

INTERNATIONAL STANDARD



LED light source characteristics –
Part 2: Design parameters and values

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INTERNATIONAL STANDARD



LED light source characteristics –
Part 2: Design parameters and values

INTERNATIONAL
ELECTROTECHNICAL
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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	5
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	8
4 Overview and common information	9
4.1 General.....	9
4.2 Numbering system	9
5 Rectangular LED modules with undefined light emitting surface.....	9
5.1 General.....	9
5.2 Mechanical references	9
5.3 LED module categories	10
5.3.1 General	10
5.3.2 L6W6.....	10
5.3.3 L14W2.....	11
5.3.4 L28W2.....	12
5.3.5 L28W4.....	13
5.3.6 L28W6.....	14
5.3.7 L28W28.....	15
5.3.8 L38W38.....	17
5.3.9 L56W56.....	20
5.3.10 L56W2.....	22
5.3.11 L56W4.....	22
5.3.12 L112W2.....	23
5.3.13 L115W2.....	26
5.3.14 L140W2.....	28
5.3.15 L145W2.....	30
5.3.16 L30W1.....	32
5.3.17 L58W1.....	33
5.3.18 L115W1.....	34
5.3.19 L145W1.....	35
6 Circular LED modules with a circular light emitting surface for spot lighting	36
6.1 General.....	36
6.2 Mechanical references	36
6.3 Mechanical interface of the LED module	38
6.3.1 LED module demarcation.....	38
6.3.2 Optics contact area.....	39
6.3.3 Requirements on screw holes	41
6.3.4 LED module electrical interconnect.....	41
6.3.5 Luminaire exclusion limits for electrical interconnects	41
6.3.6 Inner feature.....	42
6.3.7 Luminaire mechanical properties	42
7 LEDni modules with a rectangular shape and a circular light emitting surface	42
7.1 General.....	42
7.2 Mechanical references for an LEDni module	43
7.3 Mechanical interface of the LEDni module	44

7.4	LEDni module outlines	44
7.4.1	General	44
7.4.2	LEDni modules without mounting features	45
7.4.3	LEDni modules with mounting holes	46
7.4.4	LEDni modules with recessed corners	46
7.5	Electrical contact areas	47
7.5.1	Contact location	47
7.5.2	Minimum contact size	47
7.5.3	Contact overlap area	48
7.5.4	Maximum electrical contact area	48
7.6	PCB thickness	49
7.7	Inclusion limit zone	49
	Bibliography	51
	Figure 1 – Example of a luminaire with two LED modules	9
	Figure 2 – Positions of the reference point and the reference plane of the LED module	10
	Figure 3 – LED module demarcation of the L6W6 category	11
	Figure 4 – LED module demarcation of the L14W2 category	12
	Figure 5 – LED module demarcation of the L28W2 category	13
	Figure 6 – LED module demarcation of the L28W4 category	14
	Figure 7 – LED module demarcation of the L28W6 category	15
	Figure 8 – LED module demarcation of the L28W28 category	17
	Figure 9 – LED module demarcation of the L38W38 category	19
	Figure 10 – LED module demarcation of the L56W56 category	21
	Figure 11 – LED module demarcation of the L56W2 category	22
	Figure 12 – LED module demarcation of the L56W4 category	23
	Figure 13 – LED module demarcation of the L112W2 category	25
	Figure 14 – LED module demarcation of the L115W2 category	27
	Figure 15 – LED module demarcation of the L140W2 category	29
	Figure 16 – LED module demarcation of the L145W2 category	31
	Figure 17 – LED module demarcation of the L30W1 category	32
	Figure 18 – LED module demarcation of the L58W1 category	33
	Figure 19 – LED module demarcation of the L115W1 category	34
	Figure 20 – LED module demarcation of the L145W1 category	35
	Figure 21 – Positions of the reference point and reference plane of the LED module	37
	Figure 22 – Positions of the reference point, plane and axis for the LED module (example for D50 category)	37
	Figure 23 – Drawing of the demarcation of a D35 LED module	38
	Figure 24 – Drawing of the demarcation of the D50 LED module	39
	Figure 25 – Optics contact area of a D35 LED module	40
	Figure 26 – Dimensions of OCAs for a D50 category	40
	Figure 27 – Maximum inner feature outlines	42
	Figure 28 – Positions of the reference point and the reference plane of an LEDni module	43
	Figure 29 – Definition of the LEDni module border and mechanical references	44

Figure 30 – Demarcation model for the outline of an LEDni module without mounting features	45
Figure 31 – Demarcation model for the outline of an LEDni module having mounting holes.....	46
Figure 32 – Demarcation model for the outline of an LEDni module having recessed corners	47
Figure 33 – Location of the electrical contacts for LEDni modules.....	47
Figure 34 – Minimum size contact area for LEDni module electrical contacts	48
Figure 35 – Overlap area for the electrical contacts of LEDni modules	48
Figure 36 – Maximum electrical contact area for LEDni modules.....	49
Figure 37 – Inclusion limit zone for LEDni module components	49
Table 1 – LED module demarcation of the L6W6 category	10
Table 2 – LED module demarcation of the L14W2 category	12
Table 3 – LED module demarcation of the L28W2 category	13
Table 4 – LED module demarcation of the L28W4 category	14
Table 5 – LED module demarcation of the L28W6 category	15
Table 6 – LED module demarcation of the L28W28 category.....	16
Table 7 – LED module demarcation of the L38W38 category	18
Table 8 – LED module demarcation of the L56W56 category	20
Table 9 – LED module demarcation of the L56W2 category	22
Table 10 – LED module demarcation of the L56W4 category	23
Table 11 – LED module demarcation of the L112W2 category.....	24
Table 12 – LED module demarcation of the L115W2 category.....	26
Table 13 – LED module demarcation of the L140W2 category.....	28
Table 14 – LED module demarcation of the L145W2 category.....	30
Table 15 – LES category specifications for circular LED modules for spot lighting	36
Table 16 – Dimensions of D35 LED module demarcation	39
Table 17 – Maximum inner OCA diameter	40
Table 18 – Minimum and maximum OCA heights	41
Table 19 – Maximum height b of inner feature.....	42
Table 20 – Circular LES category specifications for LEDni modules	43
Table 21 – Values of dimensions for LEDni module categories ^a	45
Table 22 – Inclusion limit zone values of dimension $\phi_{\text{keep-in}}$ by LEDni module and LES category	50

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LED LIGHT SOURCE CHARACTERISTICS –

Part 2: Design parameters and values

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IEC 63356-2 has been prepared by subcommittee 34A: Electric light sources, of IEC technical committee 34: Lighting. It is an International Standard.

This second edition cancels and replaces the first edition published in 2022. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) a new Clause 6 for circular LED modules with a circular light emitting surface for spot lighting has been added;
- b) a new Clause 7 for LEDni modules with a rectangular shape and a circular light emitting surface has been added.

The text of this International Standard is based on the following documents:

Draft	Report on voting
34A/2405/FDIS	34A/2412/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 63356 series, published under the general title *LED light source characteristics*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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INTRODUCTION

The IEC 63356 series (LED light source characteristics) is split into two parts:

- Part 1: Data sheets

The scope of Part 1 covers data sheets that are comprehensive specifications for unique LED light sources (LED lamp or LED module). These are full specifications for products including, where necessary, information on interchangeability aspects, for example mechanical, electrical, optical.

Each data sheet in Part 1 relates to an individual type of LED lamp or LED module.

- Part 2: Design parameters and values

The scope of Part 2 covers design parameters and values that are used in the design of an LED light source (LED lamp or LED module) or a related component. Part 2 does not provide full product specifications but includes important interface aspects (e.g. mechanical, electrical, optical) that should be taken account of in the design of LED light sources and related components.

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LED LIGHT SOURCE CHARACTERISTICS –

Part 2: Design parameters and values

1 Scope

This part of IEC 63356 specifies design parameters and design values of an LED light source or related interface characteristics.

NOTE 1 Interface characteristics can cover interfaces between the LED light source and the luminaire or the controlgear, or the LED light source and additional attachments.

NOTE 2 Interfaces can be related to for example electrical, mechanical, or optical aspects.

This document does not cover interchangeability between products from different LED light source manufacturers.

NOTE 3 Interchangeability is covered by IEC 63356-1.

Lamp caps and lampholders specified in the IEC 60061 series are not within the scope of this document.

Compliance criteria relating to parameters in this document are covered by ~~IEC 63220¹ for safety, or IEC 63221² for performance.~~

- IEC 62031:—³, LED modules – Safety requirements, or;
- IEC 63554:—⁴, LED lamps – Safety requirements, or;
- IEC 63555:—⁵, LED light sources – Performance requirements.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

¹ ~~Under consideration.~~

² ~~Under consideration.~~

³ Third edition under preparation. Stage at the time of publication IEC CCDV 62031:2024.

⁴ First edition under preparation. Stage at the time of publication IEC CCDV 63554:2024.

⁵ First edition under preparation. Stage at the time of publication IEC CCDV 63555:2024.

3.1

thermal interface material

TIM

material with specified thermal conductivity assembled between an LED module and a luminaire to enable improved heat dissipation

4 Overview and common information

4.1 General

Dimensions are specified at a temperature of $(25 \pm 5)^\circ\text{C}$, unless otherwise specified, ~~mechanical dimensions refer to a temperature of $(25 \pm 5)^\circ\text{C}$.~~

All values of dimensions that omit an explicit unit indication are in millimetres.

4.2 Numbering system

Products that have comparable interfaces are grouped in separate clauses.

5 Rectangular LED modules with undefined light emitting surface

NOTE Clause 5, including LED module demarcations specified in 5.3.2 through 5.3.19, is taken from Zhaga Book 7 Edition 1.7.

5.1 General

Rectangular LED modules with undefined light emitting surface (LES) are intended to be mounted in a luminaire. Figure 1 illustrates an example of an LED module-luminaire combination. In this example the luminaire holds two LED modules. In practice, a luminaire can hold any number of LED modules.

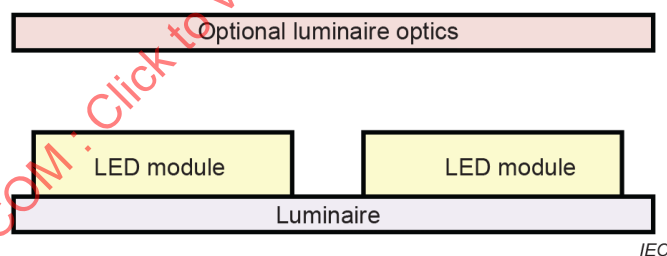


Figure 1 – Example of a luminaire with two LED modules

The luminaire typically features luminaire-optics which shape the light output of the LED module(s).

5.2 Mechanical references

The reference plane and the reference point of an LED module, including (optional) TIM are defined in Figure 2. Dimensions are specified relative to either the reference point or the reference plane unless indicated otherwise. Moreover, dimensions are specified to include the thickness of the TIM (if present).

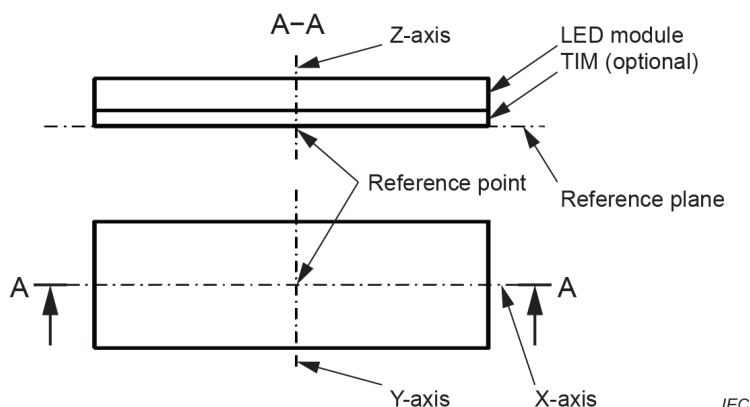


Figure 2 – Positions of the reference point and the reference plane of the LED module

5.3 LED module categories

5.3.1 General

Subclause 5.3 specifies a number of LED module categories that are identified by a designation. The LED module demarcations of these LED module categories are specified in 5.3.2 to 5.3.19.

The intention of the demarcation model is to visualize restricted areas or volumes that no part of a luminaire should cross. The hashed area indicates limits for the inclusion zone for LED module design and the exclusion zone for luminaire design.

Unless stated otherwise, all holes are available and for each hole at least 25 % of the circumference of the hole is present in the LED module. The demarcation model specifies the minimum diameter of the mounting holes at a specified position.

NOTE In typical designs the diameter of these holes can be larger allowing for a tolerance on the position of the holes.

If the LED module is applied in combination with a TIM, this material is defined to be part of the LED module. Thus, the total height of the module and TIM should not exceed the maximum height H (see 5.3.2 to 5.3.19).

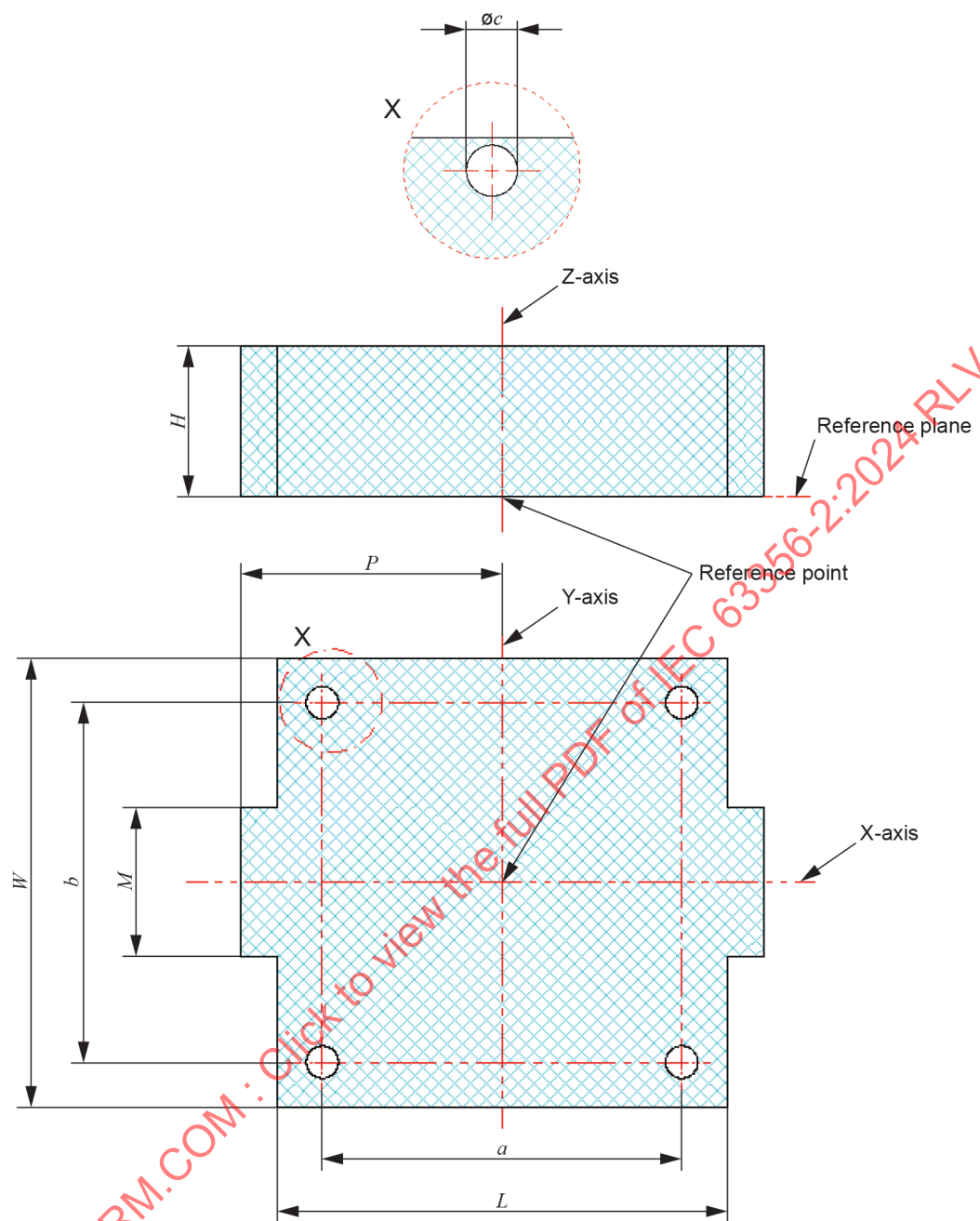
5.3.2 L6W6

The designation for this category is 'L6W6'.

The LED module demarcation of the L6W6 category is defined in Table 1 and Figure 3.

Table 1 – LED module demarcation of the L6W6 category

Dimension	Value
L	60
W	60
H	20
a	48
b	48
M	20
P	35
$\varnothing_c$	4,3



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NOTE The top drawing shows the detail X.

Figure 3 – LED module demarcation of the L6W6 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

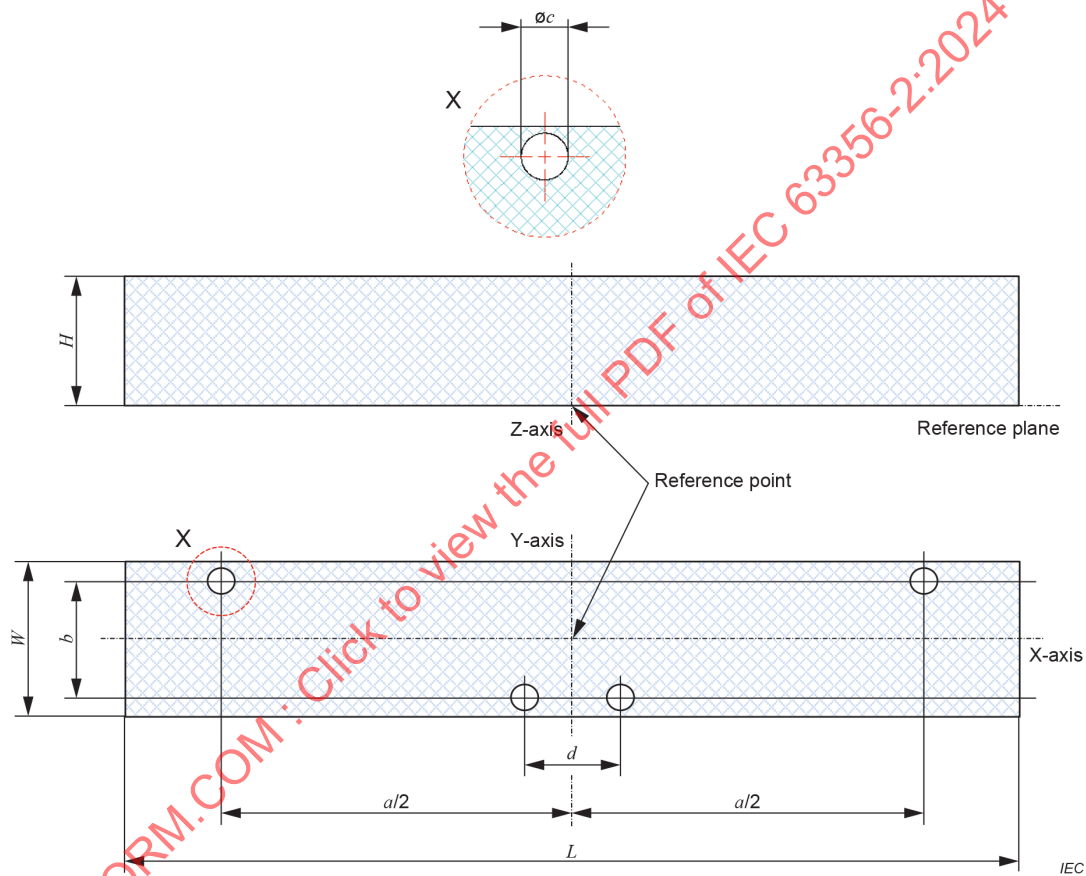
5.3.3 L14W2

The designation for this category is 'L14W2'.

The LED module demarcation of the L14W2 category is defined in Table 2 and Figure 4.

Table 2 – LED module demarcation of the L14W2 category

Dimension	Value
L	140
W	24
H	20
a	110
b	18,4
d	15
$\varnothing_c$	4,3



NOTE The top drawing shows the detail X.

Figure 4 – LED module demarcation of the L14W2 category

The X-axis and Y-axis are the symmetry axes for the outline and the crosshair lines of the mounting holes.

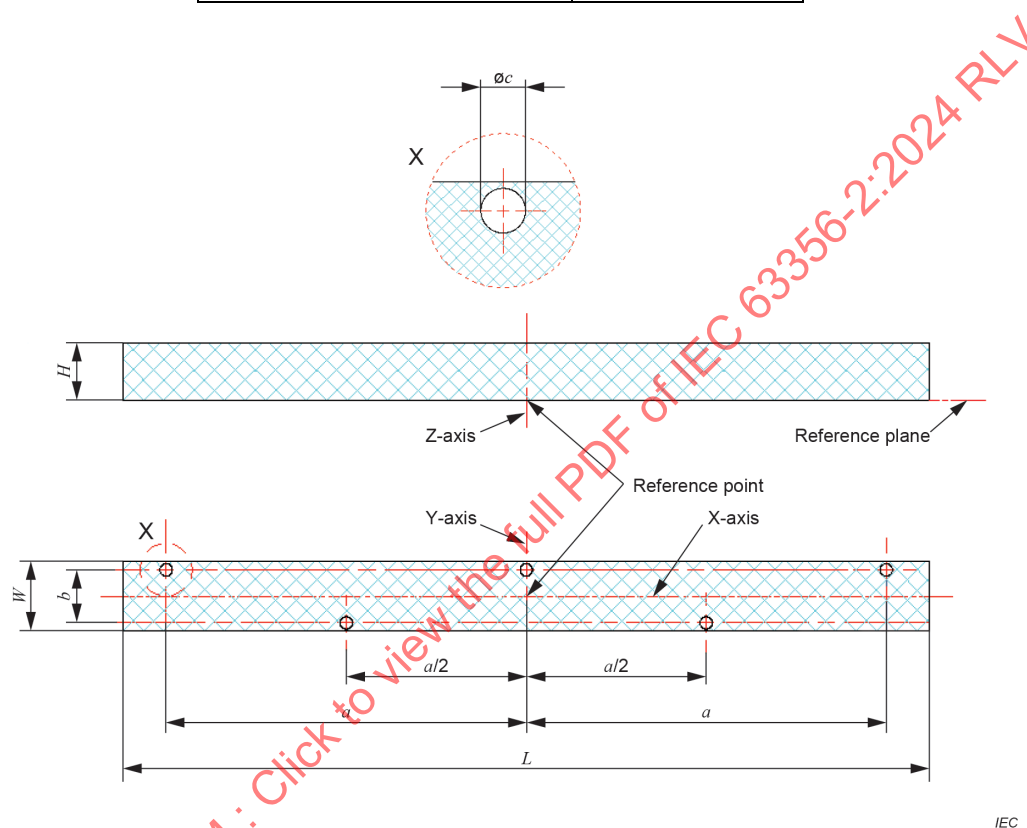
5.3.4 L28W2

The designation for this category is 'L28W2'.

The LED module demarcation of the L28W2 category is defined in Table 3 and Figure 5. The two mounting holes at the bottom of the diagram of Figure 5 are optional.

Table 3 – LED module demarcation of the L28W2 category

Dimension	Value
L	280
W	24
H	20
a	125
b	18,4
$\varnothing c$	4,3



IEC

NOTE The top drawing shows the detail X.

Figure 5 – LED module demarcation of the L28W2 category

The X-axis is the symmetry axis for the outline and the crosshair lines of the mounting holes.

The Y-axis is the symmetry axis for the outline and mounting holes.

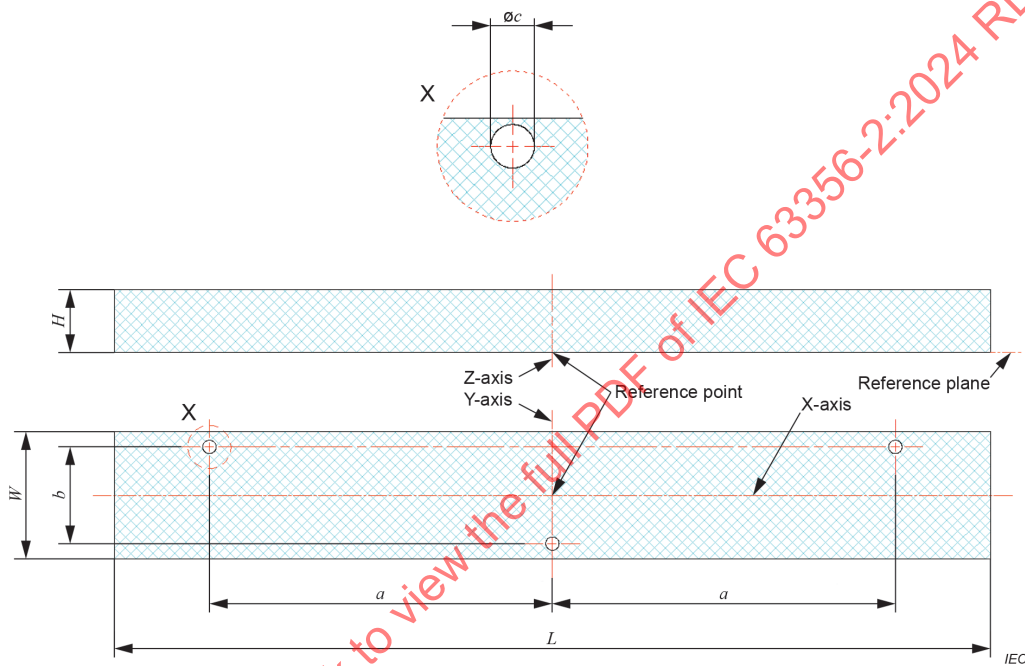
5.3.5 L28W4

The designation for this category is 'L28W4'.

The LED module demarcation of the L28W4 category is defined in Table 4 and Figure 6.

Table 4 – LED module demarcation of the L28W4 category

Dimension	Value
L	281
W	41
H	20
a	110
b	31
$\varnothing c$	4,3



NOTE The top drawing shows the detail X.

Figure 6 – LED module demarcation of the L28W4 category

The X-axis is the symmetry axis for the outline and the crosshair lines of the mounting holes.

The Y-axis is the symmetry axis for the outline and mounting holes.

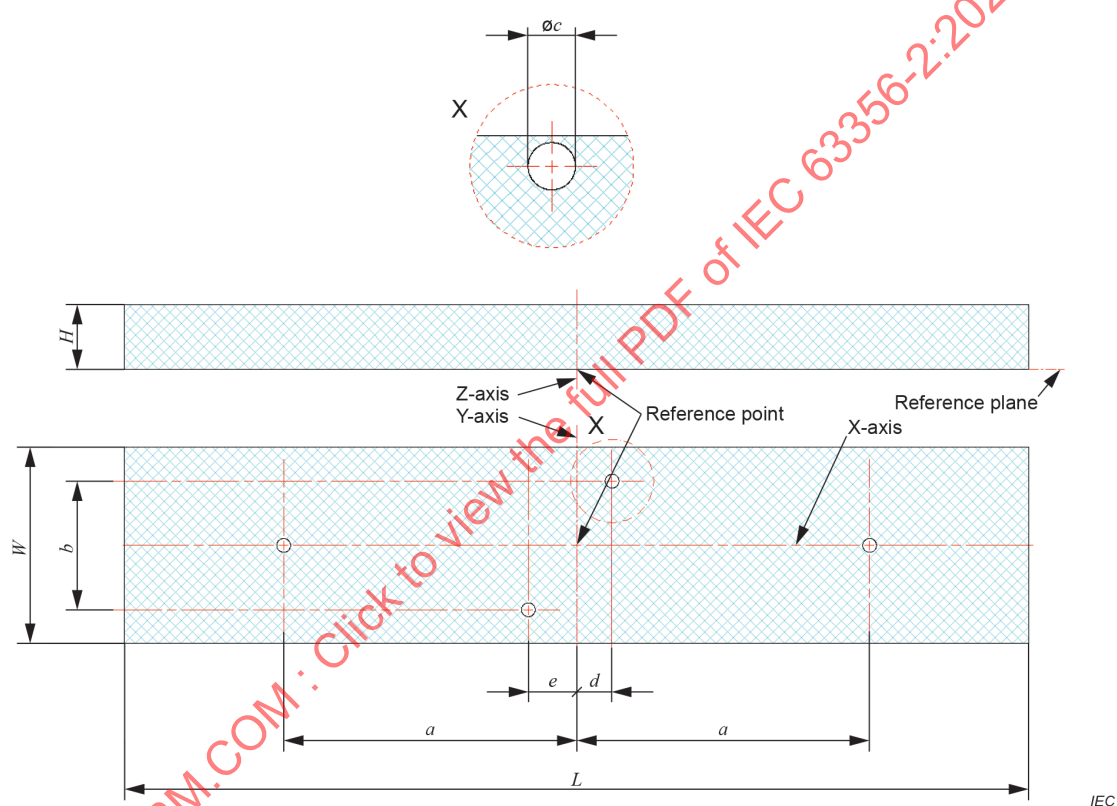
5.3.6 L28W6

The designation for this category is 'L28W6'.

The LED module demarcation of the L28W6 category is defined in Table 5 and Figure 7.

Table 5 – LED module demarcation of the L28W6 category

Dimension	Value
L	281
W	61
H	20
a	91
b	40
$\varnothing c$	4,3
d	11
e	15



NOTE The top drawing shows the detail X.

Figure 7 – LED module demarcation of the L28W6 category

The X-axis is the symmetry axis for the outline and the crosshair lines of the mounting holes.

The Y-axis is the symmetry axis for the outline and the leftmost and rightmost mounting holes.

