figure 1 – Different procedures for the static wind-force test

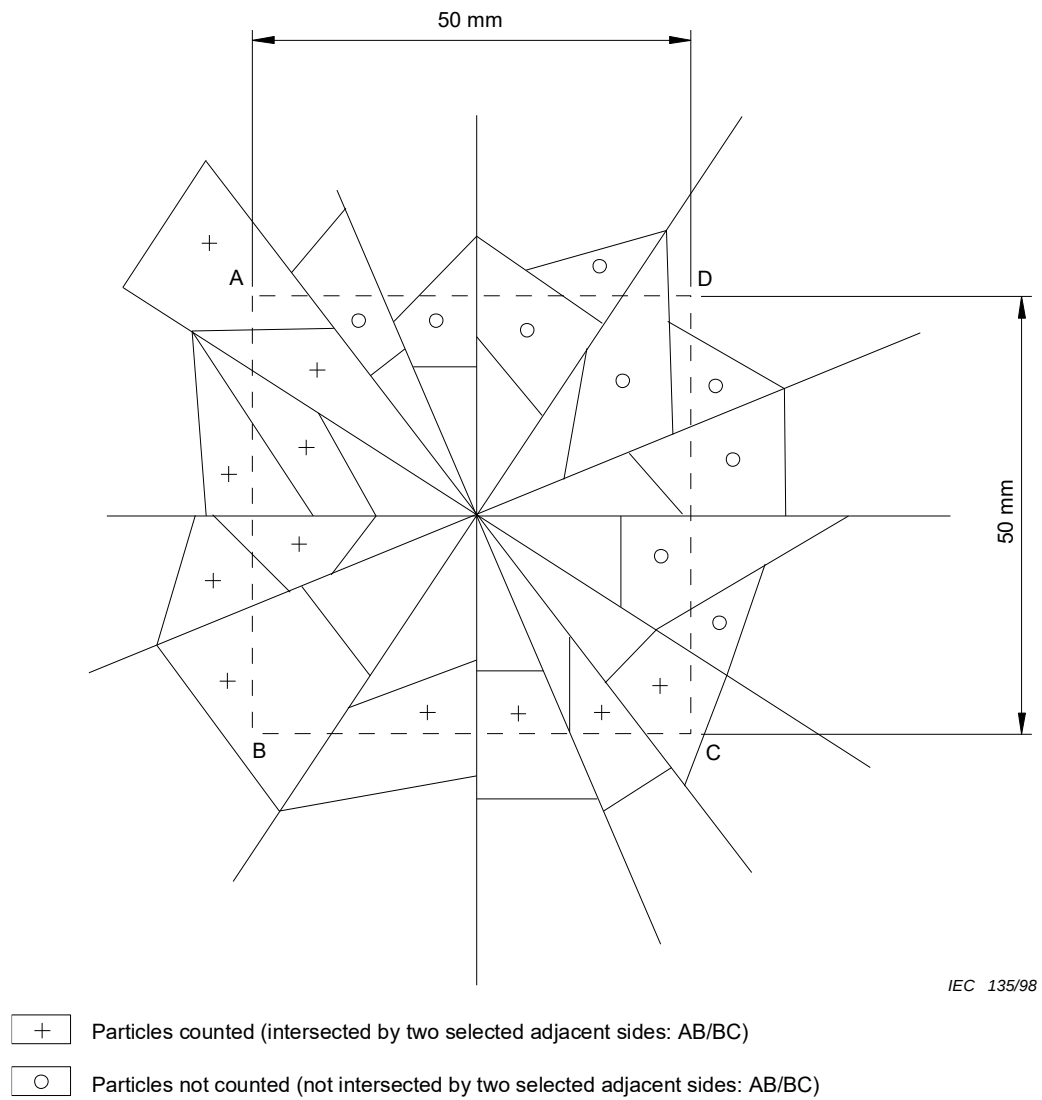


Figure 2 – Counting particles at the edge of the square

Annex A (informative)

Drag coefficient measurement

A.1 Measurement methods

The drag coefficient measurement is performed in the same way as the method used to determine the drag coefficient values introduced in ISO 4354.

The luminaire measurement is easier than measurement on a complicated structure (motionless tested luminaire representing the actual size of the luminaire).

The common practice is to place the luminaire as indicated by the manufacturer's installation rules in a wind tunnel.

The wind tunnel should be such that the surface S of the luminaire represents 5 % maximum of the cross-sectional area of the wind tunnel.

The wind speed used in the measurement should represent as far as possible the reality, according to 3.6.3.1. A speed of 25 m/s should be considered as a minimum.

After the measurement, no visible failure must impair the safety of the luminaire.

A.2 Reference documents

ISO 4354:1997, *Wind actions on structures*

Annex B
(normative)

**Schedule of amended clauses containing more serious/critical
requirements which require products to be retested**

This new edition of IEC 60598-2-3 broadens the scope of the standard to incorporate requirements for column-integrated luminaires. For other types of luminaires for road and street lighting, this new edition introduces no requirements that are more serious or critical. Consequently, luminaires for road and street lighting which have been shown to comply with IEC 60598-2-3, second edition, including its amendment 1 (1997) and its amendment 2 (2000), can be accepted as complying with this new edition without retesting.

NOTE Where more serious/critical requirements are introduced in future amendments/editions of this standard, these clauses will be marked 'R' and scheduled in this annex.

(Continued from second cover)

In this adopted standard, reference appears to International Standards for which Indian Standards also exists. The corresponding Indian Standards, which are to be substituted, are listed below along with their degree of equivalence for the editions indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
IEC 60068-3-76 : 1997 Environmental testing — Part 2-75: Tests — Test Eh: Hammer tests	IS 9000 (Part 7/Sec 7) : 2020/ IEC 60068-2-75 : 2014 Environmental testing: Part 7 Tests, Section 7 Test Eh: Hammer tests (<i>first revision</i>)	Identical
IEC 60598-1 Luminaires — Part 1: General requirements and tests	IS 10322 (Part 1) : 2026 Luminaires: Part 1 General requirements and tests (<i>second revision</i>) (IEC 60958-1 : 2024, MOD)	Modified
IEC 62262 : 2002 Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	IS 17050 : 2023/IEC 62262 : 2001 +AMD1 : 2021 Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code) (<i>first revision</i>)	Identical

The Committee has reviewed the provision of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

<i>International Standard</i>	<i>Title</i>
IEC 60364-7-714 : 1996	Electrical installations of buildings — Part 7: Requirements for special installations or locations, Section 714 External lighting installations

Only English language text has been retained while adopting it in this Indian Standard, and as such the page numbers given here are not the same as in the International Standard.

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 : 2022 'Rules for rounding off numerical values (*second revision*)'. 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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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website- www.bis.gov.in or www.standardsbis.in.

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Amendments Issued Since Publication

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

Website: www.bis.gov.in

Regional Offices:

	Telephones
Central : 601/A, Konnectus Tower -1, 6 th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	{ 2323 7617
Eastern : 8 th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	{ 2367 0012 2320 9474
Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	{ 265 9930
Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	{ 2254 1442 2254 1216
Western : 5 th Floor/MTNL CETTM, Technology Street, Hiranandani Gardens, Powai, Mumbai 400076	{ 2570 0030 2570 2715

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