5.3.7 L28W28

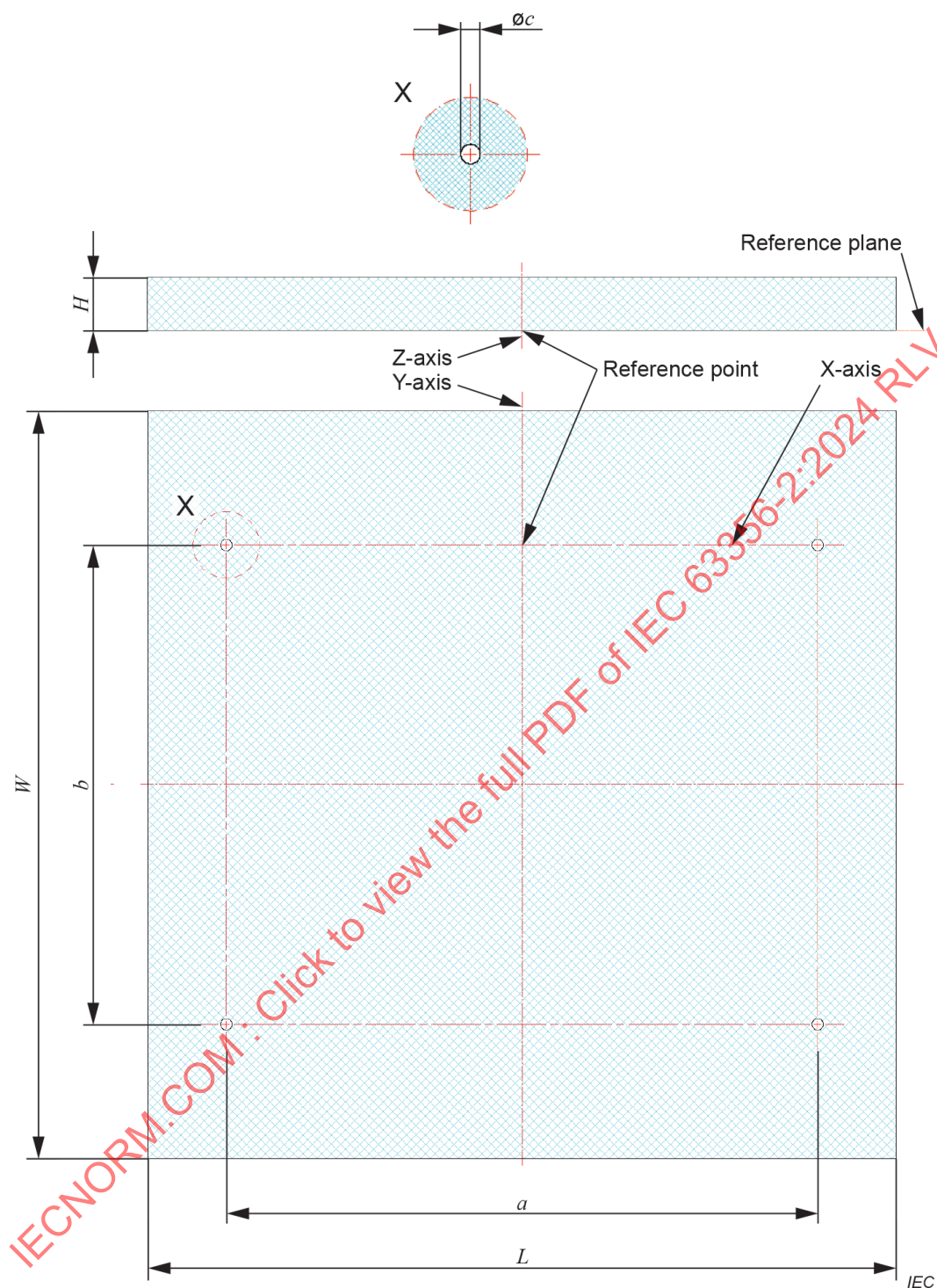
The designation for this category is 'L28W28'.

The LED module demarcation of the L28W28 category is defined in Table 6 and Figure 8.

Table 6 – LED module demarcation of the L28W28 category

Dimension	Value
L	281
W	281
H	20
a	222
b	180
$\varnothing c$	4,3

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NOTE The top drawing shows the detail X.

Figure 8 – LED module demarcation of the L28W28 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

5.3.8 L38W38

The designation for this category is 'L38W38'.

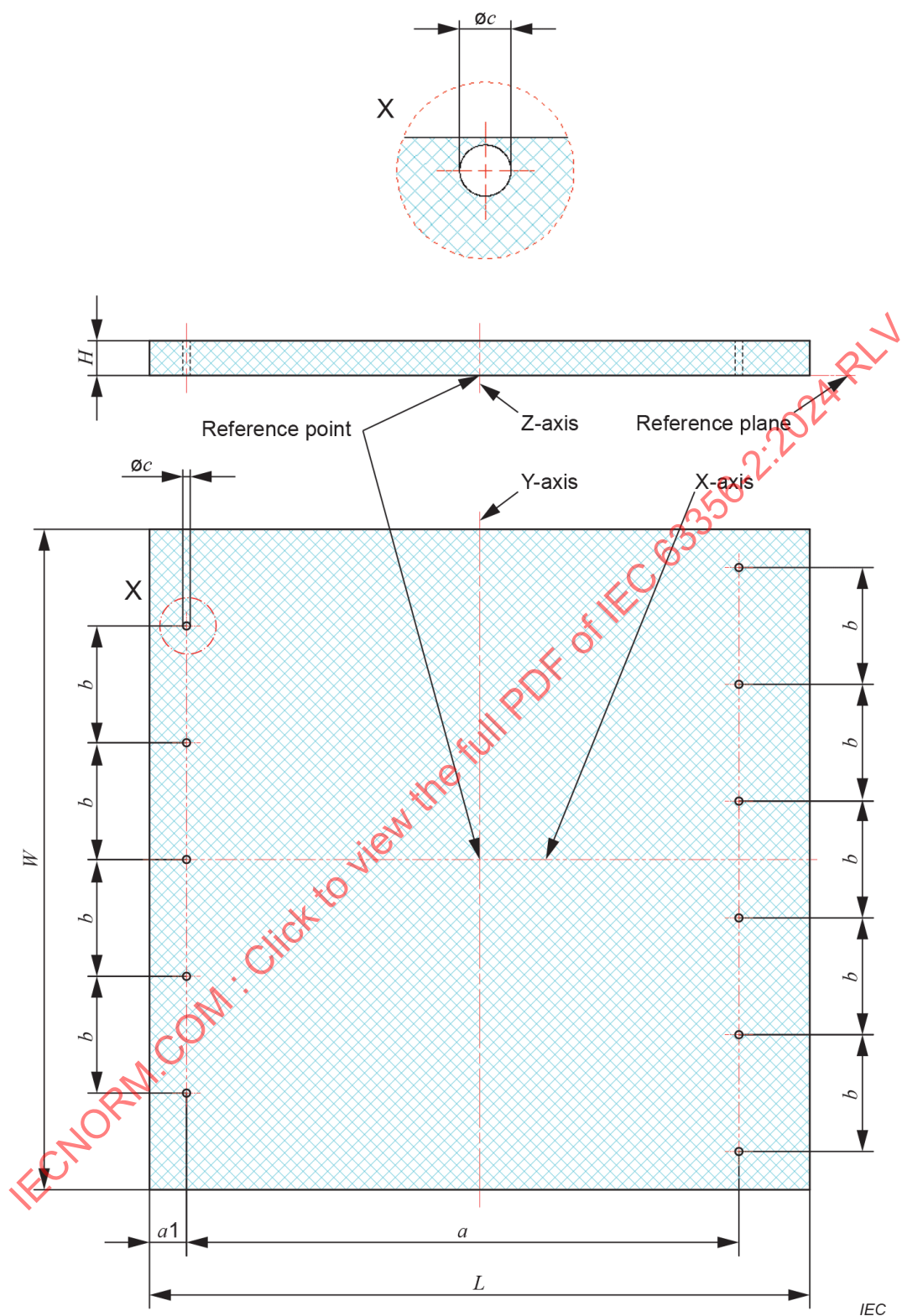
The LED module demarcation of the L38W38 category is defined in Table 7 and Figure 9.

Mounting holes not being in the corners of the LED module are optional.

Table 7 – LED module demarcation of the L38W38 category

Dimension	Value
L	381
W	381
H	20
a	371,9
$a1$	21,3
b	67,2
$\varnothing c$	4,3

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NOTE The top drawing shows the detail X.

Figure 9 – LED module demarcation of the L38W38 category

The X-axis is the symmetry axis for the outline and the mounting holes.

The Y-axis is the symmetry axis for the outline and the crosshair lines of mounting holes.

5.3.9 L56W56

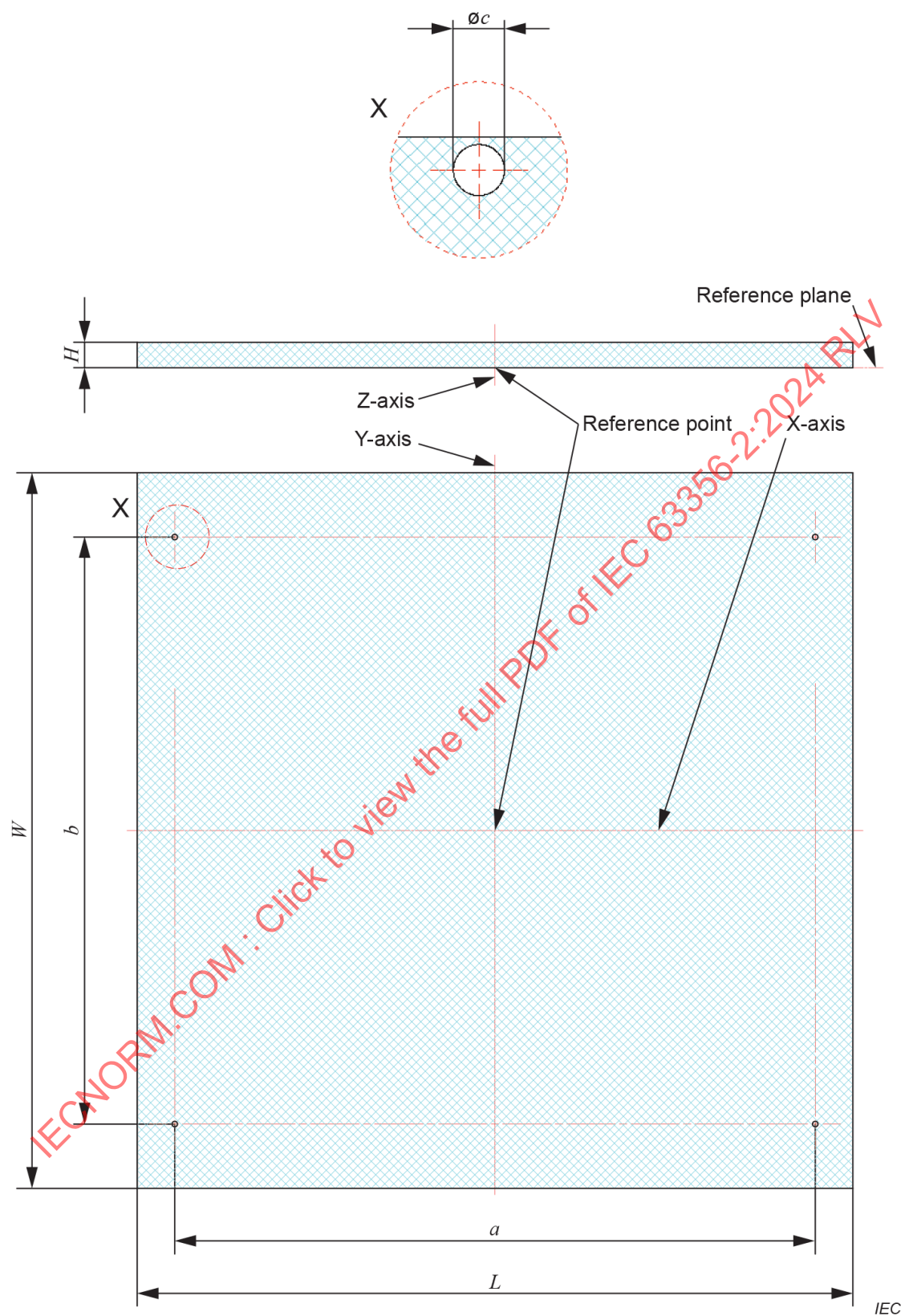
The designation for this category is 'L56W56'.

The LED module demarcation of the L56W56 category is defined in Table 8 and Figure 10.

Table 8 – LED module demarcation of the L56W56 category

Dimension	Value
L	562
W	562
H	20
a	503
b	461
$\varnothing_c$	4,3

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NOTE The top drawing shows the detail X.

Figure 10 – LED module demarcation of the L56W56 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

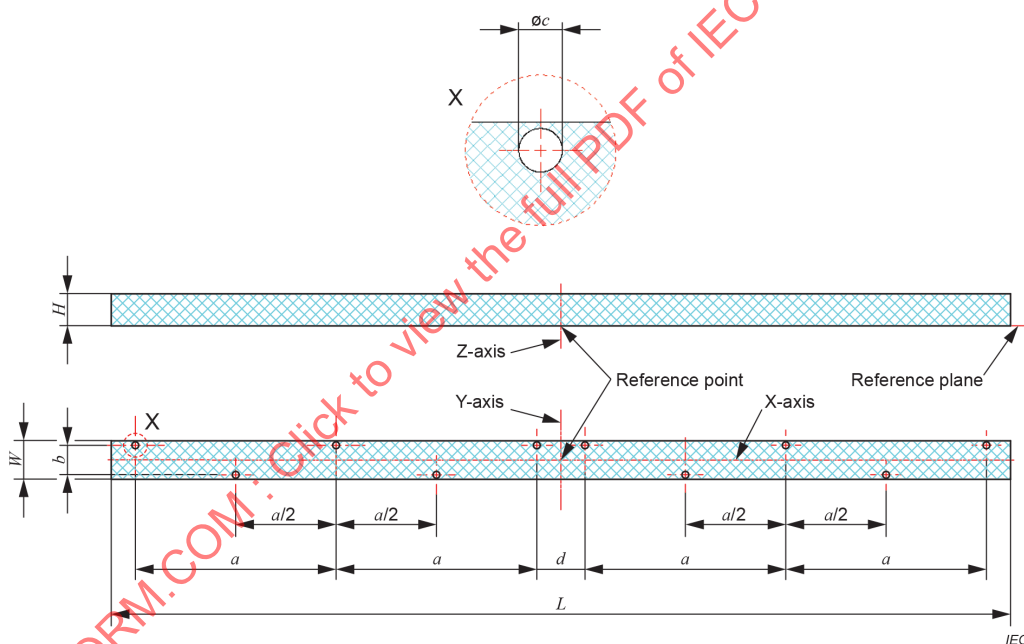
5.3.10 L56W2

The designation for this category is 'L56W2'.

The LED module demarcation of the L56W2 category is defined in Table 9 and Figure 11. The four mounting holes at the bottom of the diagram of Figure 11 are optional.

Table 9 – LED module demarcation of the L56W2 category

Dimension	Value
L	560
W	24
H	20
a	125
b	18,4
d	30
$\varnothing c$	4,3



NOTE The top drawing shows the detail X.

Figure 11 – LED module demarcation of the L56W2 category

The X-axis is the symmetry axis for the outline and the crosshair lines of the mounting holes.

The Y-axis is the symmetry axis for the outline and mounting holes.

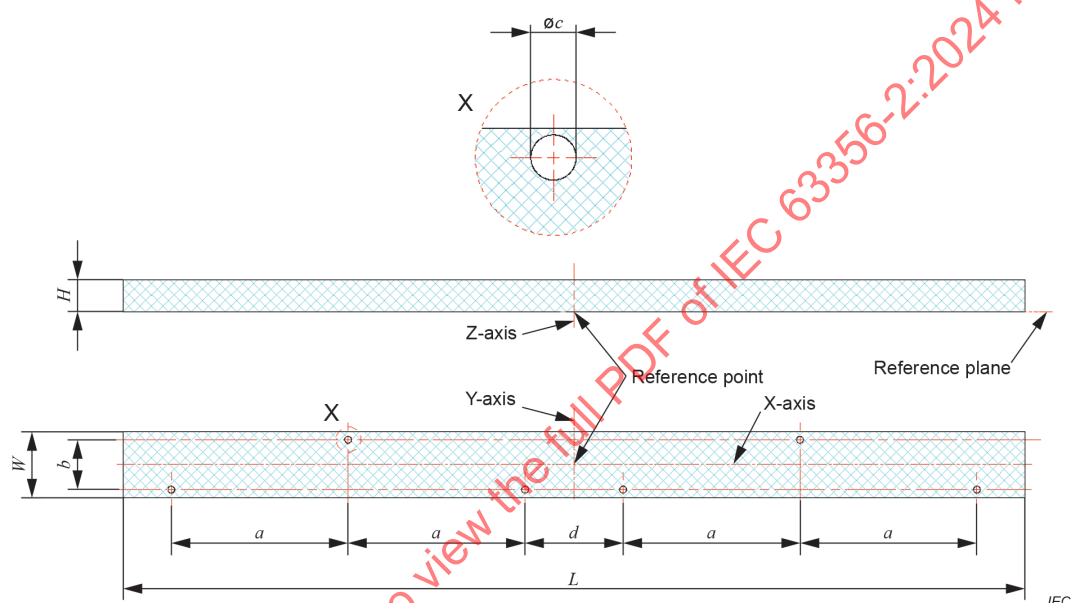
5.3.11 L56W4

The designation for this category is 'L56W4'.

The LED module demarcation of the L56W4 category is defined in Table 10 and Figure 12.

Table 10 – LED module demarcation of the L56W4 category

Dimension	Value
L	561
W	41
H	20
a	110
b	31
$\varnothing c$	4,3
d	61



NOTE The top drawing shows the detail X.

Figure 12 – LED module demarcation of the L56W4 category

The X-axis is the symmetry axis for the outline and the crosshair lines of the mounting holes.

The Y-axis is the symmetry axis for the outline and mounting holes.

5.3.12 L112W2

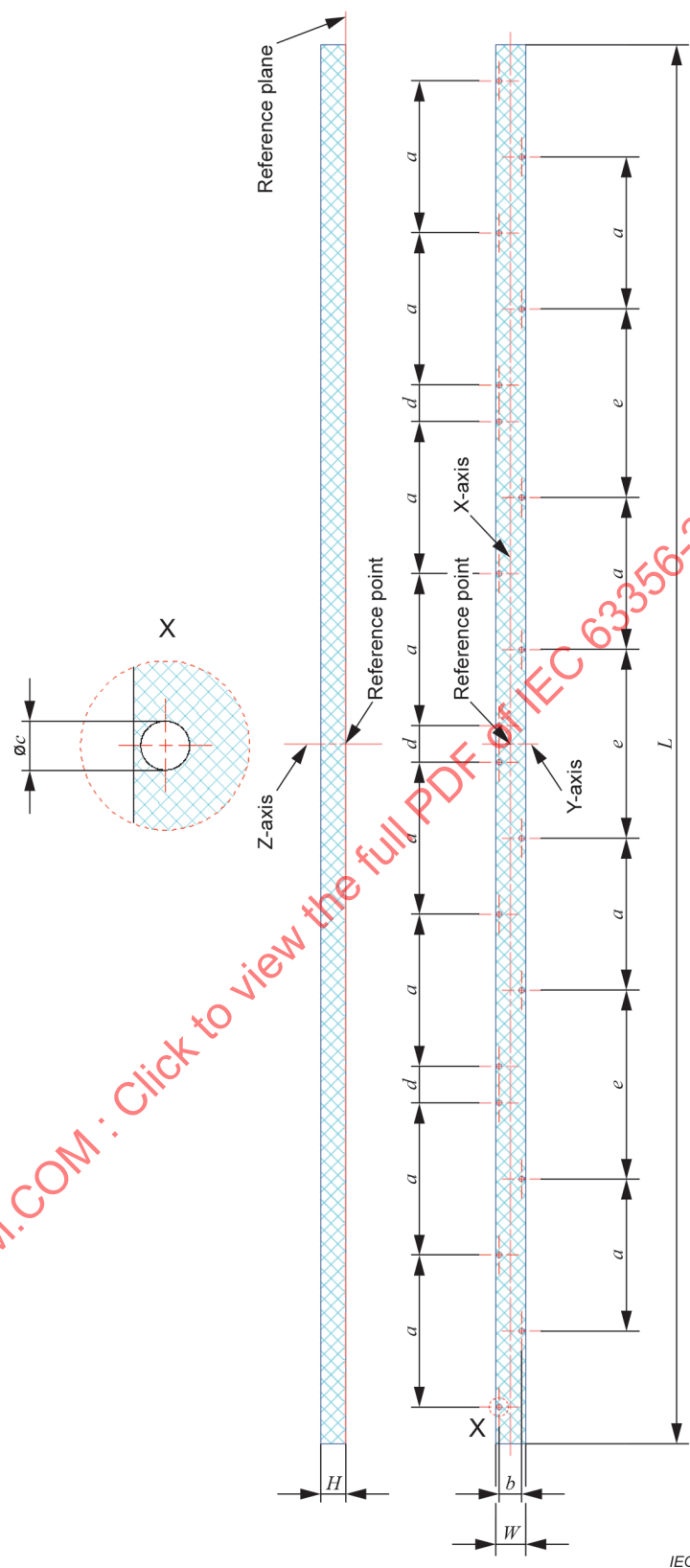
The designation for this category is 'L112W2'.

The LED module demarcation of the L112W2 category is defined in Table 11 and Figure 13.

Table 11 – LED module demarcation of the L112W2 category

Dimension	Value
<i>L</i>	1 120
<i>W</i>	24
<i>H</i>	20
<i>a</i>	125
<i>b</i>	18,4
Øc	4,3
d	30
e	155

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NOTE The drawing on the left shows the detail X.

Figure 13 – LED module demarcation of the L112W2 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

5.3.13 L115W2

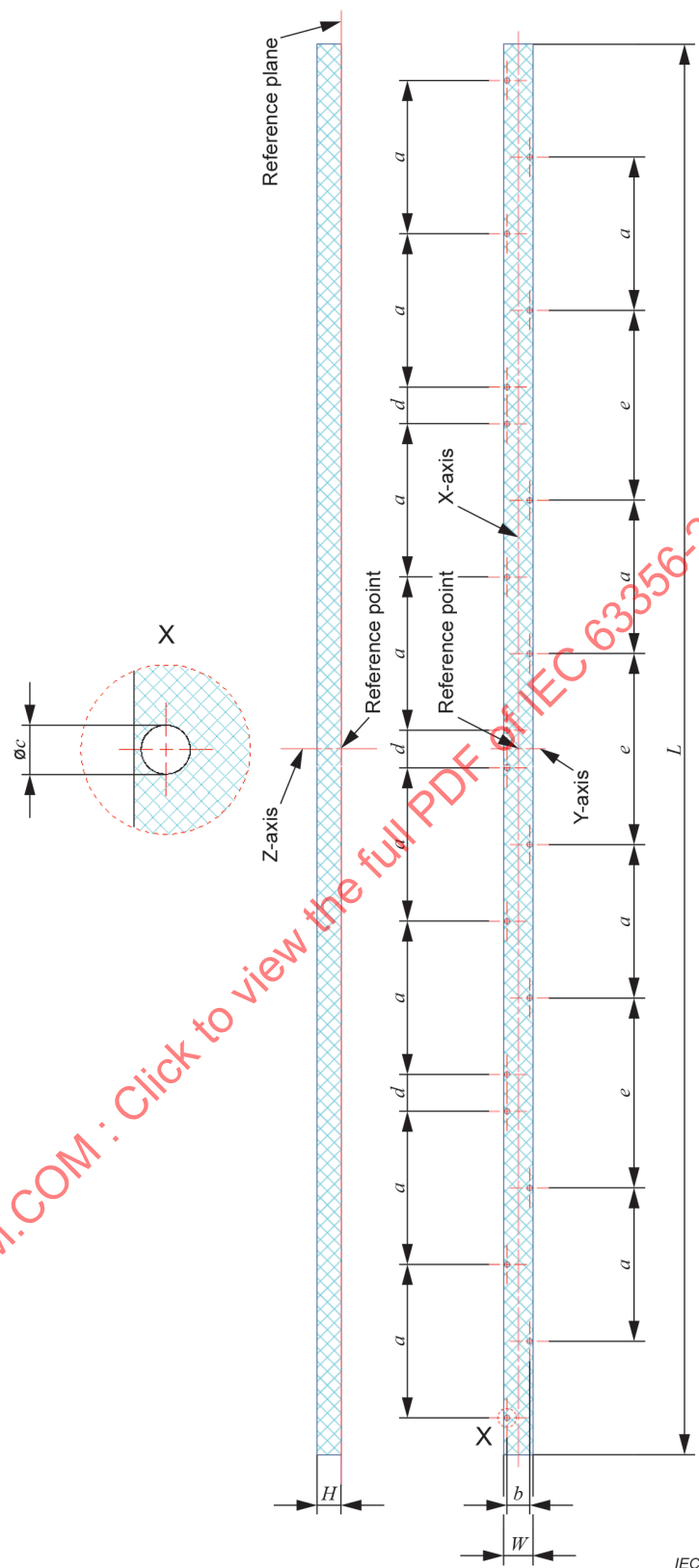
The designation for this category is 'L115W2'.

The LED module demarcation of the L115W2 category is defined in Table 12 and Figure 14.

Table 12 – LED module demarcation of the L115W2 category

Dimension	Value
L	1 150
W	24
H	20
a	125
b	18,4
$\varnothing_c$	4,3
d	30
e	155

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NOTE The drawing on the left shows the detail X.

Figure 14 – LED module demarcation of the L115W2 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

5.3.14 L140W2

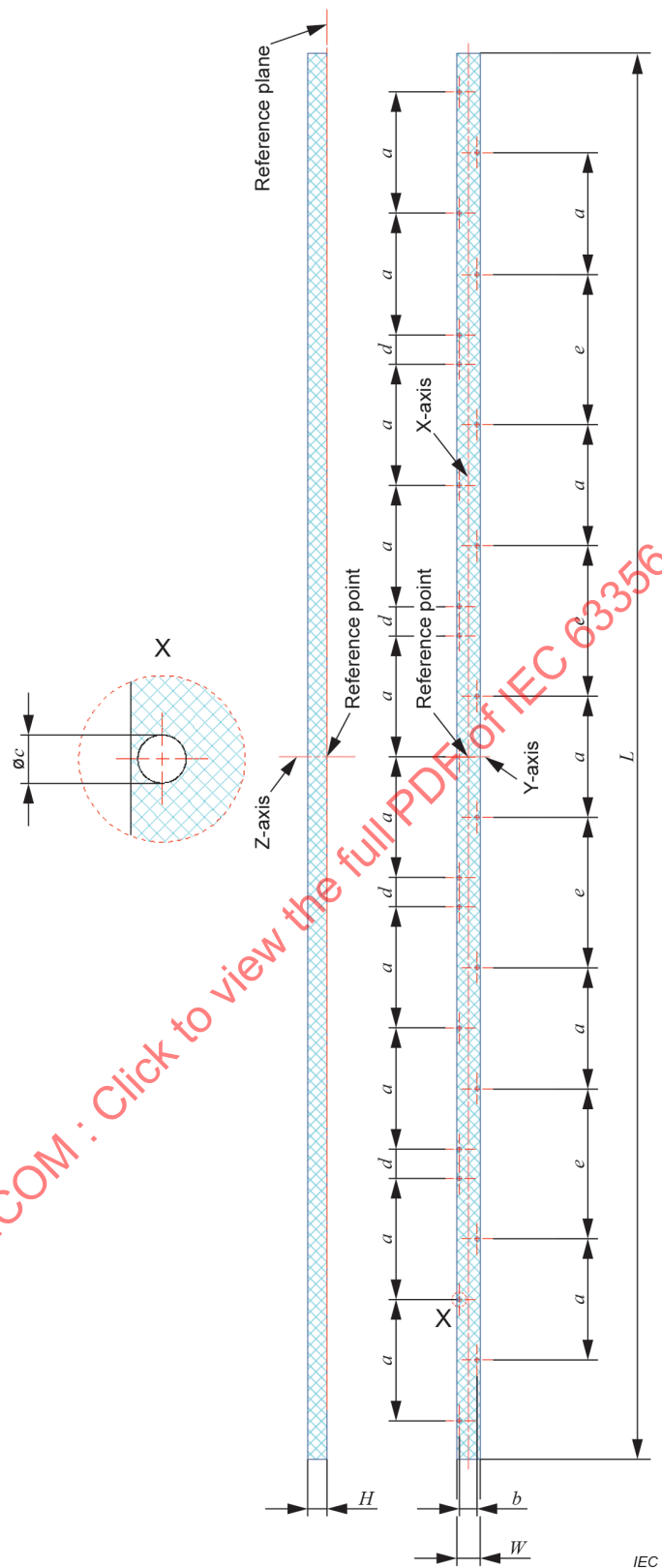
The designation for this category is 'L140W2'.

The LED module demarcation of the L140W2 category is defined in Table 13 and Figure 15.

Table 13 – LED module demarcation of the L140W2 category

Dimension	Value
<i>L</i>	1 400
<i>W</i>	24
<i>H</i>	20
<i>a</i>	125
<i>b</i>	18,4
$\varnothing_c$	4,3
<i>d</i>	30
<i>e</i>	155

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NOTE The drawing on the left shows the detail X.

Figure 15 – LED module demarcation of the L140W2 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

5.3.15 L145W2

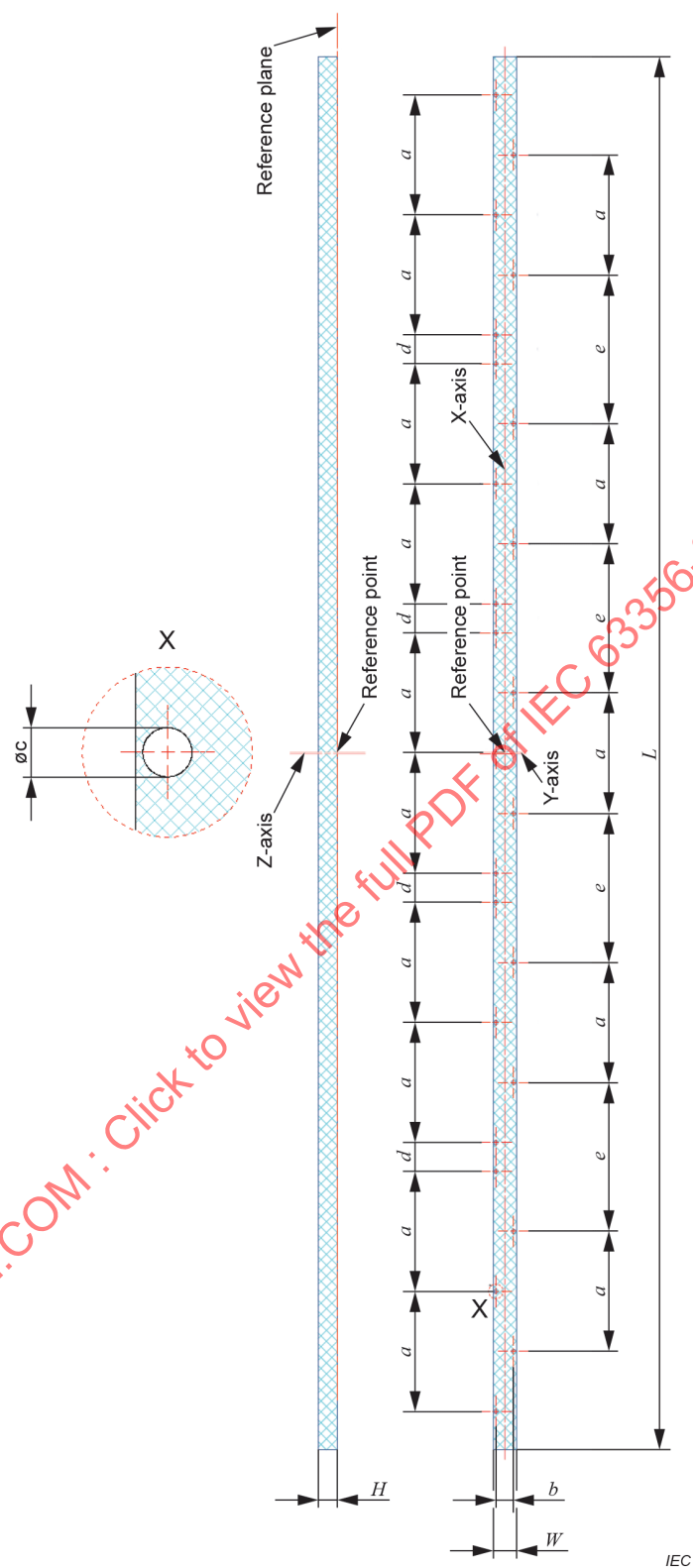
The designation for this category is 'L145W2'.

The LED module demarcation of the L145W2 category is defined in Table 14 and Figure 16.

Table 14 – LED module demarcation of the L145W2 category

Dimension	Value
L	1 450
W	24
H	20
a	125
b	18,4
$\varnothing_c$	4,3
d	30
e	155

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NOTE The drawing on the left shows the detail X.

Figure 16 – LED module demarcation of the L145W2 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

5.3.16 L30W1

The designation for this category is 'L30W1'.

The LED module demarcation of the L30W1 category is defined in Figure 17.

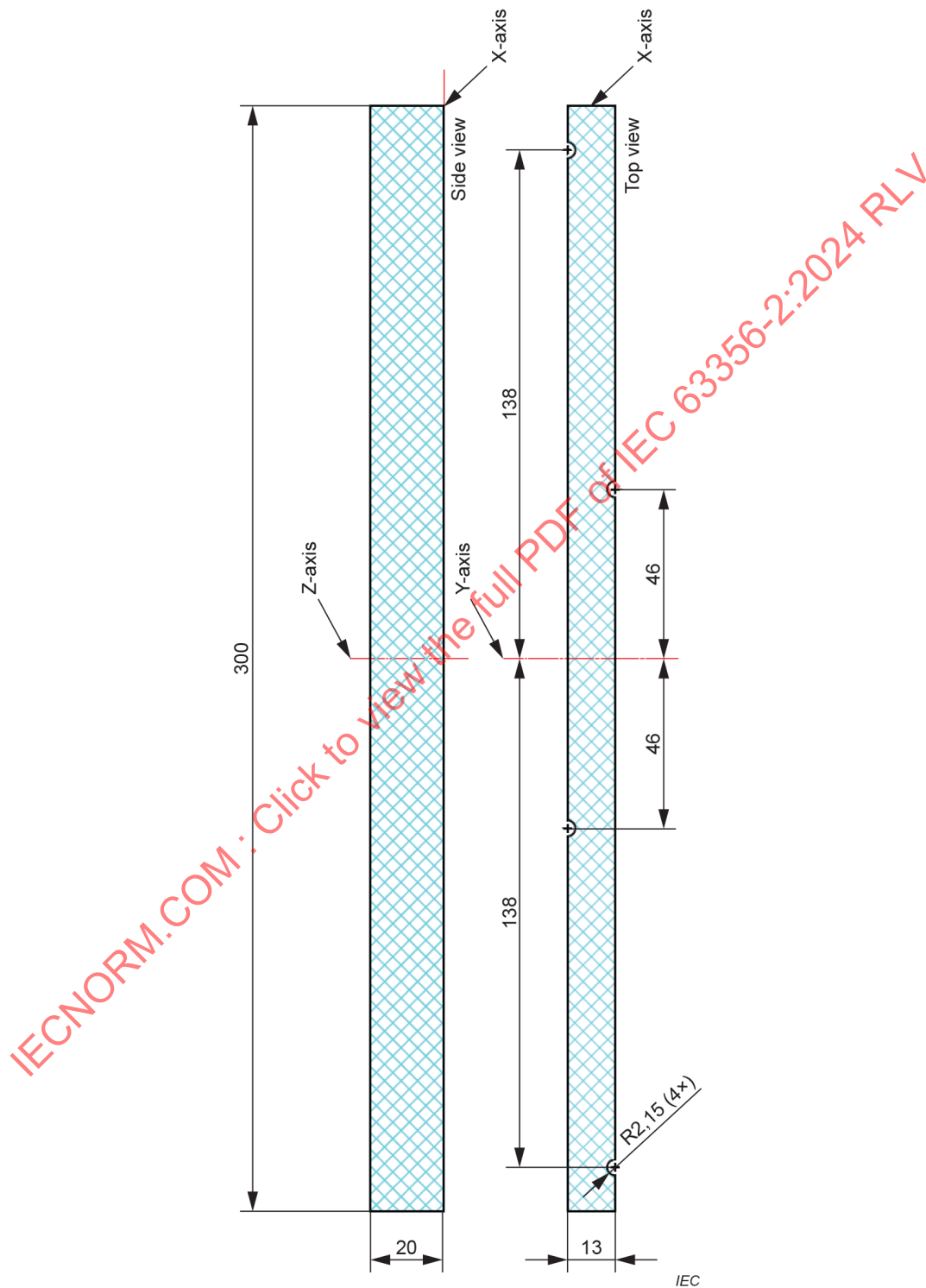


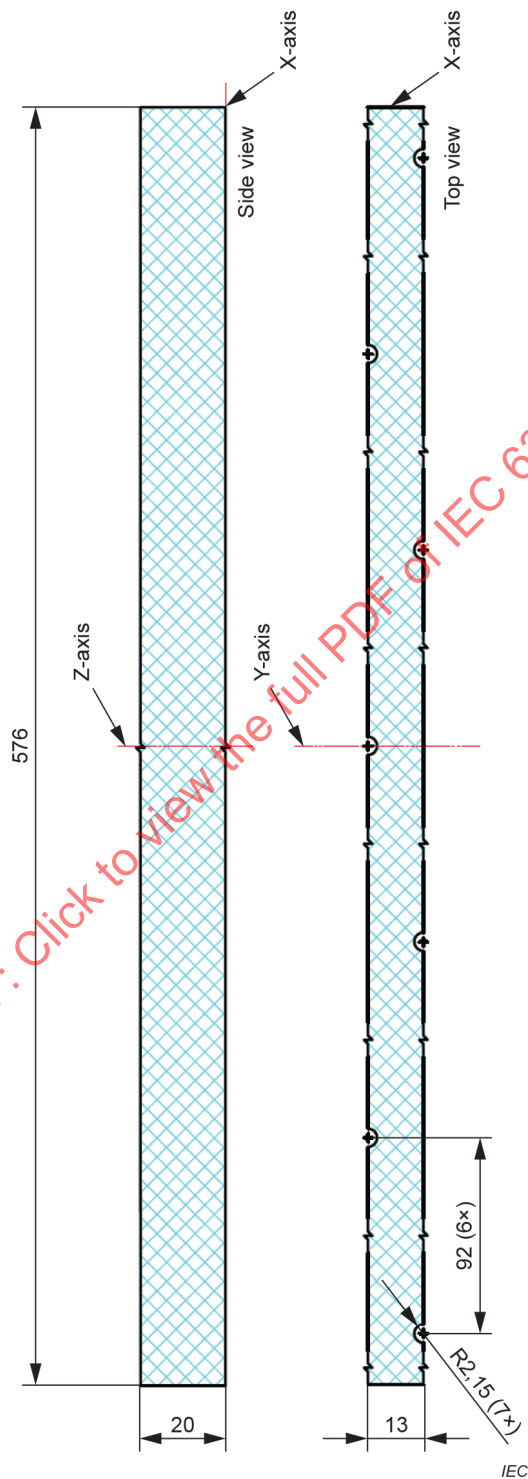
Figure 17 – LED module demarcation of the L30W1 category

The X-axis and Y-axis are the symmetry axes for the outline.

5.3.17 L58W1

The designation for this category is 'L58W1'.

The LED module demarcation of the L58W1 category is defined in Figure 18.



NOTE The X-axis is not to scale.

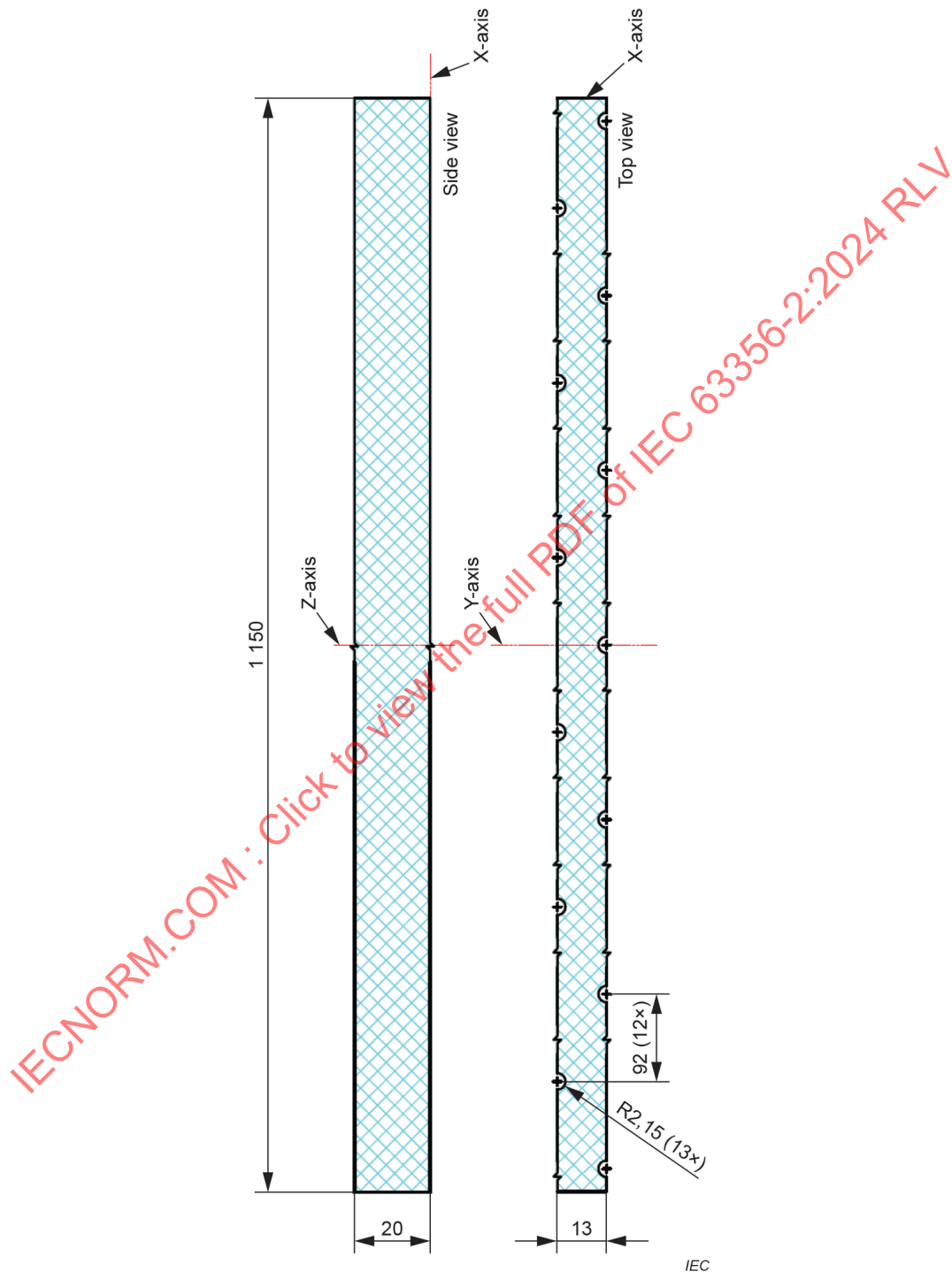
Figure 18 – LED module demarcation of the L58W1 category

The X-axis and Y-axis are the symmetry axes for the outline.

5.3.18 L115W1

The designation for this category is 'L115W1'.

The LED module demarcation of the L115W1 category is defined in Figure 19.



NOTE The X-axis is not to scale.

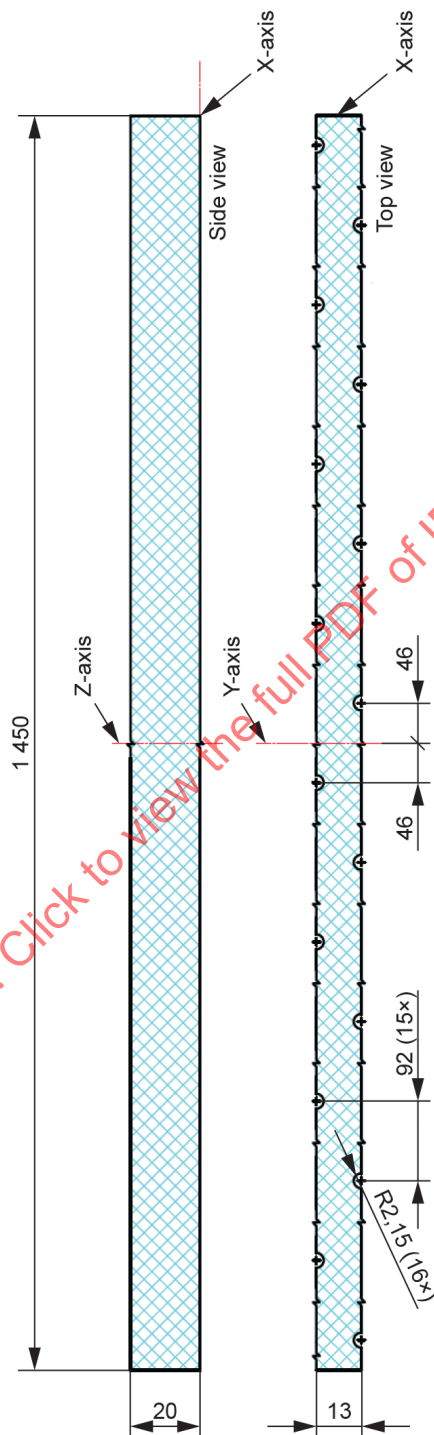
Figure 19 – LED module demarcation of the L115W1 category

The X-axis and Y-axis are the symmetry axes for the outline.

5.3.19 L145W1

The designation for this category is 'L145W1'.

The LED module demarcation of the L145W1 category is defined in Figure 20.



IEC

NOTE The X-axis is not to scale.

Figure 20 – LED module demarcation of the L145W1 category

The X-axis and Y-axis are the symmetry axes for the outline.

6 Circular LED modules with a circular light emitting surface for spot lighting

NOTE Clause 6 is taken from Zhaga Book 10 Edition 1.2.

6.1 General

LED modules with a circular light emitting surface (LES) and having high luminance typically used in spot lighting applications are intended to be fixed to a luminaire heat sink by means of screws. The LED modules specified in this Clause 6 comprise a single inseparable unit and are intended to be installed and replaced by skilled persons only.

The circular LES diameter specifications are given in Table 15 for each LES designation. The light output distribution is primarily Lambertian, to enable luminaire optics to shape an application-specific light distribution independent to that of the LED module. Clause 6 specifies LED modules having either a 35 mm (D35) or 50 mm (D50) outer diameter and five different LES diameters categorized as LES6.3, LES9, LES13.5, LES19 or LES23. The complete designation of these LED modules comprises both the outer diameter and the LES category designation (e.g. D35-LES6.3).

Table 15 – LES category specifications for circular LED modules for spot lighting

LES category designation	LES diameter mm
LES6.3	$4,5 < \varnothing \leq 6,3$
LES9	$6,3 < \varnothing \leq 9,0$
LES13.5	$9,0 < \varnothing \leq 13,5$
LES19	$13,5 < \varnothing \leq 19,0$
LES23	$19,0 < \varnothing \leq 23,0$

6.2 Mechanical references

The reference plane and the reference point of an LED module with respect to (optional) TIM are specified in Figure 21 and illustrated in Figure 22 for a D50 (50 mm outer diameter) LED module. Dimensions are specified relative to either the reference point or reference plane, unless indicated otherwise. Moreover, dimensions are specified with TIM (if present) in compressed state.

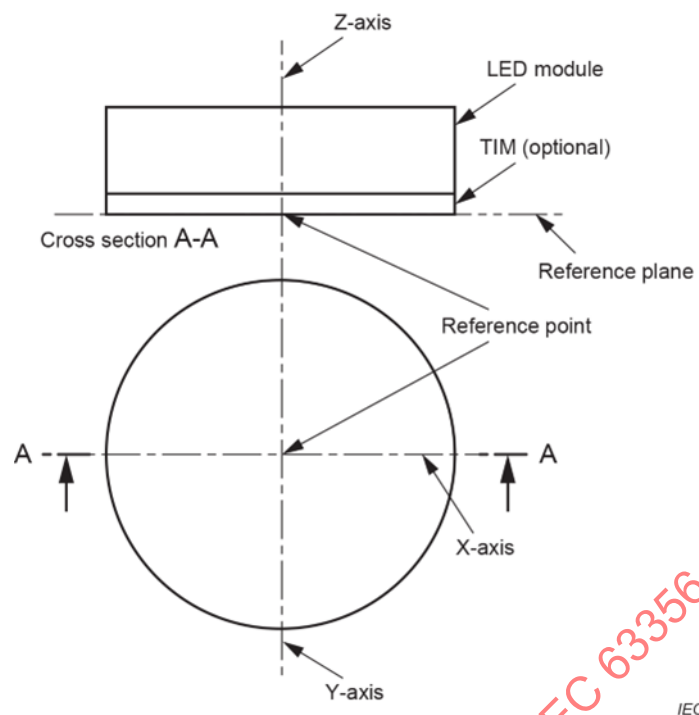


Figure 21 – Positions of the reference point and reference plane of the LED module

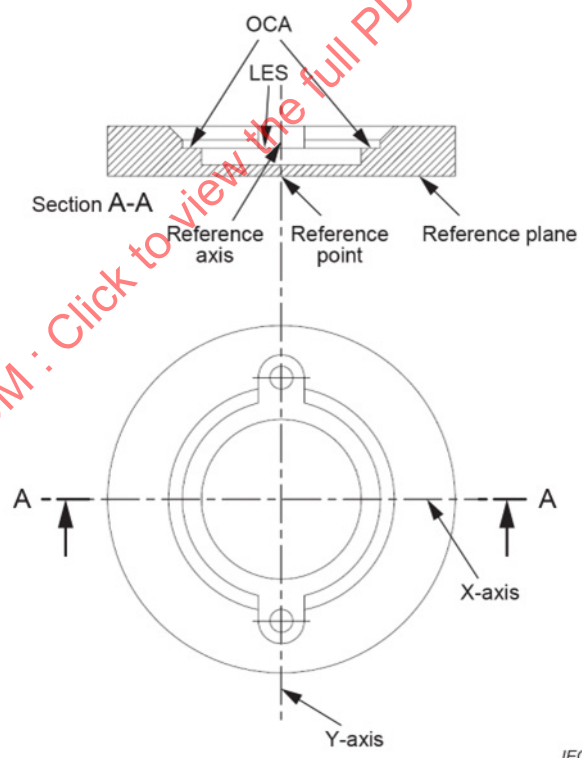


Figure 22 – Positions of the reference point, plane and axis for the LED module (example for D50 category)

6.3 Mechanical interface of the LED module

6.3.1 LED module demarcation

6.3.1.1 General

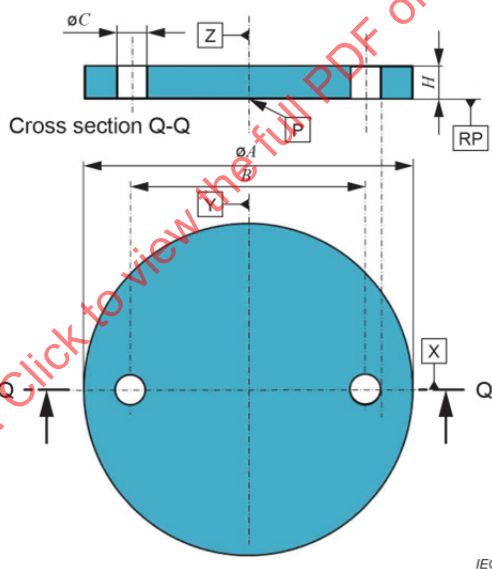
The LED module demarcations are specified in 6.3.1.2 and 6.3.1.3.

No part of the LED module (excluding the interconnect) crosses the boundaries of the LED module demarcation and no part of the luminaire (excluding the interconnect) crosses the boundaries of the LED module demarcation. The demarcation models include positions and shape for screw hole clearances.

If the LED module is applied in combination with a thermal interface material, this TIM is considered to be part of the LED module. Thus, the total height of the LED module and of the TIM (while compressed according to instructions from the LED module manufacturer) does not exceed the maximum height specified in 6.3.1.2, Figure 23, dimension H (D35 category) or 6.3.1.3, Figure 24 (D50 category).

6.3.1.2 D35 LED module demarcation

D35 LED modules have a demarcation according to the drawing in Figure 23 and with dimensions according to Table 16.



Key

- (RP) Reference plane
- (X) Reference X-axis. This is a symmetry axis for the complete model.
- (Y) Reference Y-axis. This is a symmetry axis for the complete model.
- (Z) Reference Z-axis
- (P) Reference point

The blue area indicates the inclusion limit zone for the LED module and the exclusion limit zone for the luminaire.

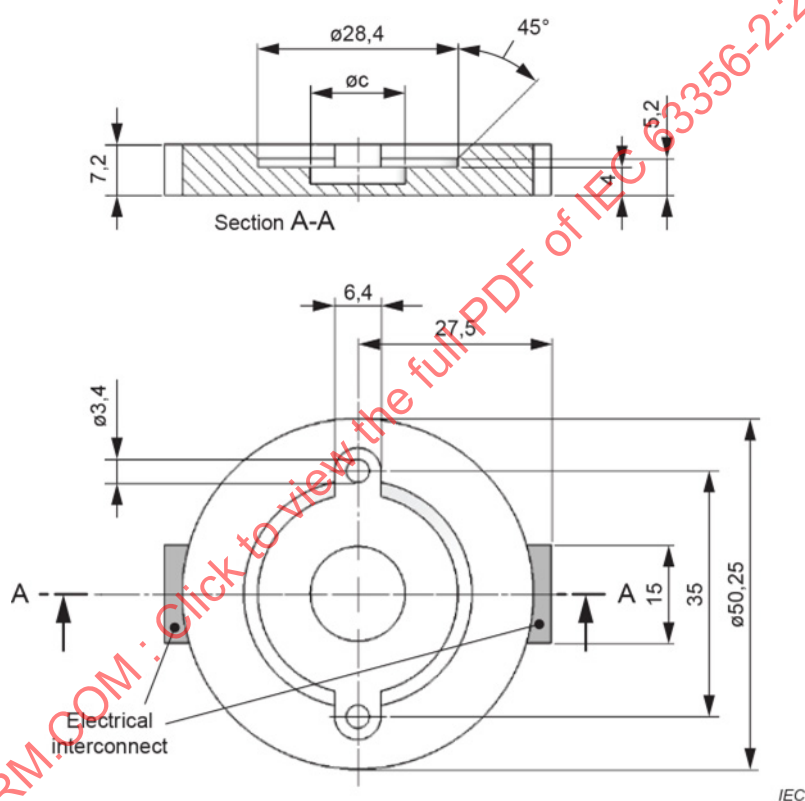
Figure 23 – Drawing of the demarcation of a D35 LED module

Table 16 – Dimensions of D35 LED module demarcation

Dimension	Value mm
$\varnothing A$	35
B	25
$\varnothing C$	3,15
H	4,0

6.3.1.3 D50 LED module demarcation

D50 LED modules including the electrical interconnect are contained within the dimensions specified in Figure 24.



$\varnothing c$ See Table 17: Maximum inner OCA diameter

Figure 24 – Drawing of the demarcation of the D50 LED module

6.3.2 Optics contact area

The optics contact area (OCA) is used as a mechanical reference plane for luminaire optics. For illustration, the optics contact area of a D35 (35 mm) LED module is shown in Figure 25. The inner diameter of the OCA for each light emitting surface (LES) category of an LED module is contained within the limit specified in Table 17. The minimum outer diameter of the OCA depends on the size category of the LED module. The height of the OCA is denoted H_{OCA} .

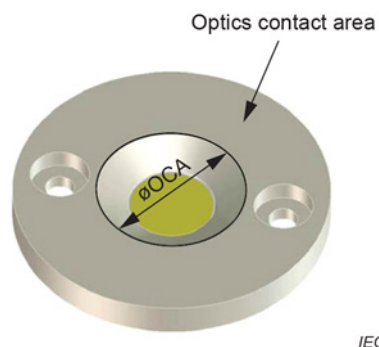


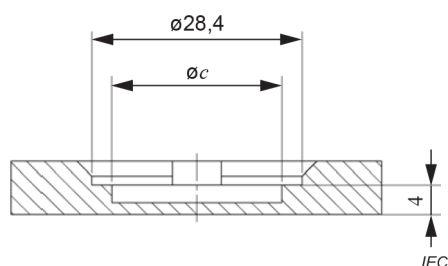
Figure 25 – Optics contact area of a D35 LED module

Table 17 – Maximum inner OCA diameter

LES category	ØOCA_{max} mm
LES6.3	11,67
LES9	13,67
LES13.5	19,17
LES19	23,2
LES23	26,2

For D35 modules, the minimum outer diameter of the OCA is the outer diameter of the module (i.e. nominal 35 mm). All the module surface is used as the OCA. The OCA of the LED module features mounting holes and can also show additional recessed features. No such features (e.g. screw heads) are allowed to extend above the OCA. The height of the OCA (H_{OCA}) falls within the range specified in Table 18.

For D50 modules, there is a fixed minimum outer diameter of the OCA, as shown in Figure 24, section A-A and Figure 26. The outer diameter of the OCA is measured at the height of the plane surface which extends between the diameters $\text{Ø}28,4$ and Ø_c in Figure 26. No mechanical features protruding from the OCA are allowed. The height of the OCA (H_{OCA}) falls within the range given in Table 18.



Ø_c See Table 17: Maximum inner OCA diameter

Figure 26 – Dimensions of OCAs for a D50 category

Table 18 – Minimum and maximum OCA heights

LED module category	OCA height H_{OCA} mm
D35	3,0 to 4,0
D50	3,5 to 4,0

6.3.3 Requirements on screw holes

6.3.3.1 D35 module

D35 LED modules have either counterbored screw holes or countersunk screw holes. In either case, the LED module manufacturer specifies the screw type for which the LED module has been designed in the product literature.

The geometry of the screw holes is such that a screw compliant with the specification in the manufacturer's product literature fits in the screw hole and the maximum height of the assembly (LED module and screws) is less than or equal to the height of the OCA (H_{OCA}).

6.3.3.2 D50 module

There are no requirements on screw holes for D50 LED modules.

6.3.4 LED module electrical interconnect

6.3.4.1 D35 module

There are no requirements for the electrical interconnect of D35 LED modules.

6.3.4.2 D50 module

An electrical interconnect is placed symmetrically with respect to the LED module X-axis (see Figure 22). The interconnect does not exceed the maximum outline given in Figure 24. If a plug is used it will have a width of maximum 14 mm and a maximum length (in plugging direction) of 8 mm. Any wires exiting the module are within the electrical interconnect shown in Figure 24.

6.3.5 Luminaire exclusion limits for electrical interconnects

6.3.5.1 D35 module

There are no luminaire exclusion limits for electrical interconnects of D35 LED modules.

6.3.5.2 D50 module

The luminaire design provides adequate space for an electrical connection as specified in 6.3.4.2.

In addition to this exclusion limit for electrical interconnects, the thickness of connection wires is taken into account.

6.3.6 Inner feature

LED modules can contain any kind of mechanical "inner feature" shown as the dense hatched area of Figure 27, such as light mixing elements, mechanical holding elements, or electrical insulation elements. Within the diameter $\varnothing_c$ shown in Figure 27 and specified as $\varnothing_{OCA}$ in Figure 25 for D35 and $\varnothing_c$ specified in Figure 24 for D50, the LED module can contain any kind of mechanical "inner feature". Any such mechanical "inner feature" does not exceed the height b as specified in Table 19 and shown in Figure 27. The inner feature may contain an extension of the OCA or even an OCA of smaller size.

If the LED module has a cover above one or more LEDs, then the cover does not exceed 20 mm measured from the reference plane (see Figure 21).

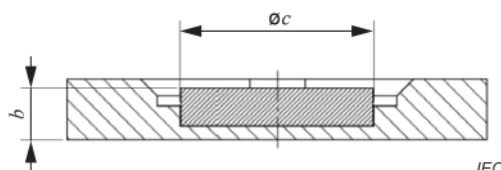


Figure 27 – Maximum inner feature outlines

Table 19 – Maximum height b of inner feature

LES category	D35 LED module mm	D50 LED module mm
LES6.3	4,0	
LES9	4,0	5,0
LES13.5	4,0	5,5
LES19		6,4
LES23		7,2

6.3.7 Luminaire mechanical properties

The module mounting surface of the luminaire has a diameter greater than the demarcation diameter (see Figure 23 and Figure 24) with means for screwing the LED module (e.g. M3 threads or holes for self-cutting screws) at points corresponding to the LED module geometry.

7 LEDni modules with a rectangular shape and a circular light emitting surface

NOTE Clause 7 is taken from Zhaga Book 12 Edition 1.3.

7.1 General

Non-integrated LED modules (LEDni modules) specified in this Clause 7 are intended to be mounted on a heat sink by means of a holder and to be connected to a separate electronic controlgear. These LEDni modules and holders are intended to be installed and replaced by luminaire manufacturers or skilled persons only.

The LEDni modules in Clause 7 have circular light emitting surfaces (LES) that comply with the diameter specifications given in Table 20 for each LES designation. The light output is essentially Lambertian to enable the luminaire optics to shape the application's desired light distribution.

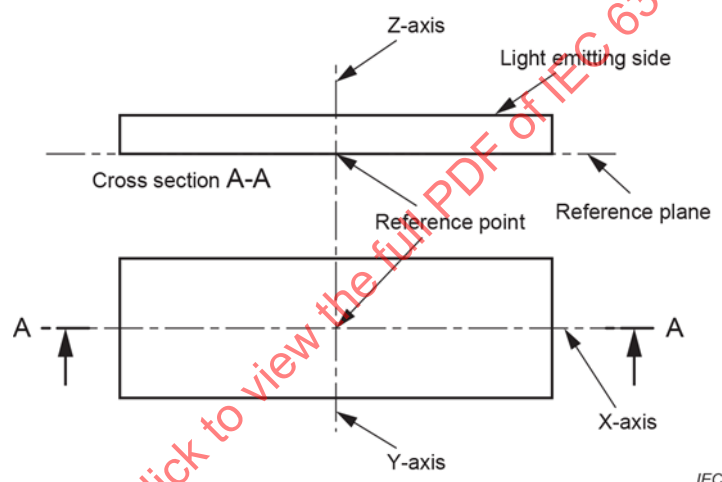
The complete designation of these LEDni modules comprises both the category designation (see 7.3 and Table 21) and the LES category designation (e.g. C28x28-LES6.3).

Table 20 – Circular LES category specifications for LEDni modules

LES category designation	LES diameter mm
LES6.3	$4,5 < \varnothing \leq 6,3$
LES9	$6,3 < \varnothing \leq 9,0$
LES13.5	$9,0 < \varnothing \leq 13,5$
LES19	$13,5 < \varnothing \leq 19,0$
LES23	$19,0 < \varnothing \leq 23,0$
LES30	$23,0 < \varnothing \leq 30,0$

7.2 Mechanical references for an LEDni module

The reference plane and the reference point of an LEDni module are shown in Figure 28. Dimensions are specified relative to either the reference point or the reference plane, unless indicated otherwise.

**Figure 28 – Positions of the reference point and the reference plane of an LEDni module**

By way of example, the red shape in Figure 29 indicates the outline of an LEDni module. By definition, the LEDni module border is the rectangle that fits the LEDni module outline such that the average deviation between the LEDni module outline and LEDni module border is minimal. In the case of an LEDni module with recessed corners, the area of these recessed corners is ignored for the mechanical references according to this definition. Also, by definition, both the X-axis and the Y-axis are axes of symmetry of the LEDni module border. The mechanical reference point is where the X-axis and the Y-axis cross.

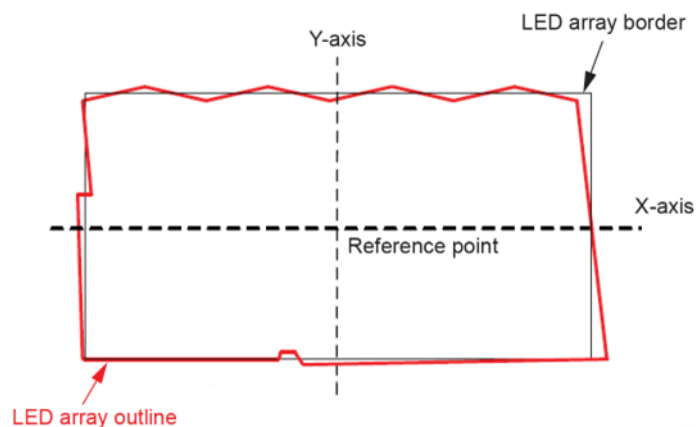


Figure 29 – Definition of the LEDni module border and mechanical references

7.3 Mechanical interface of the LEDni module

This document specifies seven LEDni module categories identified by a designation, $CW \times L$, where W is the LEDni module width and L is the LEDni module length. The designations are C24x24, C28x28, C20x24, C19x19, C16x19, C13.5x13.5 and C12x15. For each of these categories, the following are specified:

- the outline of the LEDni module;
- the position and size of the minimum contact areas;
- the height of the PCB;
- the position and size of the minimum mounting holes or recessed corners.

NOTE These mounting holes or recessed corners are optional but if they are present, the dimensional specifications are given in 7.4.3 and 7.4.4.

For each LEDni module category specified in this document, one or more of the following light emitting surface (LES) diameters can be used: LES6.3, LES9, LES13.5, LES19, LES23 or LES30. For each combination of an LEDni module category and an LES diameter, the following are specified:

- the inclusion limit zone ($\phi_{\text{keep-in}}$) being the area on the PCB where components can be placed;
- the position and size of the maximum contact areas.

7.4 LEDni module outlines

7.4.1 General

Mounting features such as holes or recessed corners are optional for LEDni modules specified in Clause 7. However, if they are present, then the relevant demarcation zones for the LEDni module outline are specified in 7.4.3 and 7.4.4. LEDni modules in the C24x24 and C28x28 categories can have mounting holes. However, LEDni modules in the C20x24, C19x19, C16x19, C13.5x13.5 and C12x15 categories are too small to accommodate mounting holes but can have recessed corner mounting features. Table 21 details the dimensions of each LEDni module category specified in 7.4.2, 7.4.3 and 7.4.4. The dimensional quantities in Table 21 are as follows:

- W : width of the LEDni module;
- L : length of the LEDni module;
- D_W : width of the demarcation zone;
- S_X : hole centre offset from the y-axis;

- S_y : hole centre offset from the x-axis;
- $\varnothing H$: hole diameter;
- D_x : electrical contact offset from the y-axis;
- D_y : electrical contact offset from the x-axis;
- L_p min: minimum length of each side of an LEDni module electrical contact area;
- L_p^* : length of each side of the overlap area for an LEDni module electrical contact.

Table 21 – Values of dimensions for LEDni module categories^a

LEDni module category designation	W mm	L mm	D_W mm	S_x mm	S_y mm	$\varnothing H$ mm	D_x mm	D_y mm	L_p min mm	L_p^* mm
C28x28	28,0	28,0	0,2	11,4	11,4	3,1	11,1	11,1	2,0	1,7
C24x24	24,0	24,0	0,2	9,4	9,4	3,1	9,1	9,1	2,0	1,7
C20x24	20,0	24,0	0,2	-	-	-	9,1	7,1	2,0	1,7
C19x19	19,0	19,0	0,2	-	-	-	7,525	7,525	1,75	1,45
C16x19	16,0	19,0	0,2	-	-	-	7,525	6,025	1,75	1,45
C13.5x13.5	13,5	13,5	0,2	-	-	-	5,25	5,25	1,3	1,3
C12x15	12,0	15,0	0,2	-	-	-	5,6	4,1	1,6	1,3

^a The values in this table are nominal values. The number of digits behind the comma does not define the required accuracy.

7.4.2 LEDni modules without mounting features

The outline of an LEDni module not having mounting holes or recessed corners is contained within the demarcation zone indicated by the green area in Figure 30. The values of dimensional quantities for each LEDni module category are given in Table 21.

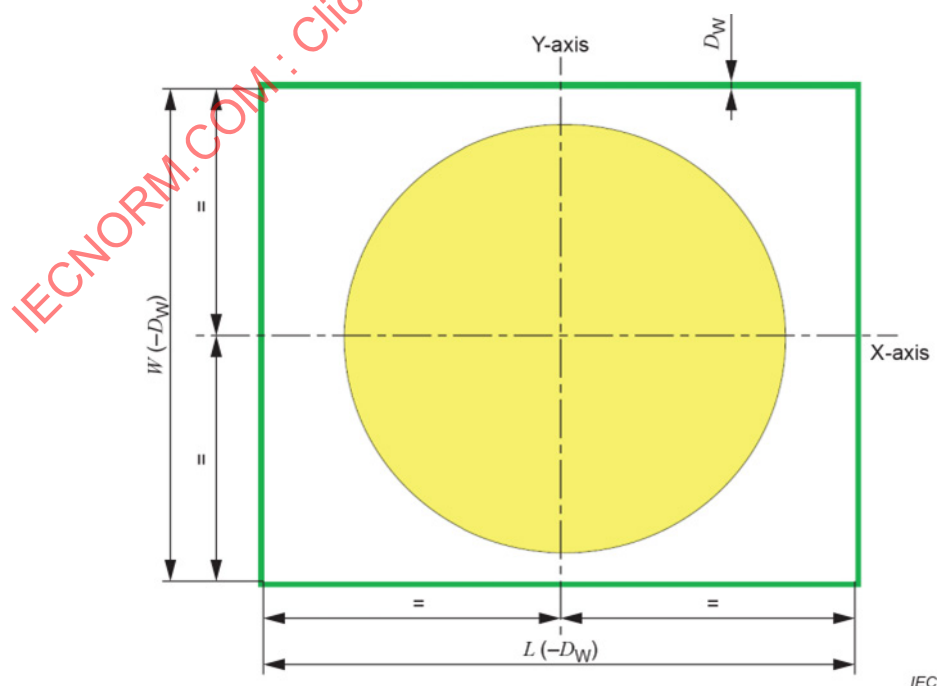


Figure 30 – Demarcation model for the outline of an LEDni module without mounting features

7.4.3 LEDni modules with mounting holes

The outline of an LEDni module having mounting holes is contained within the demarcation zone indicated by the green area in Figure 31. Only LEDni modules in the C24x24 or C28x28 categories can have mounting holes. At the same time the LEDni module does not overlap with the zones for the mounting holes in the demarcation model indicated by the red areas in Figure 31. The values of dimensional quantities for each LEDni module category are given in Table 21.

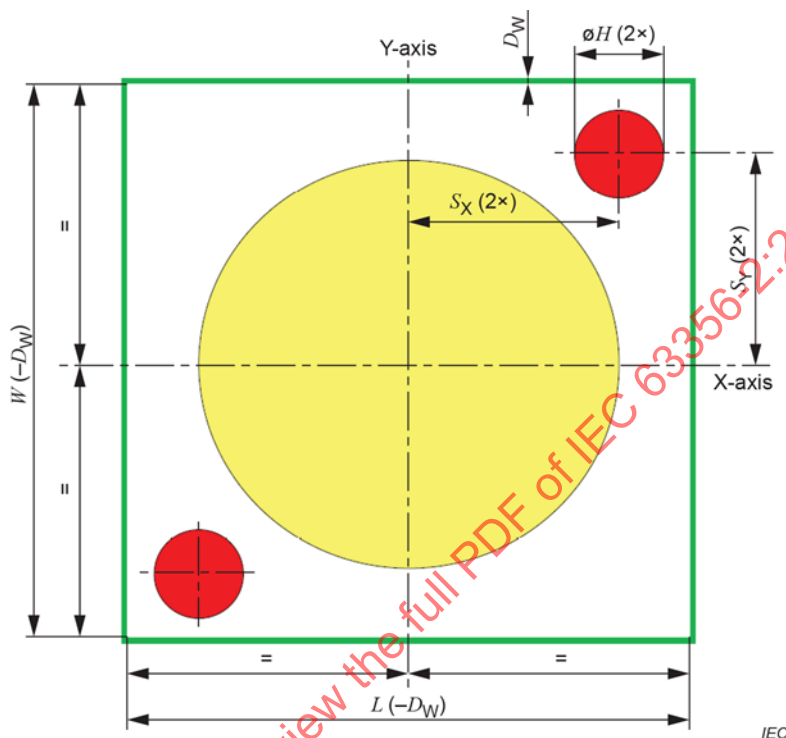


Figure 31 – Demarcation model for the outline of an LEDni module having mounting holes

7.4.4 LEDni modules with recessed corners

The outline of an LEDni module having recessed corner features is contained within the demarcation zone indicated by the green area in Figure 32. LEDni modules in the C20x24, C19x19, C16x19, C13.5x13.5 and C12x15 categories can have recessed corners. The values of dimensional quantities for each LEDni module category are given in Table 21.

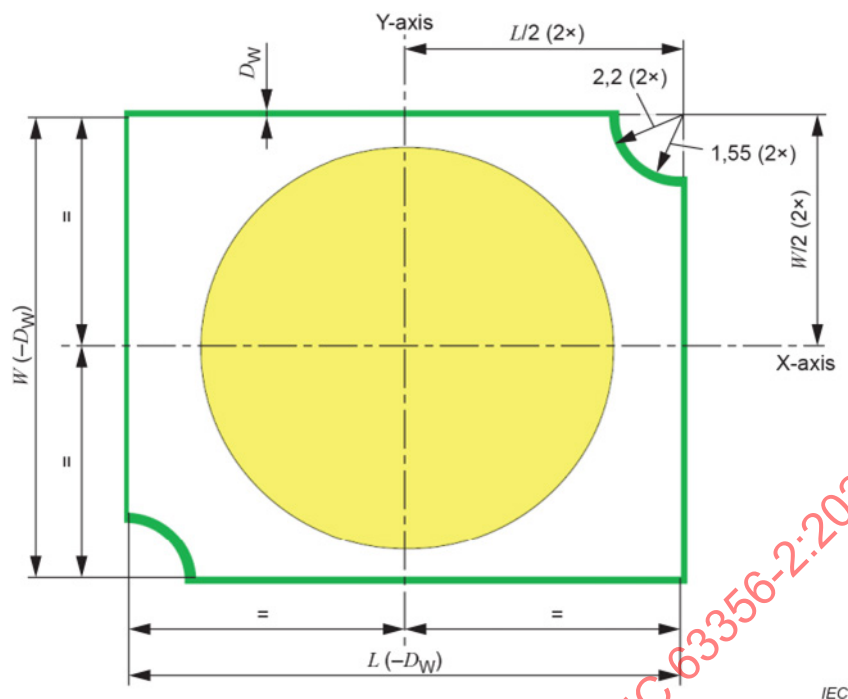


Figure 32 – Demarcation model for the outline of an LEDni module having recessed corners

7.5 Electrical contact areas

7.5.1 Contact location

The location and area for the electrical contacts of the LEDni module are as specified in Figure 33 with values of dimensional quantities given in Table 21.

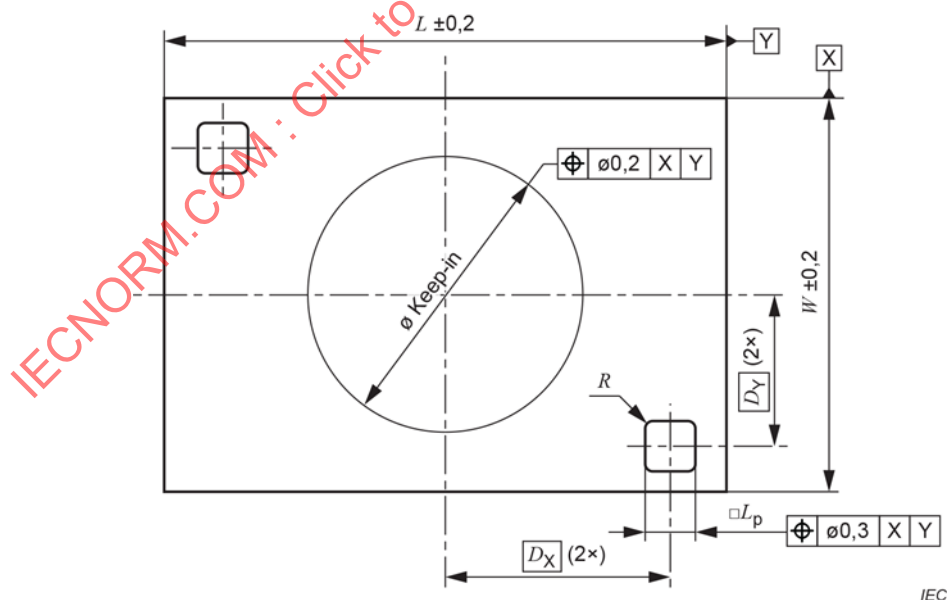


Figure 33 – Location of the electrical contacts for LEDni modules

7.5.2 Minimum contact size

The contact areas of an LEDni module completely cover the round cornered square as specified in Figure 34 with values of dimensional quantities given in Table 21.

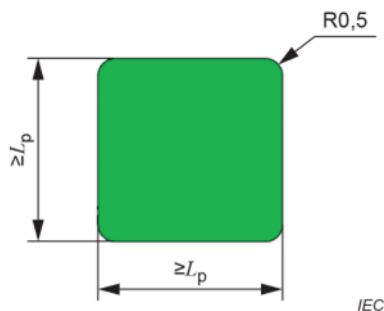


Figure 34 – Minimum size contact area for LEDni module electrical contacts

7.5.3 Contact overlap area

The electrical contact areas of the LEDni module completely cover the overlap areas shown in Figure 35 with values of dimensional quantities given in Table 21. The position and size of the overlap area for the electrical contacts are indicated by the green areas in Figure 35. The centre of the overlap areas coincides with the position indicated by D_x and D_y .

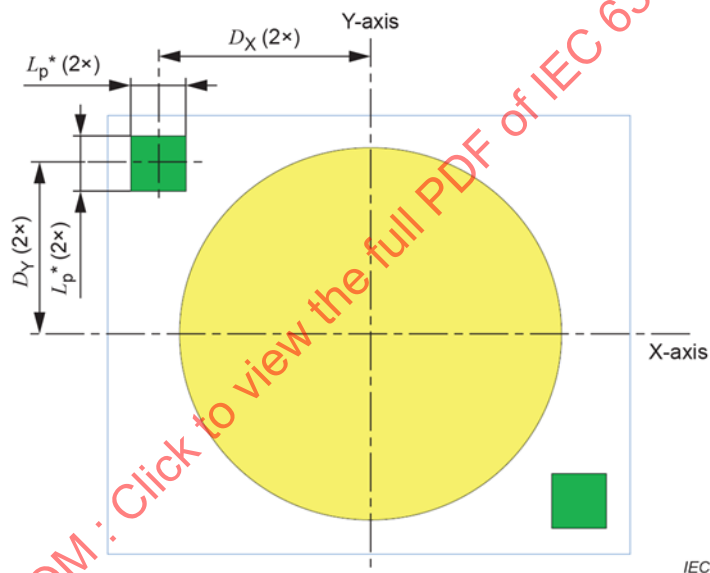


Figure 35 – Overlap area for the electrical contacts of LEDni modules

7.5.4 Maximum electrical contact area

The position and size of the maximum electrical contact areas are indicated by the green shading in Figure 36 with dimensional quantities for each LEDni module category given in Table 21 and LES category given in Table 22. The electrical contacts of the LEDni module under test are completely within these areas. PCB tracks which function as live parts are only allowed in the inclusion limit zone area indicated by yellow shading in Figure 36 and in the maximum electrical contact area (green shaded areas in Figure 36).

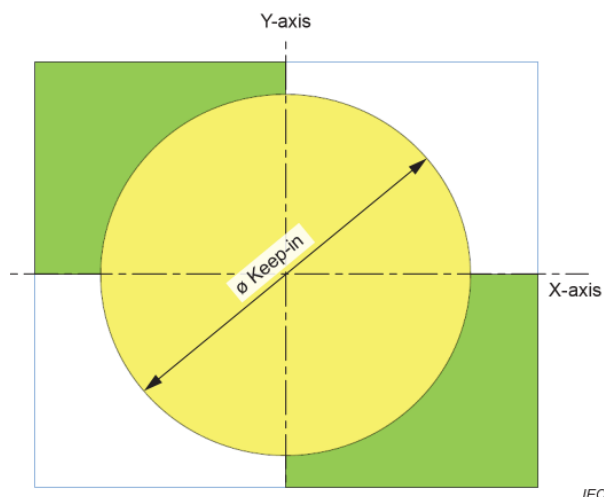


Figure 36 – Maximum electrical contact area for LEDni modules

7.6 PCB thickness

The thickness of the printed circuit board (PCB) is in the range $1,0 \text{ mm} \pm 0,15 \text{ mm}$.

7.7 Inclusion limit zone

The position and size ($\phi_{\text{keep-in}}$) of an inclusion limit zone for LEDni module components are shown by the yellow area in Figure 37 with dimensional quantities for each LEDni module category and LES category given in Table 22. The centre of this inclusion limit zone coincides with the mechanical reference point (see Figure 28). The reference X-axis and Y-axis are axes of symmetry of the inclusion zone. Outside this inclusion zone, the LEDni module does not have any feature that protrudes above the PCB top surface. PCB tracks and contact areas are not considered as features that fall in this category.

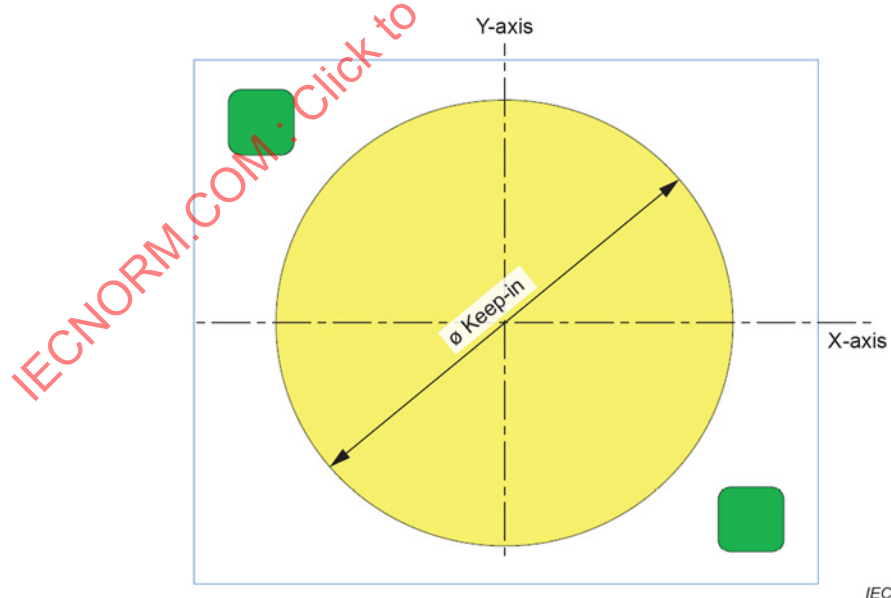


Figure 37 – Inclusion limit zone for LEDni module components

**Table 22 – Inclusion limit zone values of dimension $\phi_{\text{keep-in}}$
by LEDni module and LES category**

LEDni module category	LES category					
	LES6.3	LES9	LES13.5	LES19	LES23	LES30
C28x28	8,3 mm	11,0 mm	15,5 mm	21,0 mm	25,0 mm	25,8 mm
C24x24	8,3 mm	11,0 mm	15,5 mm	21,0 mm	21,1 mm	X
C20x24	8,3 mm	11,0 mm	15,5 mm	17,8 mm	X	X
C19x19	8,3 mm	11,0 mm	15,5 mm	16,8 mm	X	X
C16x19	8,3 mm	11,0 mm	13,8 mm	13,8 mm	X	X
C13.5x13.5	8,3 mm	11,2 mm	11,2 mm	X	X	X
C12x15	8,3 mm	9,8 mm	9,8 mm	X	X	X

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~~IEC 63221⁷, LED light sources – Performance requirements~~

~~IEC 63356-1, LED light source characteristics – Data sheets~~

IEC 62031:—⁸, LED modules – Safety requirements

IEC 63554:—⁹, LED lamps – Safety requirements

IEC 63555:—¹⁰, LED light sources – Performance requirements

Zhaga interface specification Book 7: Edition 1.7, April 2021 – Rectangular LED Module with undefined ~~LES~~ LED

Zhaga interface specification Book 10: Edition 1.2, April 2021 – Circular LED modules for spot lighting

Zhaga interface specification Book 12: Edition 1.3, April 2021 – Rectangular LED arrays with circular LES and corresponding holders

⁶ ~~Under consideration. Third edition under preparation. Stage at the time of publication IEC CCDV 62031:2024.~~

⁷ ~~Under consideration. First edition under preparation. Stage at the time of publication IEC CCDV 63555:2024.~~

⁸ Third edition under preparation. Stage at the time of publication IEC CCDV 62031:2024.

⁹ First edition under preparation. Stage at the time of publication IEC CCDV 63554:2024.

¹⁰ First edition under preparation. Stage at the time of publication IEC CCDV 63555:2024.

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INTERNATIONAL STANDARD

NORME INTERNATIONALE



**LED light source characteristics –
Part 2: Design parameters and values**

**Caractéristiques de source lumineuse à LED –
Partie 2: Paramètres et valeurs de conception**

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CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	7
4 Overview and common information	8
4.1 General.....	8
4.2 Numbering system	8
5 Rectangular LED modules with undefined light emitting surface.....	8
5.1 General.....	8
5.2 Mechanical references	8
5.3 LED module categories	9
5.3.1 General	9
5.3.2 L6W6.....	9
5.3.3 L14W2.....	10
5.3.4 L28W2.....	11
5.3.5 L28W4.....	12
5.3.6 L28W6.....	13
5.3.7 L28W28.....	14
5.3.8 L38W38.....	16
5.3.9 L56W56.....	19
5.3.10 L56W2.....	21
5.3.11 L56W4.....	21
5.3.12 L112W2.....	22
5.3.13 L115W2.....	25
5.3.14 L140W2.....	27
5.3.15 L145W2.....	29
5.3.16 L30W1.....	31
5.3.17 L58W1.....	32
5.3.18 L115W1.....	33
5.3.19 L145W1.....	34
6 Circular LED modules with a circular light emitting surface for spot lighting	35
6.1 General.....	35
6.2 Mechanical references	35
6.3 Mechanical interface of the LED module	37
6.3.1 LED module demarcation.....	37
6.3.2 Optics contact area.....	38
6.3.3 Requirements on screw holes	40
6.3.4 LED module electrical interconnect.....	40
6.3.5 Luminaire exclusion limits for electrical interconnects	40
6.3.6 Inner feature.....	41
6.3.7 Luminaire mechanical properties	41
7 LEDni modules with a rectangular shape and a circular light emitting surface	41
7.1 General.....	41
7.2 Mechanical references for an LEDni module	42
7.3 Mechanical interface of the LEDni module	43
7.4 LEDni module outlines	43

7.4.1	General	43
7.4.2	LEDni modules without mounting features	44
7.4.3	LEDni modules with mounting holes	45
7.4.4	LEDni modules with recessed corners	45
7.5	Electrical contact areas	46
7.5.1	Contact location	46
7.5.2	Minimum contact size	46
7.5.3	Contact overlap area	47
7.5.4	Maximum electrical contact area	47
7.6	PCB thickness	48
7.7	Inclusion limit zone	48
	Bibliography	50
	Figure 1 – Example of a luminaire with two LED modules	8
	Figure 2 – Positions of the reference point and the reference plane of the LED module	9
	Figure 3 – LED module demarcation of the L6W6 category	10
	Figure 4 – LED module demarcation of the L14W2 category	11
	Figure 5 – LED module demarcation of the L28W2 category	12
	Figure 6 – LED module demarcation of the L28W4 category	13
	Figure 7 – LED module demarcation of the L28W6 category	14
	Figure 8 – LED module demarcation of the L28W28 category	16
	Figure 9 – LED module demarcation of the L38W38 category	18
	Figure 10 – LED module demarcation of the L56W56 category	20
	Figure 11 – LED module demarcation of the L56W2 category	21
	Figure 12 – LED module demarcation of the L56W4 category	22
	Figure 13 – LED module demarcation of the L112W2 category	24
	Figure 14 – LED module demarcation of the L115W2 category	26
	Figure 15 – LED module demarcation of the L140W2 category	28
	Figure 16 – LED module demarcation of the L145W2 category	30
	Figure 17 – LED module demarcation of the L30W1 category	31
	Figure 18 – LED module demarcation of the L58W1 category	32
	Figure 19 – LED module demarcation of the L115W1 category	33
	Figure 20 – LED module demarcation of the L145W1 category	34
	Figure 21 – Positions of the reference point and reference plane of the LED module	36
	Figure 22 – Positions of the reference point, plane and axis for the LED module (example for D50 category)	36
	Figure 23 – Drawing of the demarcation of a D35 LED module	37
	Figure 24 – Drawing of the demarcation of the D50 LED module	38
	Figure 25 – Optics contact area of a D35 LED module	39
	Figure 26 – Dimensions of OCAs for a D50 category	39
	Figure 27 – Maximum inner feature outlines	41
	Figure 28 – Positions of the reference point and the reference plane of an LEDni module	42
	Figure 29 – Definition of the LEDni module border and mechanical references	43

Figure 30 – Demarcation model for the outline of an LEDni module without mounting features	44
Figure 31 – Demarcation model for the outline of an LEDni module having mounting holes.....	45
Figure 32 – Demarcation model for the outline of an LEDni module having recessed corners	46
Figure 33 – Location of the electrical contacts for LEDni modules.....	46
Figure 34 – Minimum size contact area for LEDni module electrical contacts	47
Figure 35 – Overlap area for the electrical contacts of LEDni modules	47
Figure 36 – Maximum electrical contact area for LEDni modules.....	48
Figure 37 – Inclusion limit zone for LEDni module components	48
Table 1 – LED module demarcation of the L6W6 category	9
Table 2 – LED module demarcation of the L14W2 category	11
Table 3 – LED module demarcation of the L28W2 category	12
Table 4 – LED module demarcation of the L28W4 category	13
Table 5 – LED module demarcation of the L28W6 category	14
Table 6 – LED module demarcation of the L28W28 category.....	15
Table 7 – LED module demarcation of the L38W38 category	17
Table 8 – LED module demarcation of the L56W56 category	19
Table 9 – LED module demarcation of the L56W2 category	21
Table 10 – LED module demarcation of the L56W4 category	22
Table 11 – LED module demarcation of the L112W2 category.....	23
Table 12 – LED module demarcation of the L115W2 category.....	25
Table 13 – LED module demarcation of the L140W2 category.....	27
Table 14 – LED module demarcation of the L145W2 category.....	29
Table 15 – LES category specifications for circular LED modules for spot lighting	35
Table 16 – Dimensions of D35 LED module demarcation	38
Table 17 – Maximum inner OCA diameter	39
Table 18 – Minimum and maximum OCA heights	40
Table 19 – Maximum height b of inner feature.....	41
Table 20 – Circular LES category specifications for LEDni modules	42
Table 21 – Values of dimensions for LEDni module categories ^a	44
Table 22 – Inclusion limit zone values of dimension $\phi_{\text{keep-in}}$ by LEDni module and LES category	49

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LED LIGHT SOURCE CHARACTERISTICS –**Part 2: Design parameters and values****FOREWORD**

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IEC 63356-2 has been prepared by subcommittee 34A: Electric light sources, of IEC technical committee 34: Lighting. It is an International Standard.

This second edition cancels and replaces the first edition published in 2022. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) a new Clause 6 for circular LED modules with a circular light emitting surface for spot lighting has been added;
- b) a new Clause 7 for LEDni modules with a rectangular shape and a circular light emitting surface has been added.

The text of this International Standard is based on the following documents:

Draft	Report on voting
34A/2405/FDIS	34A/2412/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 63356 series, published under the general title *LED light source characteristics*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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LED LIGHT SOURCE CHARACTERISTICS –

Part 2: Design parameters and values

1 Scope

This part of IEC 63356 specifies design parameters and design values of an LED light source or related interface characteristics.

NOTE 1 Interface characteristics can cover interfaces between the LED light source and the luminaire or the controlgear, or the LED light source and additional attachments.

NOTE 2 Interfaces can be related to for example electrical, mechanical, or optical aspects.

This document does not cover interchangeability between products from different LED light source manufacturers.

NOTE 3 Interchangeability is covered by IEC 63356-1.

Lamp caps and lampholders specified in the IEC 60061 series are not within the scope of this document.

Compliance criteria relating to parameters in this document are covered by:

- IEC 62031:—¹, LED modules – Safety requirements, or;
- IEC 63554:—², LED lamps – Safety requirements, or;
- IEC 63555:—³, LED light sources – Performance requirements.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

thermal interface material

TIM

material with specified thermal conductivity assembled between an LED module and a luminaire to enable improved heat dissipation

¹ Third edition under preparation. Stage at the time of publication IEC CCDV 62031:2024.

² First edition under preparation. Stage at the time of publication IEC CCDV 63554:2024.

³ First edition under preparation. Stage at the time of publication IEC CCDV 63555:2024.

4 Overview and common information

4.1 General

Dimensions are specified at a temperature of $(25 \pm 5) ^\circ\text{C}$, unless otherwise specified.

All values of dimensions that omit an explicit unit indication are in millimetres.

4.2 Numbering system

Products that have comparable interfaces are grouped in separate clauses.

5 Rectangular LED modules with undefined light emitting surface

NOTE Clause 5, including LED module demarcations specified in 5.3.2 through 5.3.19, is taken from Zhaga Book 7 Edition 1.7.

5.1 General

Rectangular LED modules with undefined light emitting surface (LES) are intended to be mounted in a luminaire. Figure 1 illustrates an example of an LED module-luminaire combination. In this example the luminaire holds two LED modules. In practice, a luminaire can hold any number of LED modules.

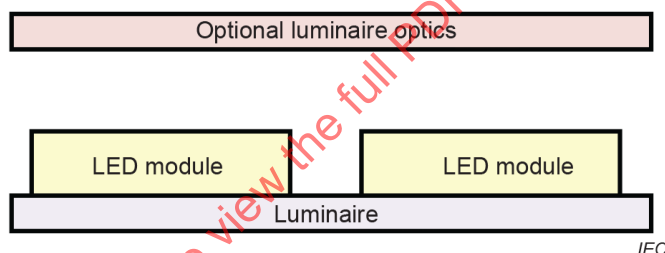


Figure 1 – Example of a luminaire with two LED modules

The luminaire typically features luminaire-optics which shape the light output of the LED module(s).

5.2 Mechanical references

The reference plane and the reference point of an LED module, including (optional) TIM are defined in Figure 2. Dimensions are specified relative to either the reference point or the reference plane unless indicated otherwise. Moreover, dimensions are specified to include the thickness of the TIM (if present).

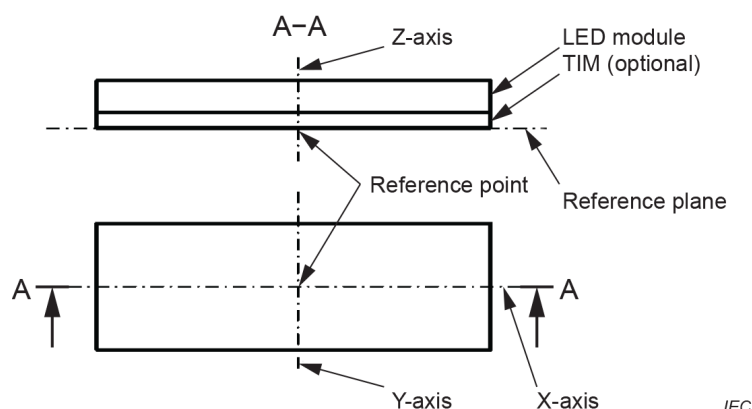


Figure 2 – Positions of the reference point and the reference plane of the LED module

5.3 LED module categories

5.3.1 General

Subclause 5.3 specifies a number of LED module categories that are identified by a designation. The LED module demarcations of these LED module categories are specified in 5.3.2 to 5.3.19.

The intention of the demarcation model is to visualize restricted areas or volumes that no part of a luminaire should cross. The hashed area indicates limits for the inclusion zone for LED module design and the exclusion zone for luminaire design.

Unless stated otherwise, all holes are available and for each hole at least 25 % of the circumference of the hole is present in the LED module. The demarcation model specifies the minimum diameter of the mounting holes at a specified position.

NOTE In typical designs the diameter of these holes can be larger allowing for a tolerance on the position of the holes.

If the LED module is applied in combination with a TIM, this material is defined to be part of the LED module. Thus, the total height of the module and TIM should not exceed the maximum height H (see 5.3.2 to 5.3.19).

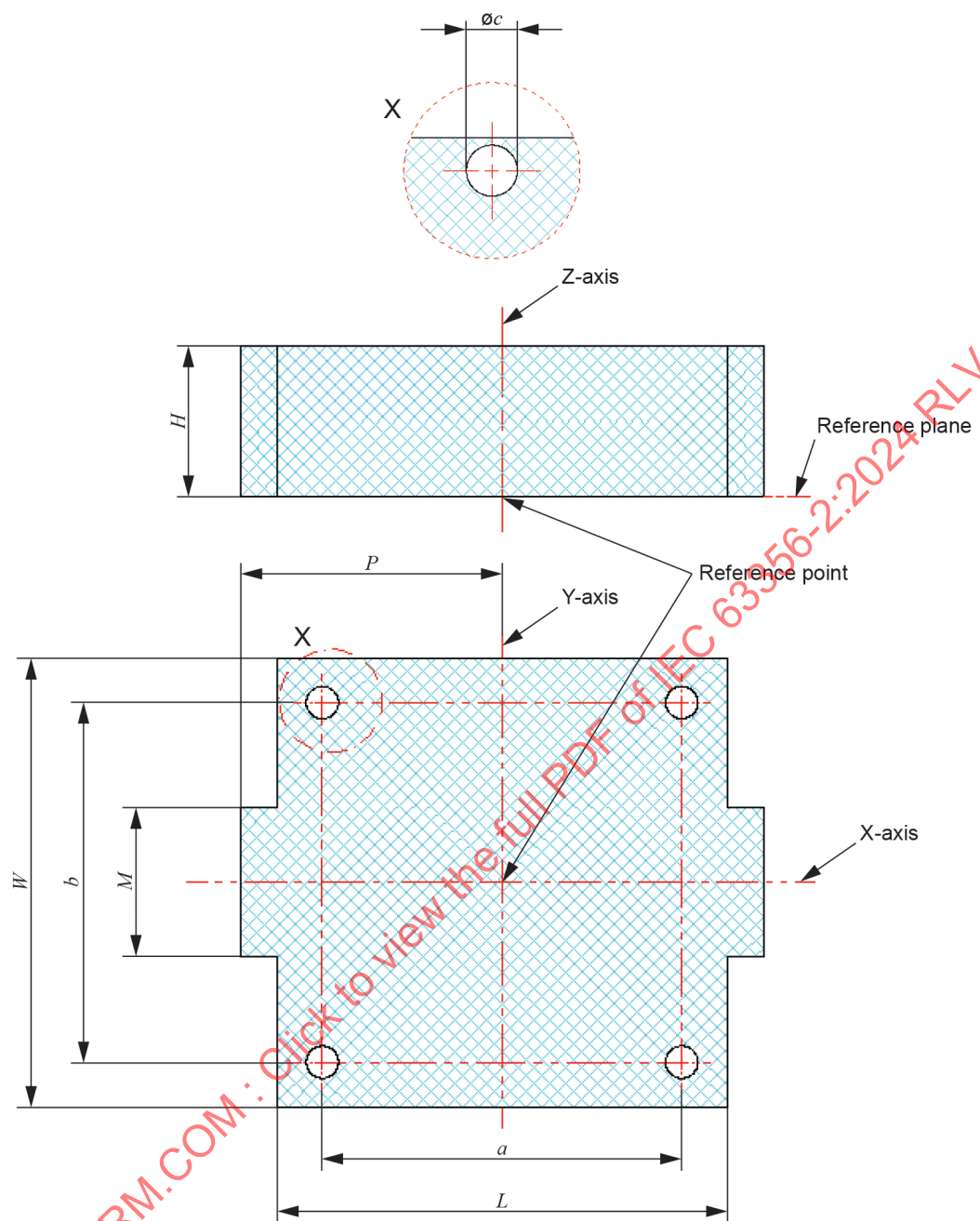
5.3.2 L6W6

The designation for this category is 'L6W6'.

The LED module demarcation of the L6W6 category is defined in Table 1 and Figure 3.

Table 1 – LED module demarcation of the L6W6 category

Dimension	Value
L	60
W	60
H	20
a	48
b	48
M	20
P	35
$\varnothing_c$	4,3



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NOTE The top drawing shows the detail X.

Figure 3 – LED module demarcation of the L6W6 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

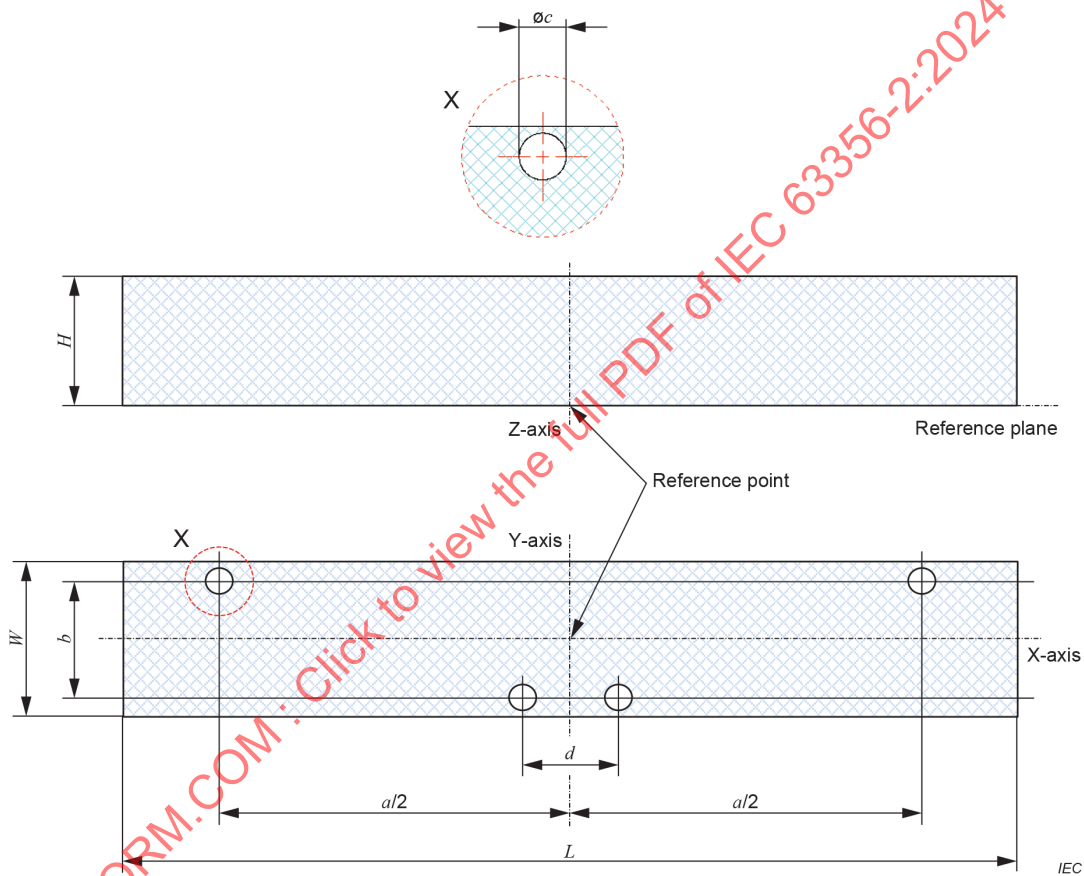
5.3.3 L14W2

The designation for this category is 'L14W2'.

The LED module demarcation of the L14W2 category is defined in Table 2 and Figure 4.

Table 2 – LED module demarcation of the L14W2 category

Dimension	Value
L	140
W	24
H	20
a	110
b	18,4
d	15
$\varnothing_c$	4,3



NOTE The top drawing shows the detail X.

Figure 4 – LED module demarcation of the L14W2 category

The X-axis and Y-axis are the symmetry axes for the outline and the crosshair lines of the mounting holes.

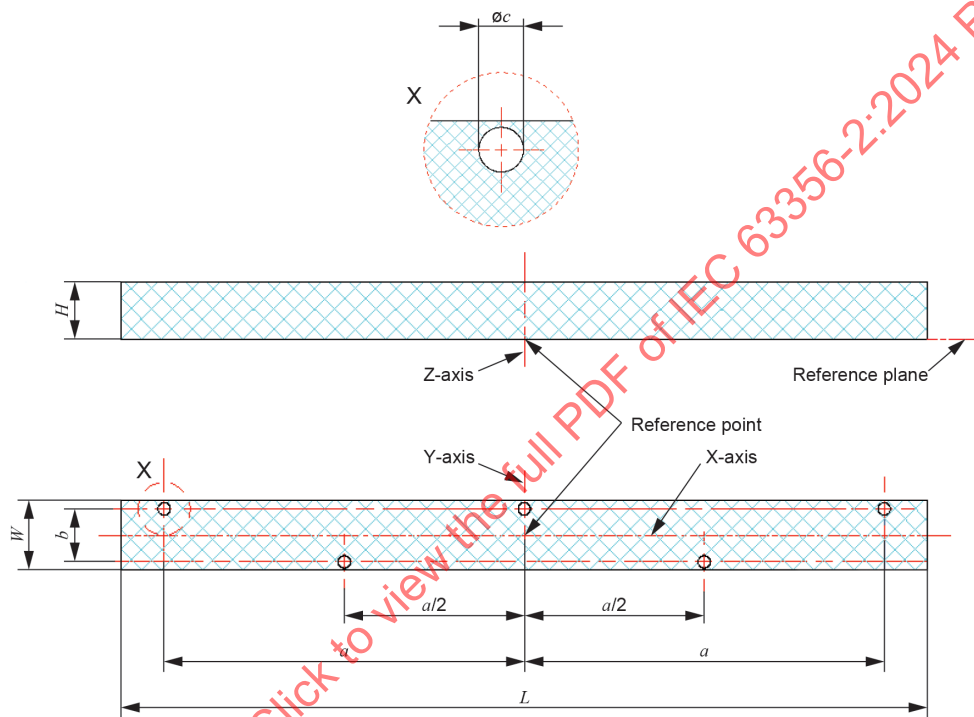
5.3.4 L28W2

The designation for this category is 'L28W2'.

The LED module demarcation of the L28W2 category is defined in Table 3 and Figure 5. The two mounting holes at the bottom of the diagram of Figure 5 are optional.

Table 3 – LED module demarcation of the L28W2 category

Dimension	Value
L	280
W	24
H	20
a	125
b	18,4
$\varnothing c$	4,3



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NOTE The top drawing shows the detail X.

Figure 5 – LED module demarcation of the L28W2 category

The X-axis is the symmetry axis for the outline and the crosshair lines of the mounting holes.

The Y-axis is the symmetry axis for the outline and mounting holes.

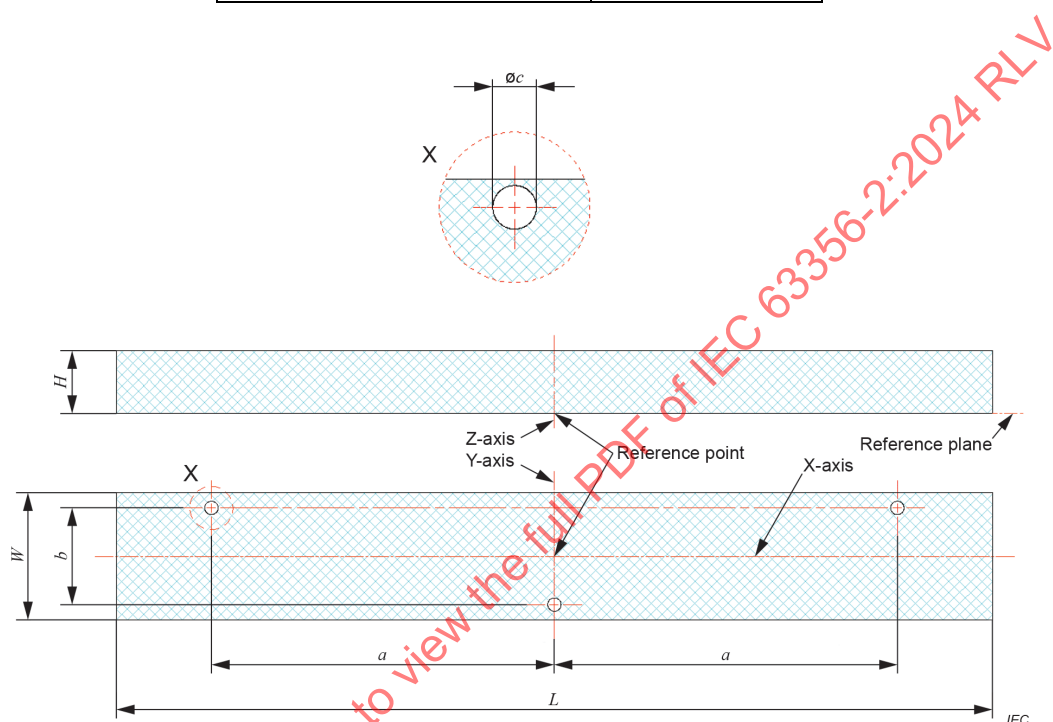
5.3.5 L28W4

The designation for this category is 'L28W4'.

The LED module demarcation of the L28W4 category is defined in Table 4 and Figure 6.

Table 4 – LED module demarcation of the L28W4 category

Dimension	Value
L	281
W	41
H	20
a	110
b	31
$\varnothing c$	4,3



NOTE The top drawing shows the detail X.

Figure 6 – LED module demarcation of the L28W4 category

The X-axis is the symmetry axis for the outline and the crosshair lines of the mounting holes.

The Y-axis is the symmetry axis for the outline and mounting holes.

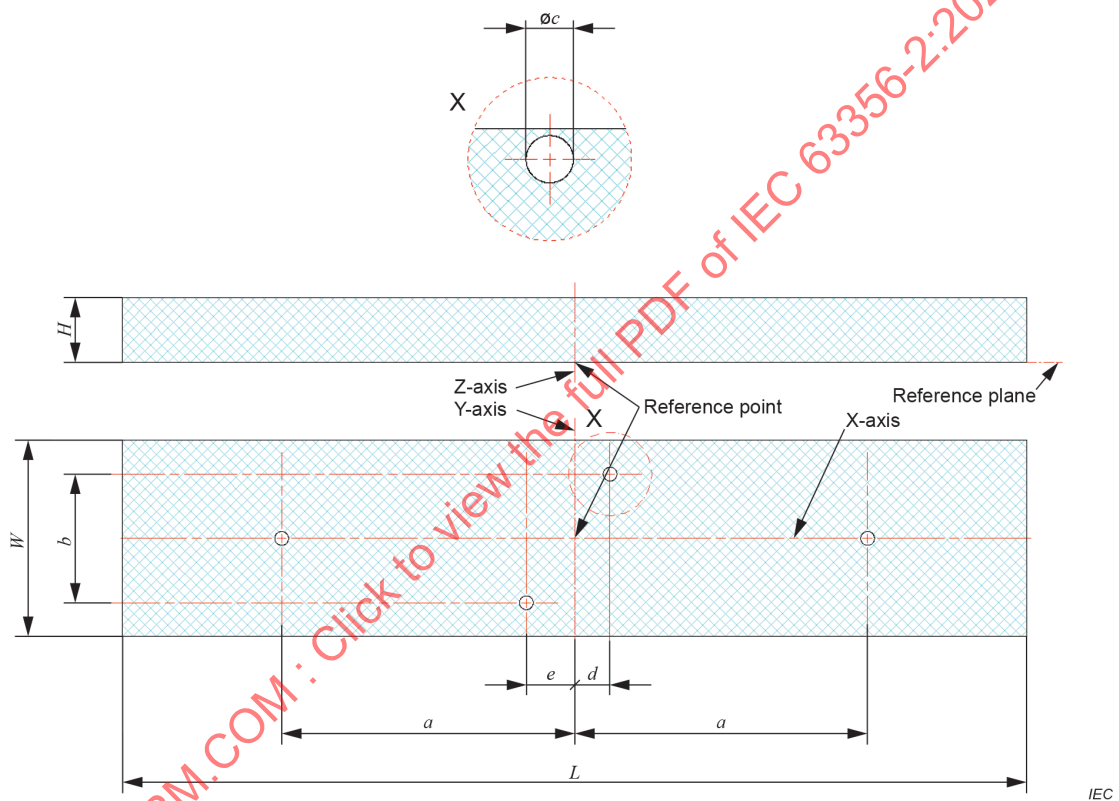
5.3.6 L28W6

The designation for this category is 'L28W6'.

The LED module demarcation of the L28W6 category is defined in Table 5 and Figure 7.

Table 5 – LED module demarcation of the L28W6 category

Dimension	Value
L	281
W	61
H	20
a	91
b	40
$\varnothing c$	4,3
d	11
e	15



NOTE The top drawing shows the detail X.

Figure 7 – LED module demarcation of the L28W6 category

The X-axis is the symmetry axis for the outline and the crosshair lines of the mounting holes.

The Y-axis is the symmetry axis for the outline and the leftmost and rightmost mounting holes.

5.3.7 L28W28

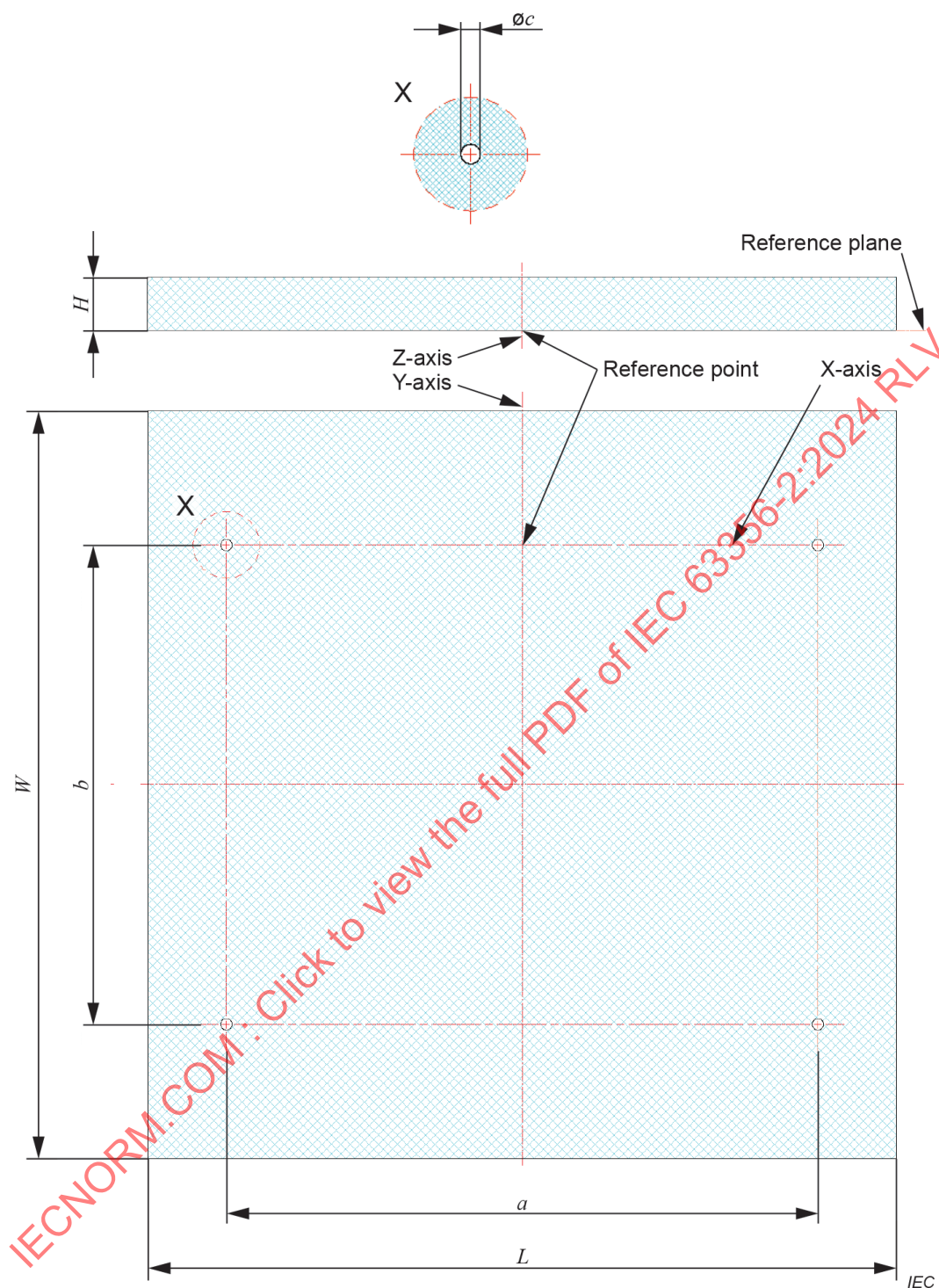
The designation for this category is 'L28W28'.

The LED module demarcation of the L28W28 category is defined in Table 6 and Figure 8.

Table 6 – LED module demarcation of the L28W28 category

Dimension	Value
L	281
W	281
H	20
a	222
b	180
$\varnothing c$	4,3

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NOTE The top drawing shows the detail X.

Figure 8 – LED module demarcation of the L28W28 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

5.3.8 L38W38

The designation for this category is 'L38W38'.

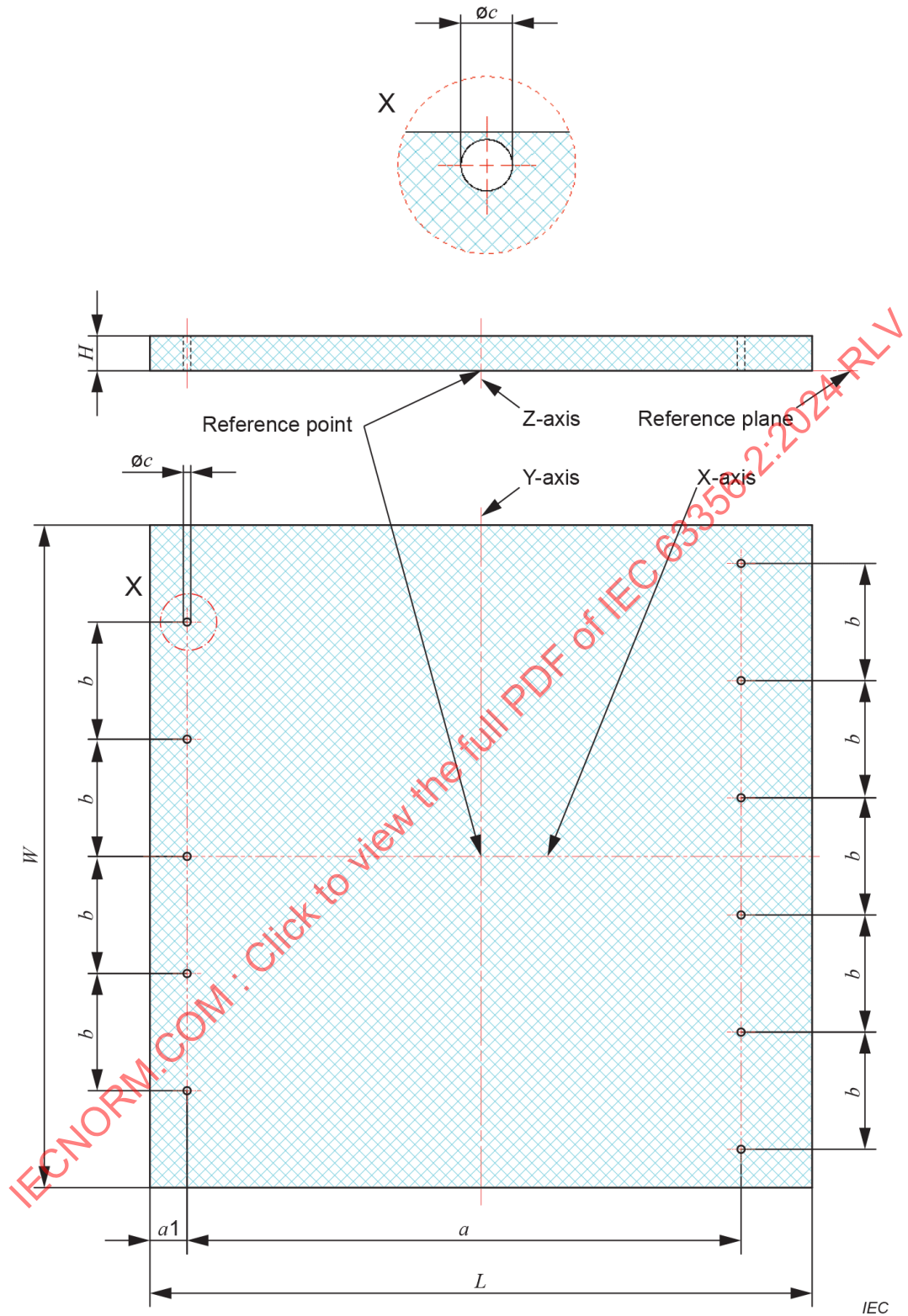
The LED module demarcation of the L38W38 category is defined in Table 7 and Figure 9.

Mounting holes not being in the corners of the LED module are optional.

Table 7 – LED module demarcation of the L38W38 category

Dimension	Value
L	381
W	381
H	20
a	371,9
$a1$	21,3
b	67,2
$\varnothing c$	4,3

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NOTE The top drawing shows the detail X.

Figure 9 – LED module demarcation of the L38W38 category

The X-axis is the symmetry axis for the outline and the mounting holes.

The Y-axis is the symmetry axis for the outline and the crosshair lines of mounting holes.

5.3.9 L56W56

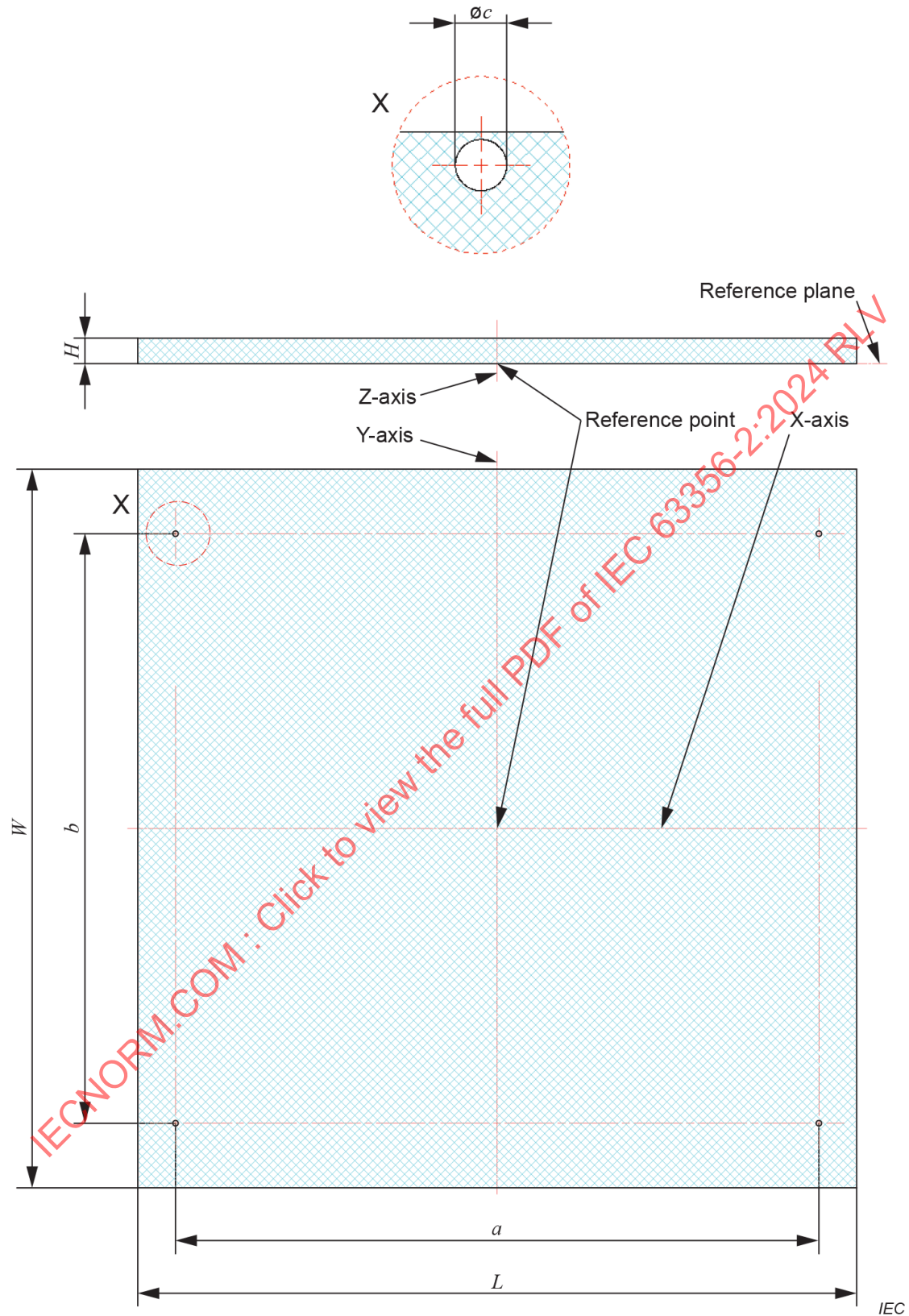
The designation for this category is 'L56W56'.

The LED module demarcation of the L56W56 category is defined in Table 8 and Figure 10.

Table 8 – LED module demarcation of the L56W56 category

Dimension	Value
L	562
W	562
H	20
a	503
b	461
$\varnothing_c$	4,3

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NOTE The top drawing shows the detail X.

Figure 10 – LED module demarcation of the L56W56 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

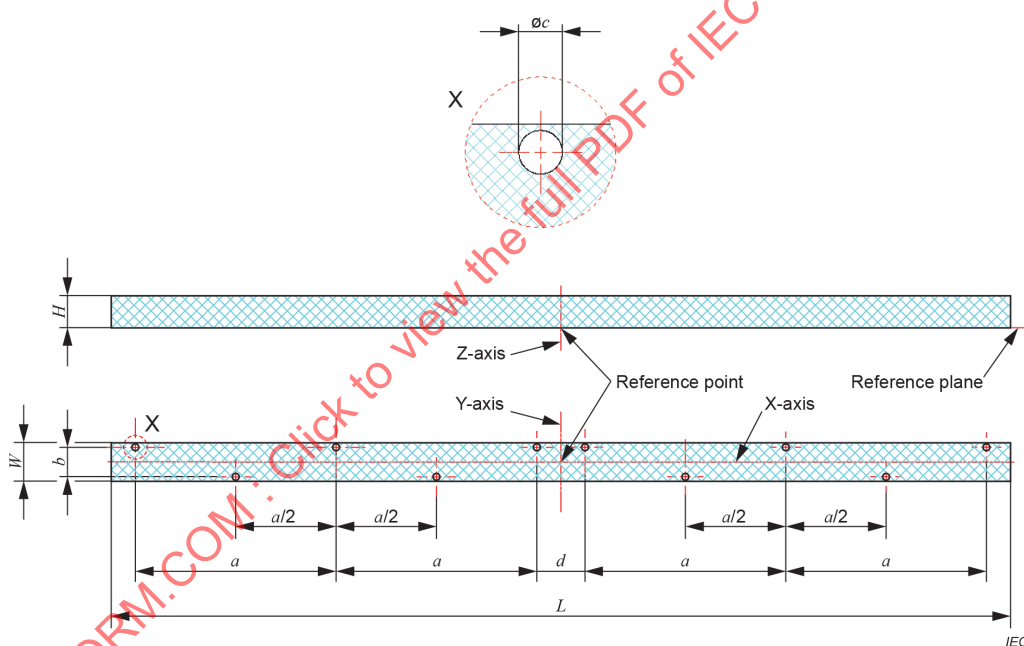
5.3.10 L56W2

The designation for this category is 'L56W2'.

The LED module demarcation of the L56W2 category is defined in Table 9 and Figure 11. The four mounting holes at the bottom of the diagram of Figure 11 are optional.

Table 9 – LED module demarcation of the L56W2 category

Dimension	Value
L	560
W	24
H	20
a	125
b	18,4
d	30
$\varnothing_c$	4,3



NOTE The top drawing shows the detail X.

Figure 11 – LED module demarcation of the L56W2 category

The X-axis is the symmetry axis for the outline and the crosshair lines of the mounting holes.

The Y-axis is the symmetry axis for the outline and mounting holes.

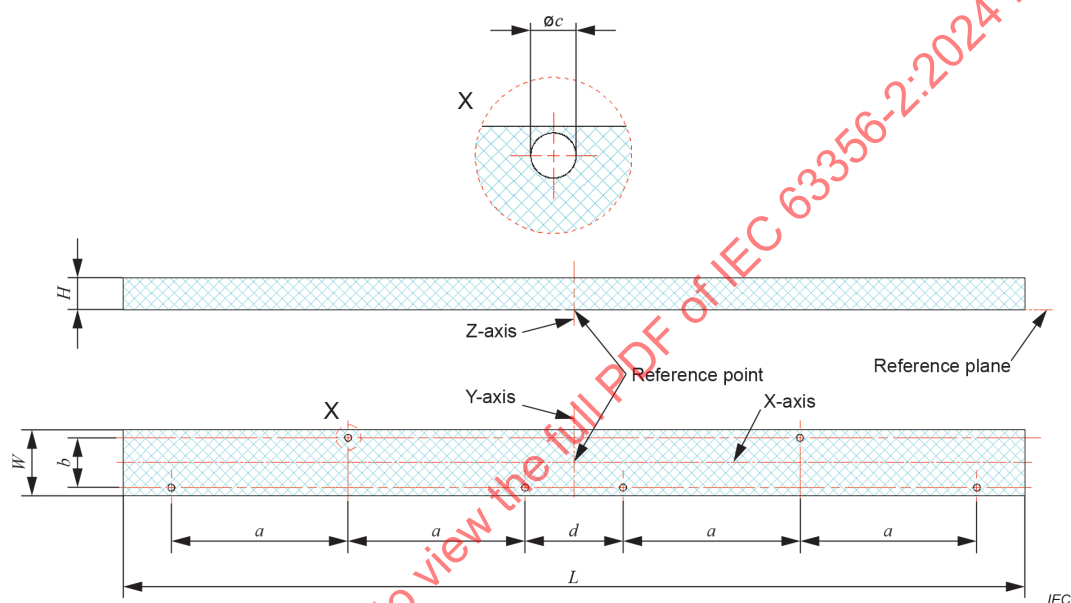
5.3.11 L56W4

The designation for this category is 'L56W4'.

The LED module demarcation of the L56W4 category is defined in Table 10 and Figure 12.

Table 10 – LED module demarcation of the L56W4 category

Dimension	Value
L	561
W	41
H	20
a	110
b	31
$\varnothing c$	4,3
d	61



NOTE The top drawing shows the detail X.

Figure 12 – LED module demarcation of the L56W4 category

The X-axis is the symmetry axis for the outline and the crosshair lines of the mounting holes.

The Y-axis is the symmetry axis for the outline and mounting holes.

5.3.12 L112W2

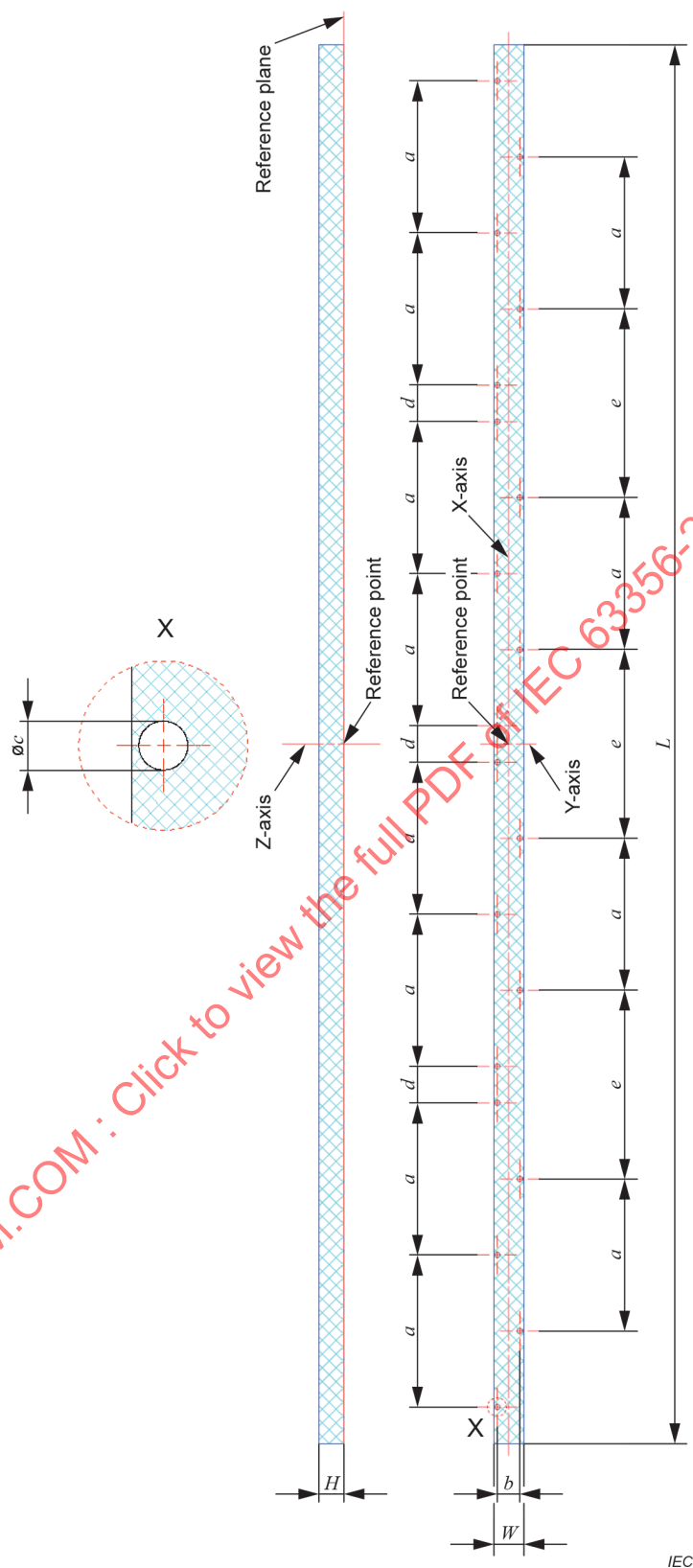
The designation for this category is 'L112W2'.

The LED module demarcation of the L112W2 category is defined in Table 11 and Figure 13.

Table 11 – LED module demarcation of the L112W2 category

Dimension	Value
<i>L</i>	1 120
<i>W</i>	24
<i>H</i>	20
<i>a</i>	125
<i>b</i>	18,4
Øc	4,3
d	30
e	155

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NOTE The drawing on the left shows the detail X.

Figure 13 – LED module demarcation of the L112W2 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

5.3.13 L115W2

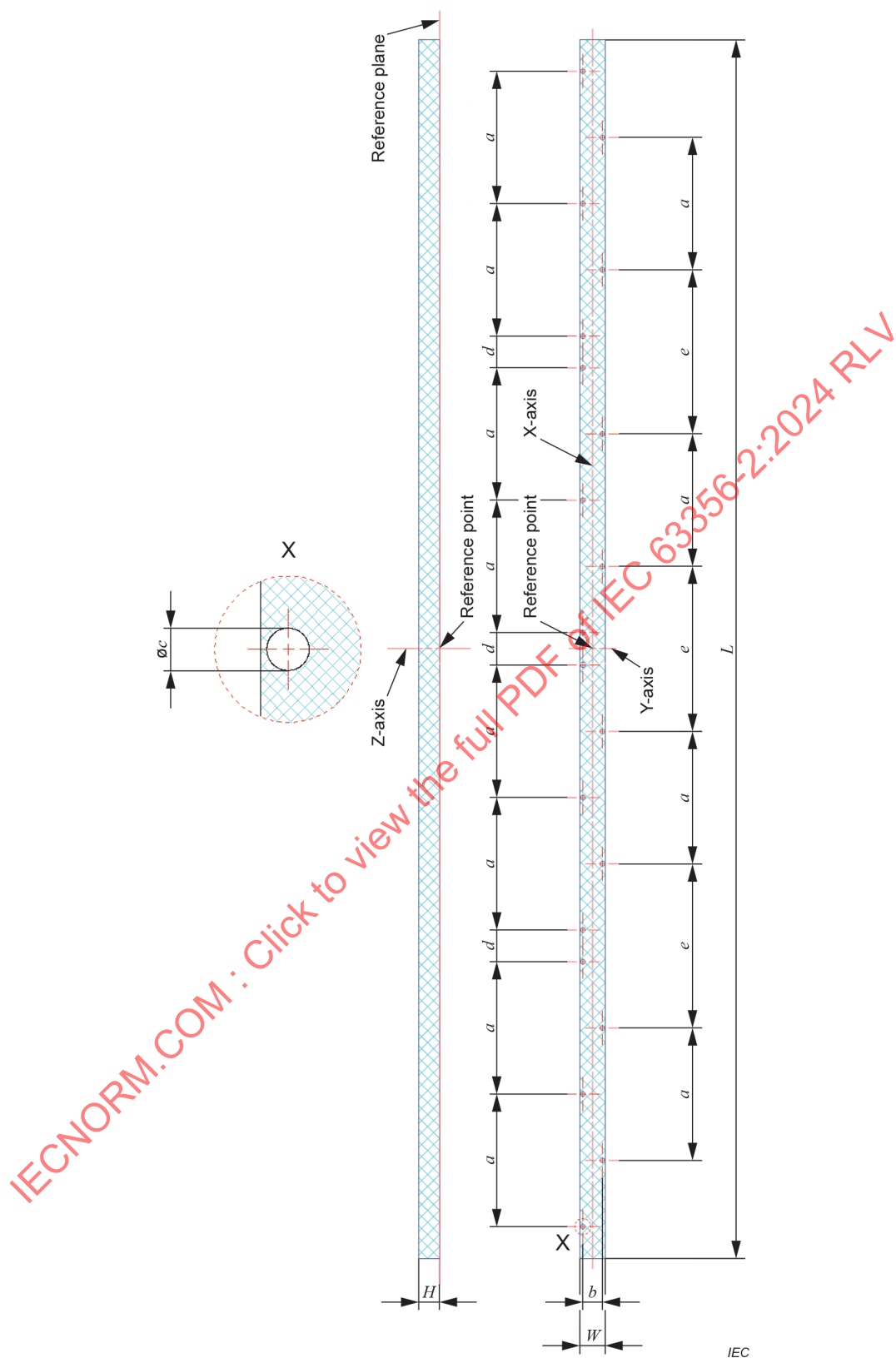
The designation for this category is 'L115W2'.

The LED module demarcation of the L115W2 category is defined in Table 12 and Figure 14.

Table 12 – LED module demarcation of the L115W2 category

Dimension	Value
L	1 150
W	24
H	20
a	125
b	18,4
$\varnothing_c$	4,3
d	30
e	155

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NOTE The drawing on the left shows the detail X.

Figure 14 – LED module demarcation of the L115W2 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

5.3.14 L140W2

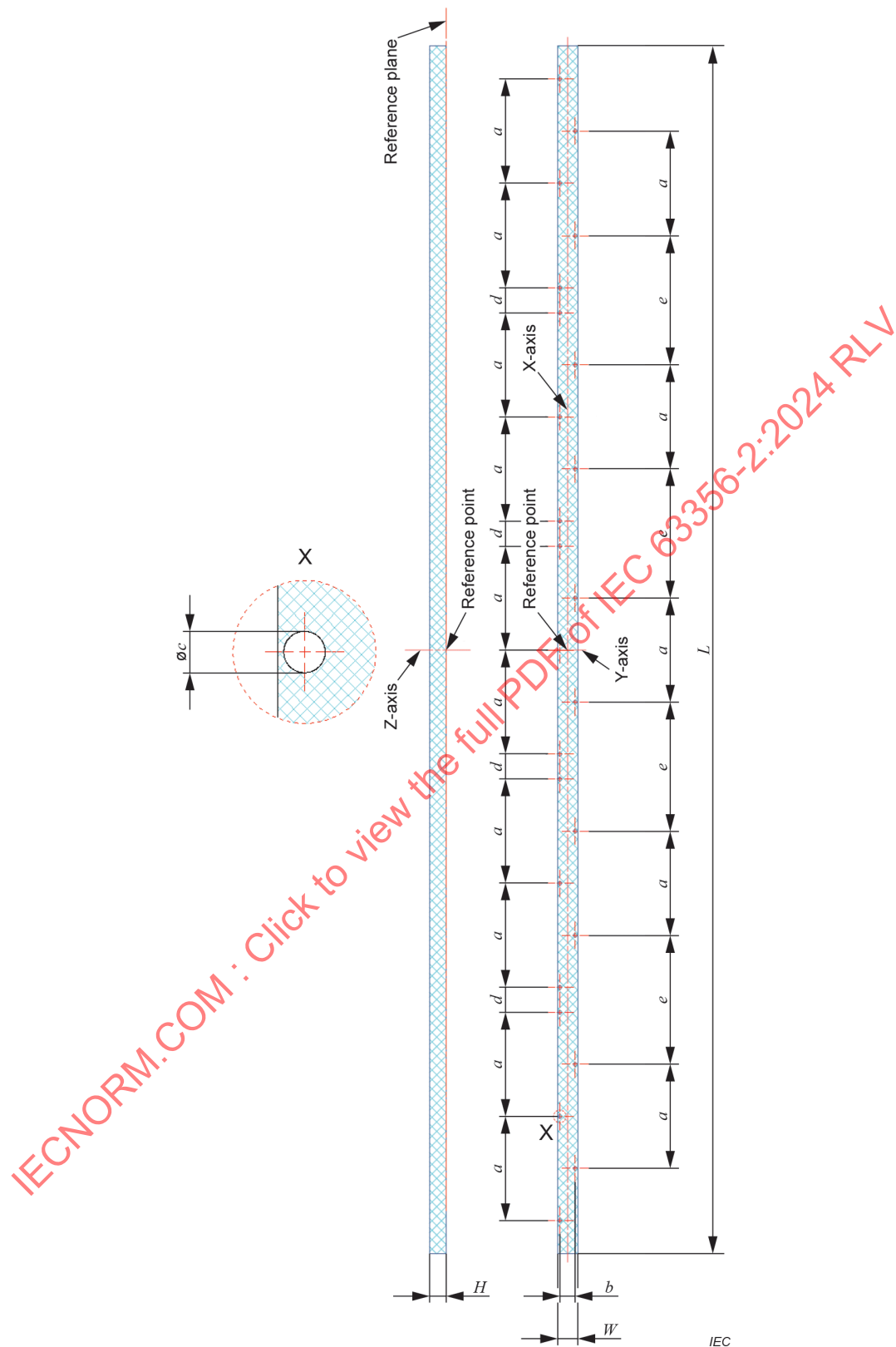
The designation for this category is 'L140W2'.

The LED module demarcation of the L140W2 category is defined in Table 13 and Figure 15.

Table 13 – LED module demarcation of the L140W2 category

Dimension	Value
<i>L</i>	1 400
<i>W</i>	24
<i>H</i>	20
<i>a</i>	125
<i>b</i>	18,4
$\varnothing_c$	4,3
<i>d</i>	30
<i>e</i>	155

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NOTE The drawing on the left shows the detail X.

Figure 15 – LED module demarcation of the L140W2 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

5.3.15 L145W2

The designation for this category is 'L145W2'.

The LED module demarcation of the L145W2 category is defined in Table 14 and Figure 16.

Table 14 – LED module demarcation of the L145W2 category

Dimension	Value
<i>L</i>	1 450
<i>W</i>	24
<i>H</i>	20
<i>a</i>	125
<i>b</i>	18,4
$\varnothing_c$	4,3
<i>d</i>	30
<i>e</i>	155

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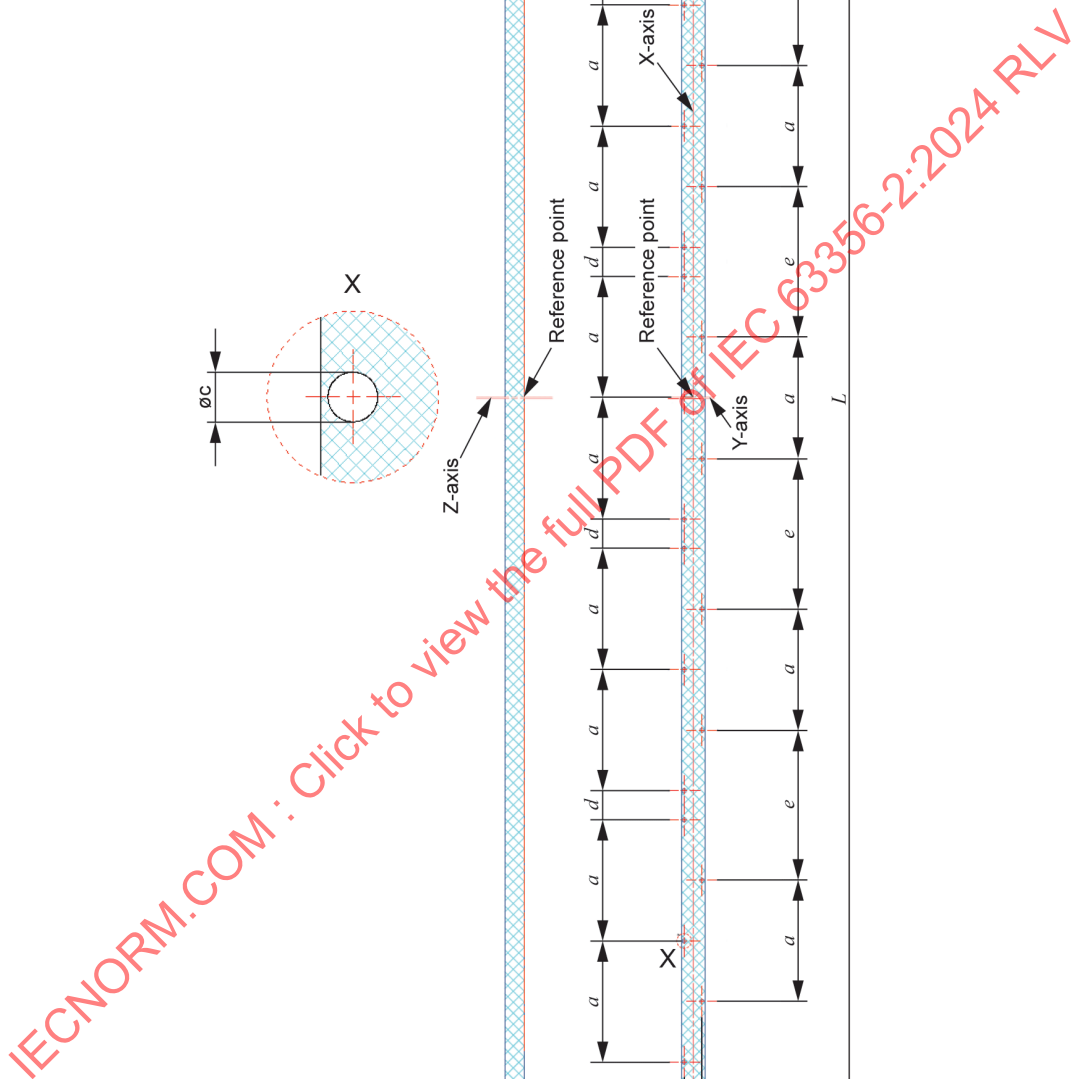


Figure 16 – LED module demarcation of the L145W2 category

The X-axis and Y-axis are the symmetry axes for the outline and the mounting holes.

5.3.16 L30W1

The designation for this category is 'L30W1'.

The LED module demarcation of the L30W1 category is defined in Figure 17.

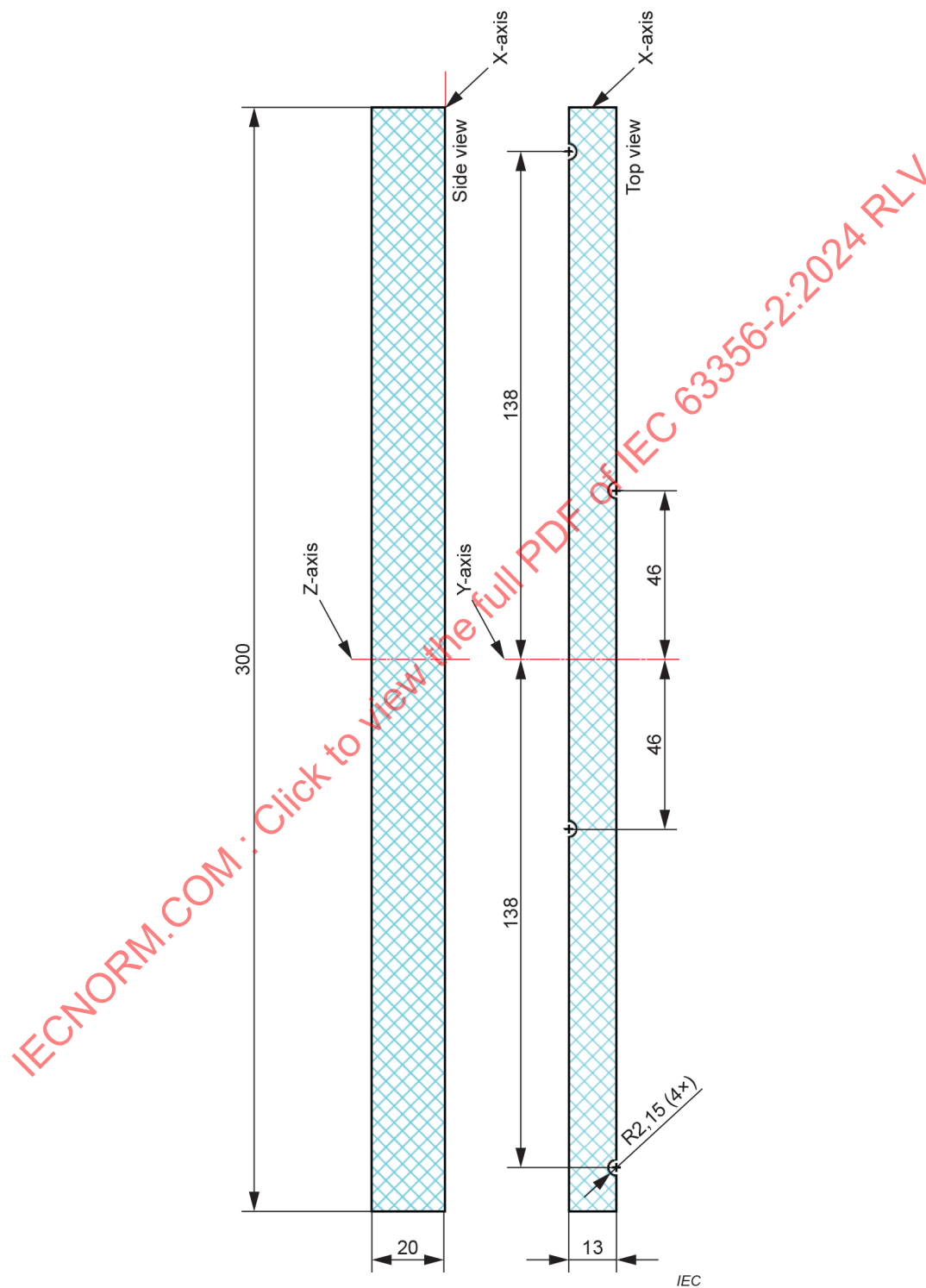


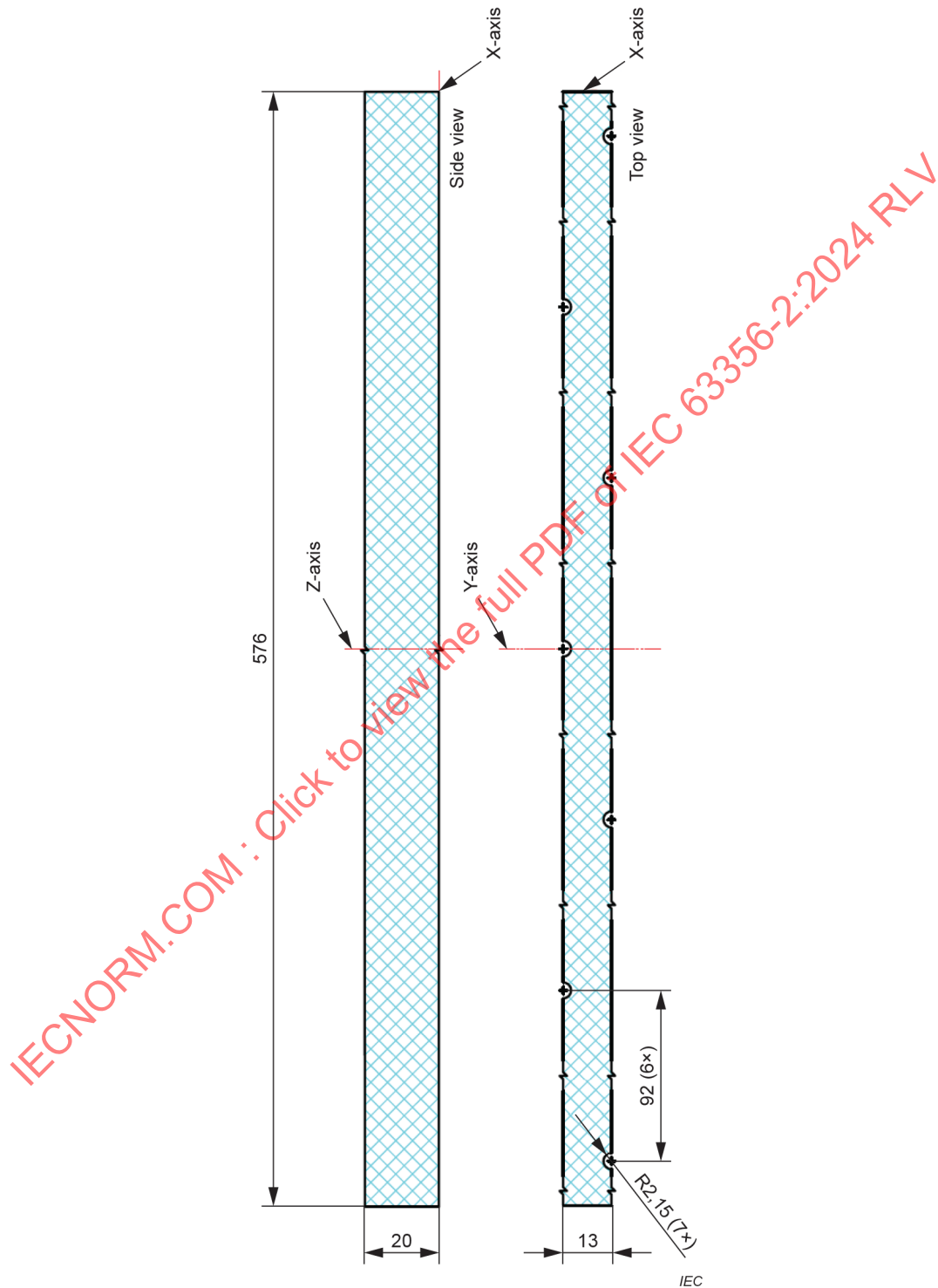
Figure 17 – LED module demarcation of the L30W1 category

The X-axis and Y-axis are the symmetry axes for the outline.

5.3.17 L58W1

The designation for this category is 'L58W1'.

The LED module demarcation of the L58W1 category is defined in Figure 18.



NOTE The X-axis is not to scale.

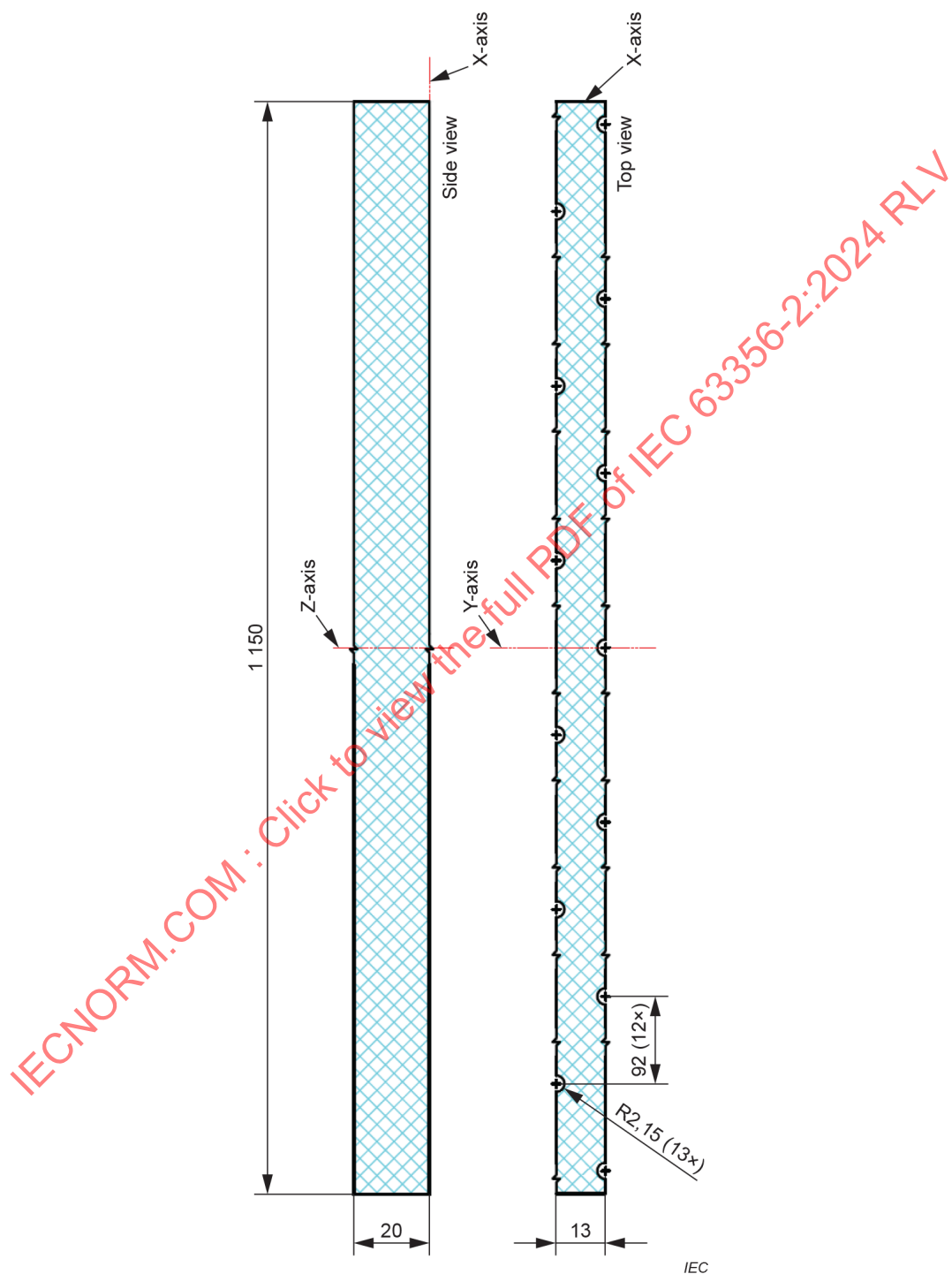
Figure 18 – LED module demarcation of the L58W1 category

The X-axis and Y-axis are the symmetry axes for the outline.

5.3.18 L115W1

The designation for this category is 'L115W1'.

The LED module demarcation of the L115W1 category is defined in Figure 19.



NOTE The X-axis is not to scale.

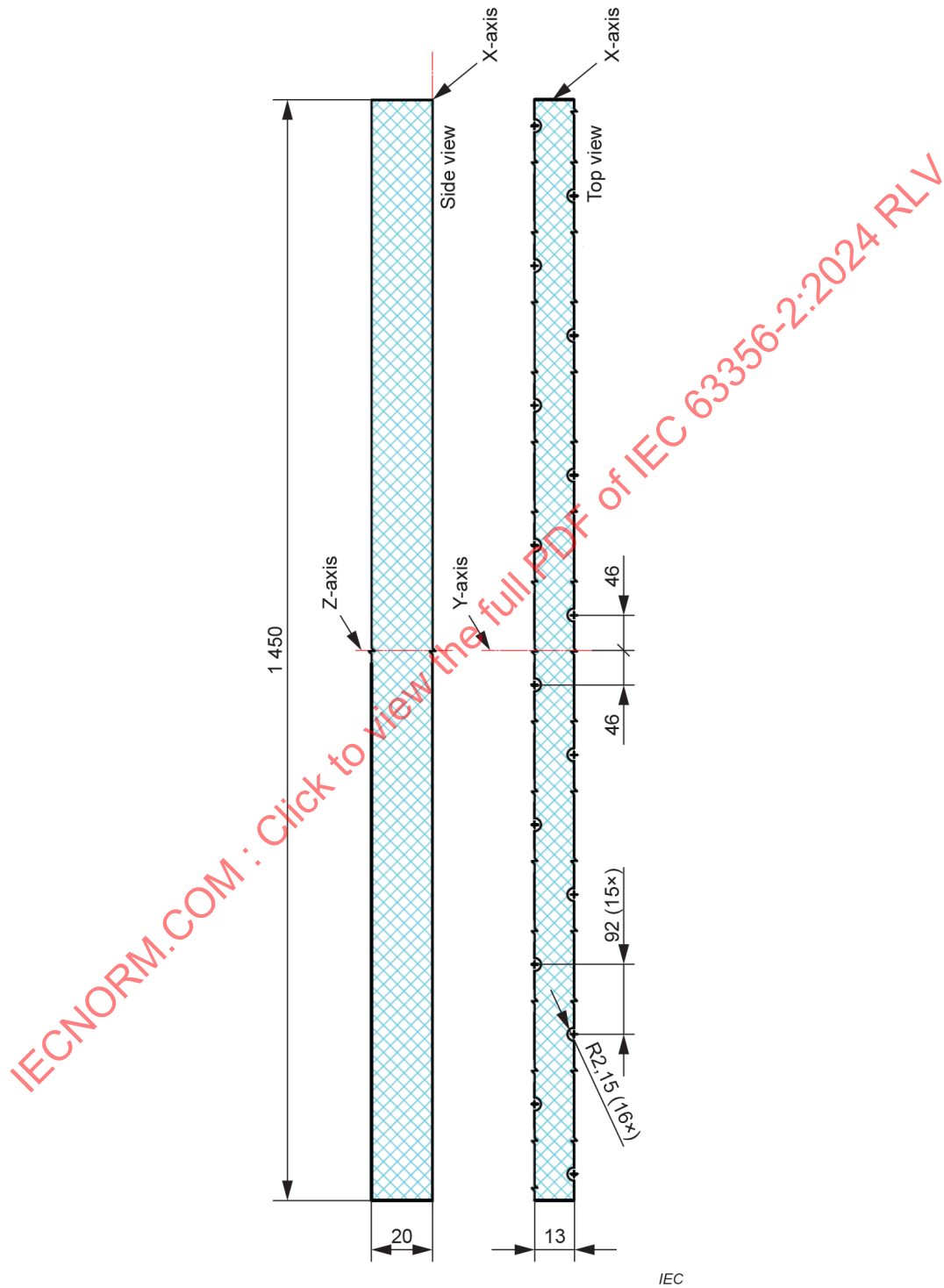
Figure 19 – LED module demarcation of the L115W1 category

The X-axis and Y-axis are the symmetry axes for the outline.

5.3.19 L145W1

The designation for this category is 'L145W1'.

The LED module demarcation of the L145W1 category is defined in Figure 20.



NOTE The X-axis is not to scale.

Figure 20 – LED module demarcation of the L145W1 category

The X-axis and Y-axis are the symmetry axes for the outline.

6 Circular LED modules with a circular light emitting surface for spot lighting

NOTE Clause 6 is taken from Zhaga Book 10 Edition 1.2.

6.1 General

LED modules with a circular light emitting surface (LES) and having high luminance typically used in spot lighting applications are intended to be fixed to a luminaire heat sink by means of screws. The LED modules specified in this Clause 6 comprise a single inseparable unit and are intended to be installed and replaced by skilled persons only.

The circular LES diameter specifications are given in Table 15 for each LES designation. The light output distribution is primarily Lambertian, to enable luminaire optics to shape an application-specific light distribution independent to that of the LED module. Clause 6 specifies LED modules having either a 35 mm (D35) or 50 mm (D50) outer diameter and five different LES diameters categorized as LES6.3, LES9, LES13.5, LES19 or LES23. The complete designation of these LED modules comprises both the outer diameter and the LES category designation (e.g. D35-LES6.3).

Table 15 – LES category specifications for circular LED modules for spot lighting

LES category designation	LES diameter mm
LES6.3	$4,5 < \varnothing \leq 6,3$
LES9	$6,3 < \varnothing \leq 9,0$
LES13.5	$9,0 < \varnothing \leq 13,5$
LES19	$13,5 < \varnothing \leq 19,0$
LES23	$19,0 < \varnothing \leq 23,0$

6.2 Mechanical references

The reference plane and the reference point of an LED module with respect to (optional) TIM are specified in Figure 21 and illustrated in Figure 22 for a D50 (50 mm outer diameter) LED module. Dimensions are specified relative to either the reference point or reference plane, unless indicated otherwise. Moreover, dimensions are specified with TIM (if present) in compressed state.

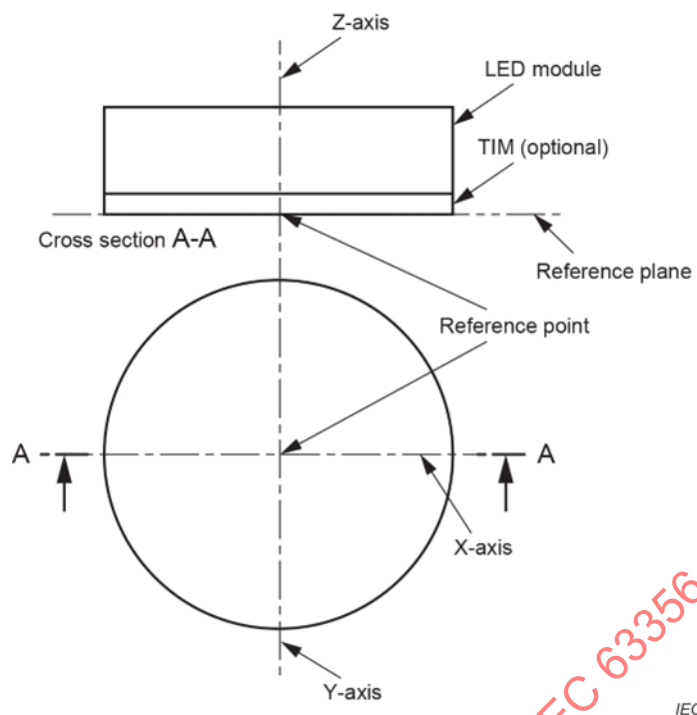


Figure 21 – Positions of the reference point and reference plane of the LED module

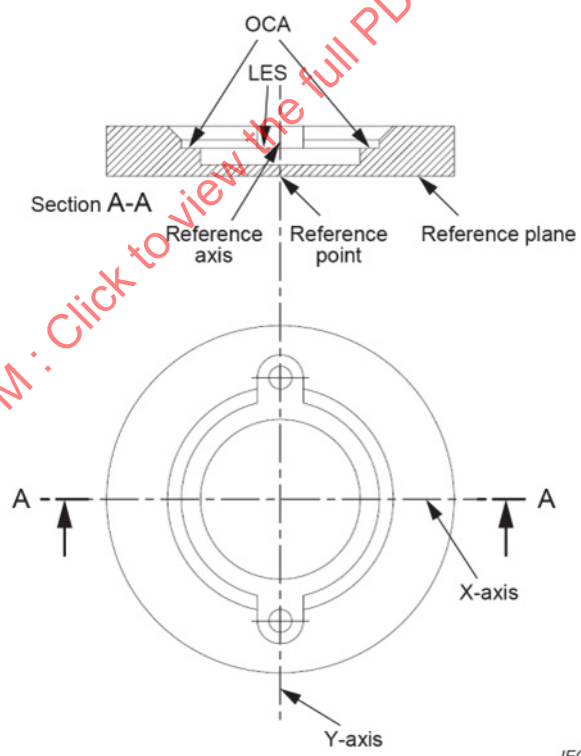


Figure 22 – Positions of the reference point, plane and axis for the LED module (example for D50 category)

6.3 Mechanical interface of the LED module

6.3.1 LED module demarcation

6.3.1.1 General

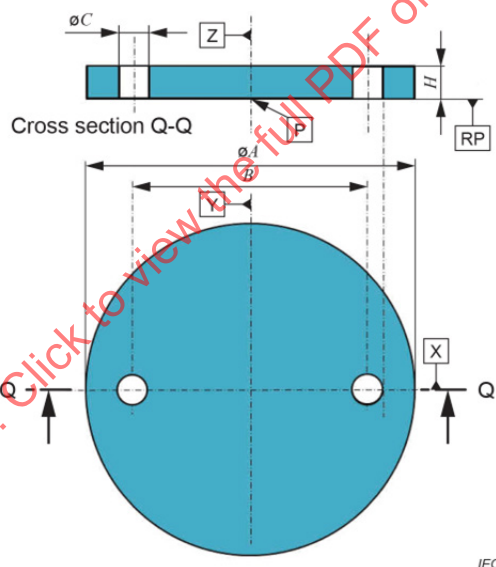
The LED module demarcations are specified in 6.3.1.2 and 6.3.1.3.

No part of the LED module (excluding the interconnect) crosses the boundaries of the LED module demarcation and no part of the luminaire (excluding the interconnect) crosses the boundaries of the LED module demarcation. The demarcation models include positions and shape for screw hole clearances.

If the LED module is applied in combination with a thermal interface material, this TIM is considered to be part of the LED module. Thus, the total height of the LED module and of the TIM (while compressed according to instructions from the LED module manufacturer) does not exceed the maximum height specified in 6.3.1.2, Figure 23, dimension H (D35 category) or 6.3.1.3, Figure 24 (D50 category).

6.3.1.2 D35 LED module demarcation

D35 LED modules have a demarcation according to the drawing in Figure 23 and with dimensions according to Table 16.



Key

- (RP) Reference plane
- (X) Reference X-axis. This is a symmetry axis for the complete model.
- (Y) Reference Y-axis. This is a symmetry axis for the complete model.
- (Z) Reference Z-axis
- (P) Reference point

The blue area indicates the inclusion limit zone for the LED module and the exclusion limit zone for the luminaire.

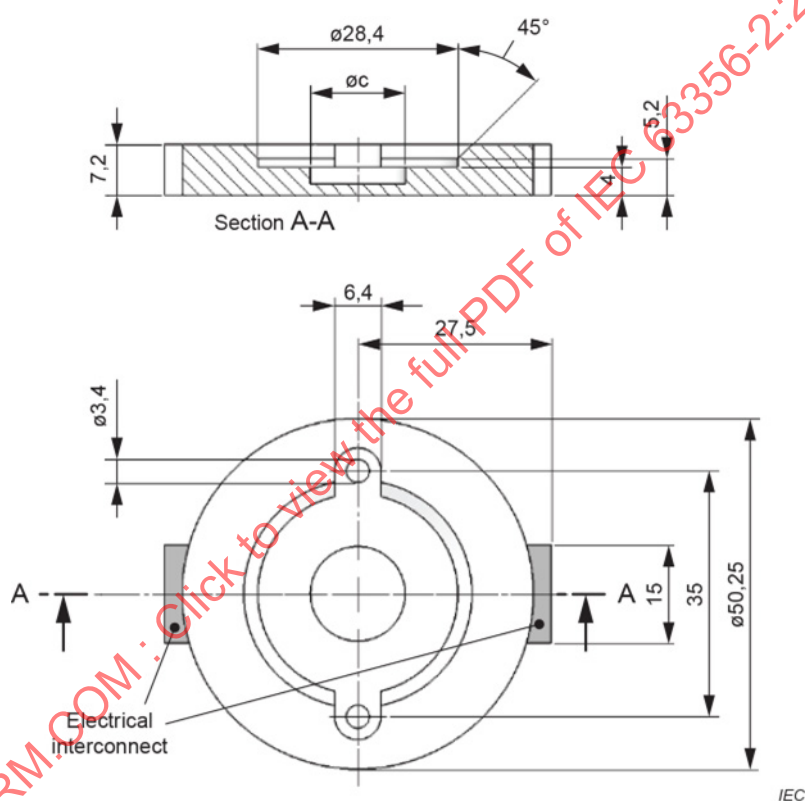
Figure 23 – Drawing of the demarcation of a D35 LED module

Table 16 – Dimensions of D35 LED module demarcation

Dimension	Value mm
$\varnothing A$	35
B	25
$\varnothing C$	3,15
H	4,0

6.3.1.3 D50 LED module demarcation

D50 LED modules including the electrical interconnect are contained within the dimensions specified in Figure 24.



$\varnothing c$ See Table 17: Maximum inner OCA diameter

Figure 24 – Drawing of the demarcation of the D50 LED module

6.3.2 Optics contact area

The optics contact area (OCA) is used as a mechanical reference plane for luminaire optics. For illustration, the optics contact area of a D35 (35 mm) LED module is shown in Figure 25. The inner diameter of the OCA for each light emitting surface (LES) category of an LED module is contained within the limit specified in Table 17. The minimum outer diameter of the OCA depends on the size category of the LED module. The height of the OCA is denoted H_{OCA} .

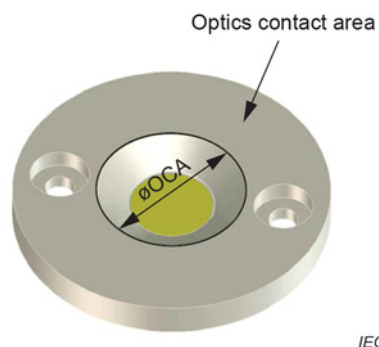


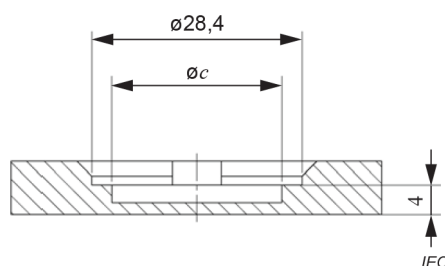
Figure 25 – Optics contact area of a D35 LED module

Table 17 – Maximum inner OCA diameter

LES category	ØOCA_{max} mm
LES6.3	11,67
LES9	13,67
LES13.5	19,17
LES19	23,2
LES23	26,2

For D35 modules, the minimum outer diameter of the OCA is the outer diameter of the module (i.e. nominal 35 mm). All the module surface is used as the OCA. The OCA of the LED module features mounting holes and can also show additional recessed features. No such features (e.g. screw heads) are allowed to extend above the OCA. The height of the OCA (H_{OCA}) falls within the range specified in Table 18.

For D50 modules, there is a fixed minimum outer diameter of the OCA, as shown in Figure 24, section A-A and Figure 26. The outer diameter of the OCA is measured at the height of the plane surface which extends between the diameters $\text{Ø}28,4$ and Ø_c in Figure 26. No mechanical features protruding from the OCA are allowed. The height of the OCA (H_{OCA}) falls within the range given in Table 18.



Ø_c See Table 17: Maximum inner OCA diameter

Figure 26 – Dimensions of OCAs for a D50 category

Table 18 – Minimum and maximum OCA heights

LED module category	OCA height H_{OCA} mm
D35	3,0 to 4,0
D50	3,5 to 4,0

6.3.3 Requirements on screw holes

6.3.3.1 D35 module

D35 LED modules have either counterbored screw holes or countersunk screw holes. In either case, the LED module manufacturer specifies the screw type for which the LED module has been designed in the product literature.

The geometry of the screw holes is such that a screw compliant with the specification in the manufacturer's product literature fits in the screw hole and the maximum height of the assembly (LED module and screws) is less than or equal to the height of the OCA (H_{OCA}).

6.3.3.2 D50 module

There are no requirements on screw holes for D50 LED modules.

6.3.4 LED module electrical interconnect

6.3.4.1 D35 module

There are no requirements for the electrical interconnect of D35 LED modules.

6.3.4.2 D50 module

An electrical interconnect is placed symmetrically with respect to the LED module X-axis (see Figure 22). The interconnect does not exceed the maximum outline given in Figure 24. If a plug is used it will have a width of maximum 14 mm and a maximum length (in plugging direction) of 8 mm. Any wires exiting the module are within the electrical interconnect shown in Figure 24.

6.3.5 Luminaire exclusion limits for electrical interconnects

6.3.5.1 D35 module

There are no luminaire exclusion limits for electrical interconnects of D35 LED modules.

6.3.5.2 D50 module

The luminaire design provides adequate space for an electrical connection as specified in 6.3.4.2.

In addition to this exclusion limit for electrical interconnects, the thickness of connection wires is taken into account.

6.3.6 Inner feature

LED modules can contain any kind of mechanical "inner feature" shown as the dense hatched area of Figure 27, such as light mixing elements, mechanical holding elements, or electrical insulation elements. Within the diameter $\varnothing_c$ shown in Figure 27 and specified as $\varnothing_{OCA}$ in Figure 25 for D35 and $\varnothing_c$ specified in Figure 24 for D50, the LED module can contain any kind of mechanical "inner feature". Any such mechanical "inner feature" does not exceed the height b as specified in Table 19 and shown in Figure 27. The inner feature may contain an extension of the OCA or even an OCA of smaller size.

If the LED module has a cover above one or more LEDs, then the cover does not exceed 20 mm measured from the reference plane (see Figure 21).

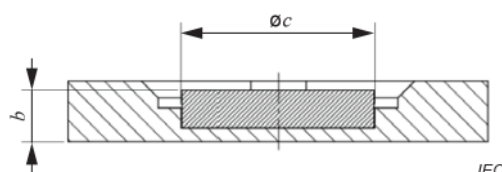


Figure 27 – Maximum inner feature outlines

Table 19 – Maximum height b of inner feature

LES category	D35 LED module mm	D50 LED module mm
LES6.3	4,0	
LES9	4,0	5,0
LES13.5	4,0	5,5
LES19		6,4
LES23		7,2

6.3.7 Luminaire mechanical properties

The module mounting surface of the luminaire has a diameter greater than the demarcation diameter (see Figure 23 and Figure 24) with means for screwing the LED module (e.g. M3 threads or holes for self-cutting screws) at points corresponding to the LED module geometry.

7 LEDni modules with a rectangular shape and a circular light emitting surface

NOTE Clause 7 is taken from Zhaga Book 12 Edition 1.3.

7.1 General

Non-integrated LED modules (LEDni modules) specified in this Clause 7 are intended to be mounted on a heat sink by means of a holder and to be connected to a separate electronic controlgear. These LEDni modules and holders are intended to be installed and replaced by luminaire manufacturers or skilled persons only.

The LEDni modules in Clause 7 have circular light emitting surfaces (LES) that comply with the diameter specifications given in Table 20 for each LES designation. The light output is essentially Lambertian to enable the luminaire optics to shape the application's desired light distribution.

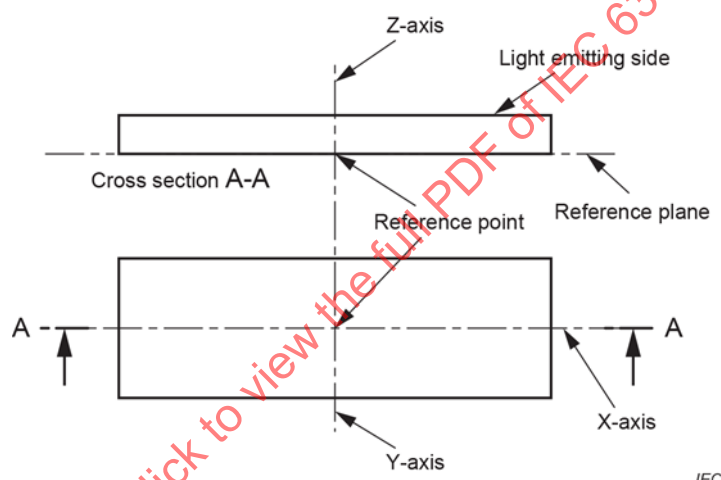
The complete designation of these LEDni modules comprises both the category designation (see 7.3 and Table 21) and the LES category designation (e.g. C28x28-LES6.3).

Table 20 – Circular LES category specifications for LEDni modules

LES category designation	LES diameter mm
LES6.3	$4,5 < \varnothing \leq 6,3$
LES9	$6,3 < \varnothing \leq 9,0$
LES13.5	$9,0 < \varnothing \leq 13,5$
LES19	$13,5 < \varnothing \leq 19,0$
LES23	$19,0 < \varnothing \leq 23,0$
LES30	$23,0 < \varnothing \leq 30,0$

7.2 Mechanical references for an LEDni module

The reference plane and the reference point of an LEDni module are shown in Figure 28. Dimensions are specified relative to either the reference point or the reference plane, unless indicated otherwise.

**Figure 28 – Positions of the reference point and the reference plane of an LEDni module**

By way of example, the red shape in Figure 29 indicates the outline of an LEDni module. By definition, the LEDni module border is the rectangle that fits the LEDni module outline such that the average deviation between the LEDni module outline and LEDni module border is minimal. In the case of an LEDni module with recessed corners, the area of these recessed corners is ignored for the mechanical references according to this definition. Also, by definition, both the X-axis and the Y-axis are axes of symmetry of the LEDni module border. The mechanical reference point is where the X-axis and the Y-axis cross.

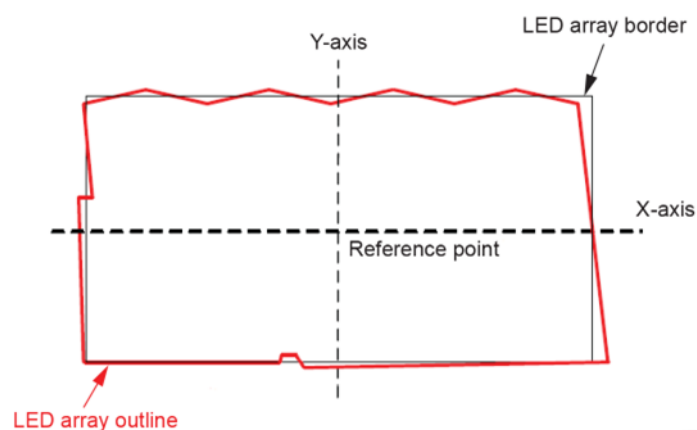


Figure 29 – Definition of the LEDni module border and mechanical references

7.3 Mechanical interface of the LEDni module

This document specifies seven LEDni module categories identified by a designation, $CW \times L$, where W is the LEDni module width and L is the LEDni module length. The designations are C24x24, C28x28, C20x24, C19x19, C16x19, C13.5x13.5 and C12x15. For each of these categories, the following are specified:

- the outline of the LEDni module;
- the position and size of the minimum contact areas;
- the height of the PCB;
- the position and size of the minimum mounting holes or recessed corners.

NOTE These mounting holes or recessed corners are optional but if they are present, the dimensional specifications are given in 7.4.3 and 7.4.4.

For each LEDni module category specified in this document, one or more of the following light emitting surface (LES) diameters can be used: LES6.3, LES9, LES13.5, LES19, LES23 or LES30. For each combination of an LEDni module category and an LES diameter, the following are specified:

- the inclusion limit zone ($\phi_{\text{keep-in}}$) being the area on the PCB where components can be placed;
- the position and size of the maximum contact areas.

7.4 LEDni module outlines

7.4.1 General

Mounting features such as holes or recessed corners are optional for LEDni modules specified in Clause 7. However, if they are present, then the relevant demarcation zones for the LEDni module outline are specified in 7.4.3 and 7.4.4. LEDni modules in the C24x24 and C28x28 categories can have mounting holes. However, LEDni modules in the C20x24, C19x19, C16x19, C13.5x13.5 and C12x15 categories are too small to accommodate mounting holes but can have recessed corner mounting features. Table 21 details the dimensions of each LEDni module category specified in 7.4.2, 7.4.3 and 7.4.4. The dimensional quantities in Table 21 are as follows:

- W : width of the LEDni module;
- L : length of the LEDni module;
- D_W : width of the demarcation zone;
- S_x : hole centre offset from the y-axis;

- S_y : hole centre offset from the x-axis;
- $\varnothing H$: hole diameter;
- D_x : electrical contact offset from the y-axis;
- D_y : electrical contact offset from the x-axis;
- L_p min: minimum length of each side of an LEDni module electrical contact area;
- L_p^* : length of each side of the overlap area for an LEDni module electrical contact.

Table 21 – Values of dimensions for LEDni module categories^a

LEDni module category designation	W mm	L mm	D_W mm	S_x mm	S_y mm	$\varnothing H$ mm	D_x mm	D_y mm	L_p min mm	L_p^* mm
C28x28	28,0	28,0	0,2	11,4	11,4	3,1	11,1	11,1	2,0	1,7
C24x24	24,0	24,0	0,2	9,4	9,4	3,1	9,1	9,1	2,0	1,7
C20x24	20,0	24,0	0,2	-	-	-	9,1	7,1	2,0	1,7
C19x19	19,0	19,0	0,2	-	-	-	7,525	7,525	1,75	1,45
C16x19	16,0	19,0	0,2	-	-	-	7,525	6,025	1,75	1,45
C13.5x13.5	13,5	13,5	0,2	-	-	-	5,25	5,25	1,3	1,3
C12x15	12,0	15,0	0,2	-	-	-	5,6	4,1	1,6	1,3

^a The values in this table are nominal values. The number of digits behind the comma does not define the required accuracy.

7.4.2 LEDni modules without mounting features

The outline of an LEDni module not having mounting holes or recessed corners is contained within the demarcation zone indicated by the green area in Figure 30. The values of dimensional quantities for each LEDni module category are given in Table 21.

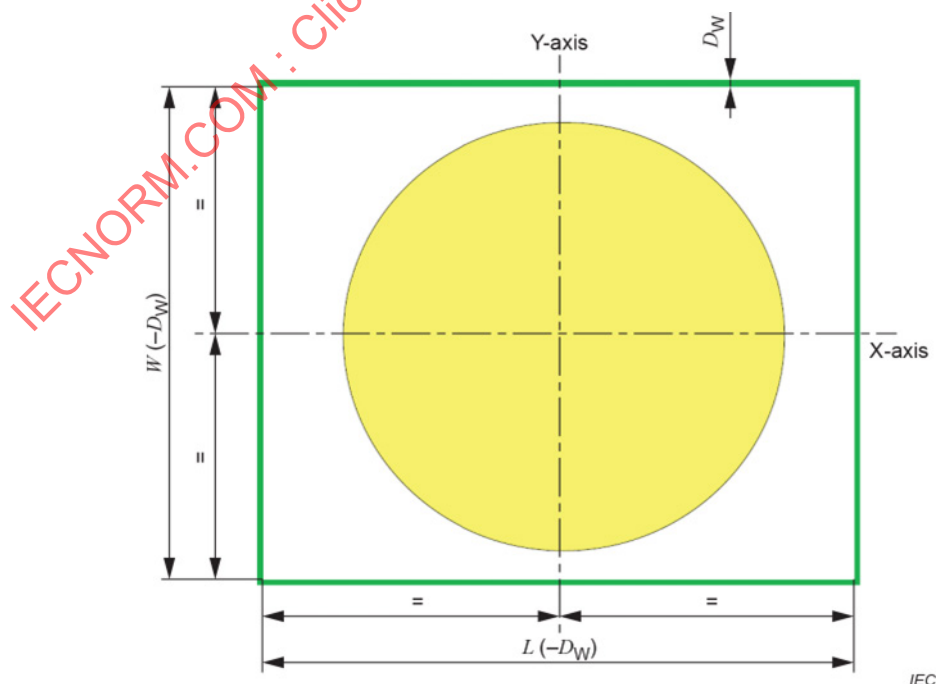


Figure 30 – Demarcation model for the outline of an LEDni module without mounting features

7.4.3 LEDni modules with mounting holes

The outline of an LEDni module having mounting holes is contained within the demarcation zone indicated by the green area in Figure 31. Only LEDni modules in the C24x24 or C28x28 categories can have mounting holes. At the same time the LEDni module does not overlap with the zones for the mounting holes in the demarcation model indicated by the red areas in Figure 31. The values of dimensional quantities for each LEDni module category are given in Table 21.

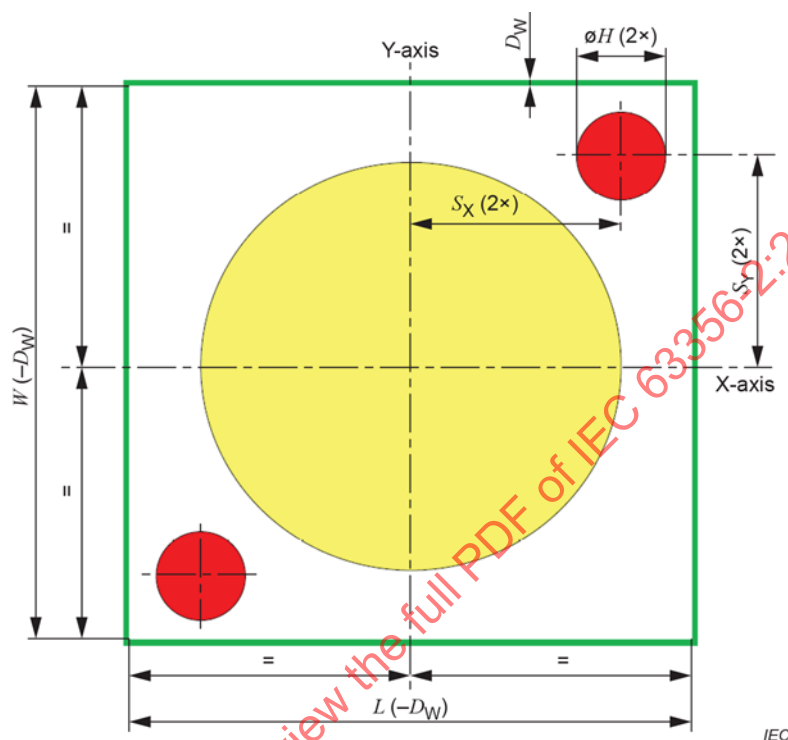


Figure 31 – Demarcation model for the outline of an LEDni module having mounting holes

7.4.4 LEDni modules with recessed corners

The outline of an LEDni module having recessed corner features is contained within the demarcation zone indicated by the green area in Figure 32. LEDni modules in the C20x24, C19x19, C16x19, C13.5x13.5 and C12x15 categories can have recessed corners. The values of dimensional quantities for each LEDni module category are given in Table 21.

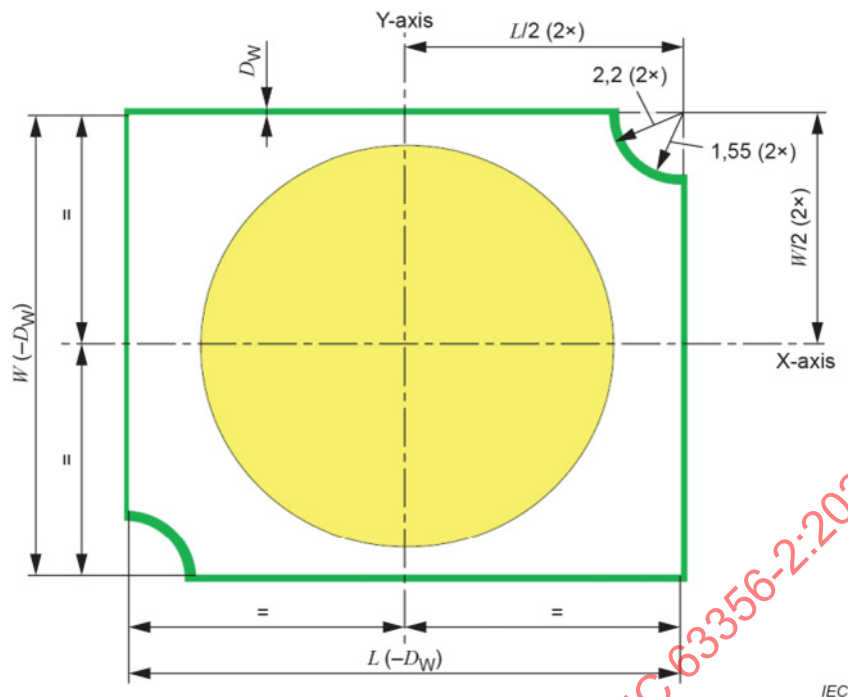


Figure 32 – Demarcation model for the outline of an LEDni module having recessed corners

7.5 Electrical contact areas

7.5.1 Contact location

The location and area for the electrical contacts of the LEDni module are as specified in Figure 33 with values of dimensional quantities given in Table 21.

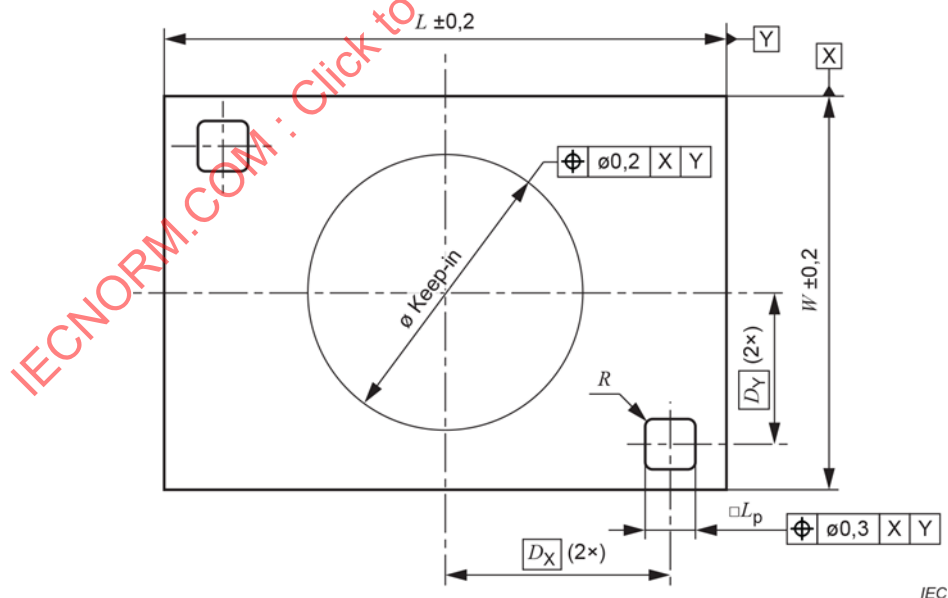


Figure 33 – Location of the electrical contacts for LEDni modules

7.5.2 Minimum contact size

The contact areas of an LEDni module completely cover the round cornered square as specified in Figure 34 with values of dimensional quantities given in Table 21.

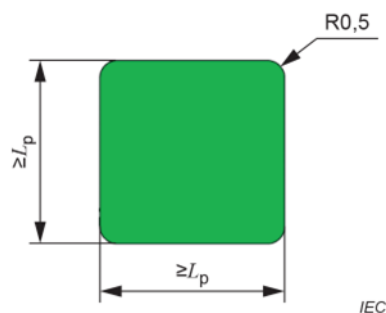


Figure 34 – Minimum size contact area for LEDni module electrical contacts

7.5.3 Contact overlap area

The electrical contact areas of the LEDni module completely cover the overlap areas shown in Figure 35 with values of dimensional quantities given in Table 21. The position and size of the overlap area for the electrical contacts are indicated by the green areas in Figure 35. The centre of the overlap areas coincides with the position indicated by D_x and D_y .

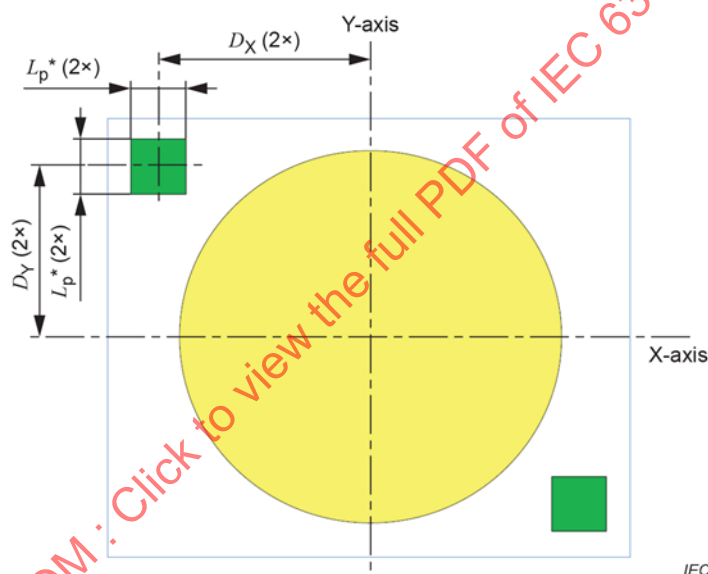


Figure 35 – Overlap area for the electrical contacts of LEDni modules

7.5.4 Maximum electrical contact area

The position and size of the maximum electrical contact areas are indicated by the green shading in Figure 36 with dimensional quantities for each LEDni module category given in Table 21 and LES category given in Table 22. The electrical contacts of the LEDni module under test are completely within these areas. PCB tracks which function as live parts are only allowed in the inclusion limit zone area indicated by yellow shading in Figure 36 and in the maximum electrical contact area (green shaded areas in Figure 36).

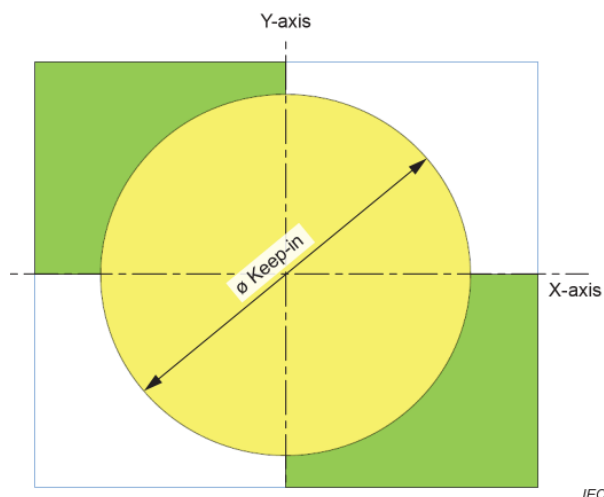


Figure 36 – Maximum electrical contact area for LEDni modules

7.6 PCB thickness

The thickness of the printed circuit board (PCB) is in the range $1,0 \text{ mm} \pm 0,15 \text{ mm}$.

7.7 Inclusion limit zone

The position and size ($\phi_{\text{keep-in}}$) of an inclusion limit zone for LEDni module components are shown by the yellow area in Figure 37 with dimensional quantities for each LEDni module category and LES category given in Table 22. The centre of this inclusion limit zone coincides with the mechanical reference point (see Figure 28). The reference X-axis and Y-axis are axes of symmetry of the inclusion zone. Outside this inclusion zone, the LEDni module does not have any feature that protrudes above the PCB top surface. PCB tracks and contact areas are not considered as features that fall in this category.

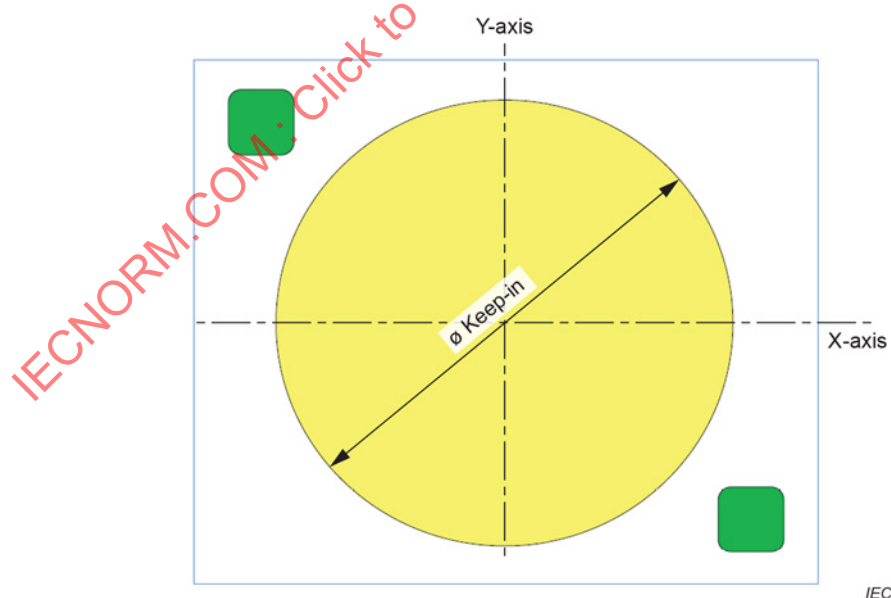


Figure 37 – Inclusion limit zone for LEDni module components

**Table 22 – Inclusion limit zone values of dimension $\phi_{\text{keep-in}}$
by LEDni module and LES category**

LEDni module category	LES category					
	LES6.3	LES9	LES13.5	LES19	LES23	LES30
C28x28	8,3 mm	11,0 mm	15,5 mm	21,0 mm	25,0 mm	25,8 mm
C24x24	8,3 mm	11,0 mm	15,5 mm	21,0 mm	21,1 mm	X
C20x24	8,3 mm	11,0 mm	15,5 mm	17,8 mm	X	X
C19x19	8,3 mm	11,0 mm	15,5 mm	16,8 mm	X	X
C16x19	8,3 mm	11,0 mm	13,8 mm	13,8 mm	X	X
C13.5x13.5	8,3 mm	11,2 mm	11,2 mm	X	X	X
C12x15	8,3 mm	9,8 mm	9,8 mm	X	X	X

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IEC 63554:—⁵, *LED lamps – Safety requirements*

IEC 63555:—⁶, *LED light sources – Performance requirements*

Zhaga interface specification Book 7: Edition 1.7, April 2021 – Rectangular LED Module with undefined LED

Zhaga interface specification Book 10: Edition 1.2, April 2021 – Circular LED modules for spot lighting

Zhaga interface specification Book 12: Edition 1.3, April 2021 – Rectangular LED arrays with circular LES and corresponding holders

⁴ Third edition under preparation. Stage at the time of publication IEC CCDV 62031:2024.

⁵ First edition under preparation. Stage at the time of publication IEC CCDV 63554:2024.

⁶ First edition under preparation. Stage at the time of publication IEC CCDV 63555:2024.

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SOMMAIRE

AVANT-PROPOS	55
1 Domaine d'application	57
2 Références normatives	57
3 Termes et définitions	57
4 Vue d'ensemble et informations communes	58
4.1 Généralités	58
4.2 Système de numérotation	58
5 Modules à LED rectangulaires à surface électroluminescente non définie	58
5.1 Généralités	58
5.2 Références mécaniques	58
5.3 Catégories de modules à LED	59
5.3.1 Généralités	59
5.3.2 L6W6	59
5.3.3 L14W2	61
5.3.4 L28W2	62
5.3.5 L28W4	63
5.3.6 L28W6	63
5.3.7 L28W28	64
5.3.8 L38W38	66
5.3.9 L56W56	67
5.3.10 L56W2	69
5.3.11 L56W4	70
5.3.12 L112W2	70
5.3.13 L115W2	73
5.3.14 L140W2	75
5.3.15 L145W2	77
5.3.16 L30W1	79
5.3.17 L58W1	79
5.3.18 L115W1	80
5.3.19 L145W1	81
6 Modules à LED circulaires à surface électroluminescente circulaire pour un éclairage par spots	82
6.1 Généralités	83
6.2 Références mécaniques	83
6.3 Interface mécanique du module à LED	85
6.3.1 Démarcation de module à LED	85
6.3.2 Zone de contact optique	86
6.3.3 Exigences relatives aux trous de vis	88
6.3.4 Interconnexion électrique du module à LED	88
6.3.5 Limites d'exclusion du luminaire pour les interconnexions électriques	88
6.3.6 Élément interne	89
6.3.7 Propriétés mécaniques du luminaire	89
7 Modules à LEDni de forme rectangulaire à surface électroluminescente circulaire	89
7.1 Généralités	89
7.2 Références mécaniques pour un module à LEDni	90
7.3 Interface mécanique du module à LEDni	91

7.4	Contours du module à LEDni	91
7.4.1	Généralités	91
7.4.2	Modules à LEDni sans éléments de montage	92
7.4.3	Modules à LEDni avec trous de montage	93
7.4.4	Modules à LEDni à coins rentrants	94
7.5	Zones de contact électrique	95
7.5.1	Emplacement du contact	95
7.5.2	Taille de contact minimale	95
7.5.3	Zone de chevauchement des contacts	96
7.5.4	Zone de contact électrique maximale	96
7.6	Épaisseur de la carte de circuit imprimé	97
7.7	Zone de limitation d'inclusion	97
	Bibliographie	99
	Figure 1 – Exemple de luminaire avec deux modules à LED	58
	Figure 2 – Position du point de référence et du plan de référence du module à LED	59
	Figure 3 – Démarcation du module à LED de la catégorie L6W6	60
	Figure 4 – Démarcation du module à LED de la catégorie L14W2	61
	Figure 5 – Démarcation du module à LED de la catégorie L28W2	62
	Figure 6 – Démarcation du module à LED de la catégorie L28W4	63
	Figure 7 – Démarcation du module à LED de la catégorie L28W6	64
	Figure 8 – Démarcation du module à LED de la catégorie L28W28	65
	Figure 9 – Démarcation du module à LED de la catégorie L38W38	67
	Figure 10 – Démarcation du module à LED de la catégorie L56W56	68
	Figure 11 – Démarcation du module à LED de la catégorie L56W2	69
	Figure 12 – Démarcation du module à LED de la catégorie L56W4	70
	Figure 13 – Démarcation du module à LED de la catégorie L112W2	72
	Figure 14 – Démarcation du module à LED de la catégorie L115W2	74
	Figure 15 – Démarcation du module à LED de la catégorie L140W2	76
	Figure 16 – Démarcation du module à LED de la catégorie L145W2	78
	Figure 17 – Démarcation du module à LED de la catégorie L30W1	79
	Figure 18 – Démarcation du module à LED de la catégorie L58W1	80
	Figure 19 – Démarcation du module à LED de la catégorie L115W1	81
	Figure 20 – Démarcation du module à LED de la catégorie L145W1	82
	Figure 21 – Position du point de référence et du plan de référence du module à LED	84
	Figure 22 – Position du point de référence, du plan de référence et de l'axe de référence pour le module à LED (exemple pour la catégorie D50)	84
	Figure 23 – Dessin de la démarcation d'un module à LED D35	85
	Figure 24 – Dessin de la démarcation d'un module à LED D50	86
	Figure 25 – Zone de contact optique d'un module à LED D35	87
	Figure 26 – Dimension des OCA pour une catégorie D50	87
	Figure 27 – Dimensions maximales de l'élément interne	89
	Figure 28 – Position du point de référence et du plan de référence d'un module à LEDni	90
	Figure 29 – Définition du bord du module à LEDni et références mécaniques	91

Figure 30 – Modèle de démarcation du contour d'un module à LEDni sans éléments de montage	93
Figure 31 – Modèle de démarcation du contour d'un module à LEDni avec trous de montage	94
Figure 32 – Modèle de démarcation du contour d'un module à LEDni avec coins rentrants	95
Figure 33 – Emplacement des contacts électriques de modules à LEDni.....	95
Figure 34 – Taille minimale de la zone de contact des contacts électriques du module à LEDni.....	96
Figure 35 – Zone de chevauchement des contacts électriques de modules à LEDni.....	96
Figure 36 – Zone de contact électrique maximale de modules à LEDni	97
Figure 37 – Zone de limitation d'inclusion de composants de module à LEDni	97
Tableau 1 – Démarcation du module à LED de la catégorie L6W6	60
Tableau 2 – Démarcation du module à LED de la catégorie L14W2	61
Tableau 3 – Démarcation du module à LED de la catégorie L28W2	62
Tableau 4 – Démarcation du module à LED de la catégorie L28W4	63
Tableau 5 – Démarcation du module à LED de la catégorie L28W6	64
Tableau 6 – Démarcation du module à LED de la catégorie L28W28	65
Tableau 7 – Démarcation du module à LED de la catégorie L38W38	66
Tableau 8 – Démarcation du module à LED de la catégorie L56W56	68
Tableau 9 – Démarcation du module à LED de la catégorie L56W2	69
Tableau 10 – Démarcation du module à LED de la catégorie L56W4.....	70
Tableau 11 – Démarcation du module à LED de la catégorie L112W2.....	71
Tableau 12 – Démarcation du module à LED de la catégorie L115W2.....	73
Tableau 13 – Démarcation du module à LED de la catégorie L140W2.....	75
Tableau 14 – Démarcation du module à LED de la catégorie L145W2.....	77
Tableau 15 – Spécifications des catégories de LES des modules à LED circulaires destinés à un éclairage par spots.....	83
Tableau 16 – Dimensions de la démarcation du module à LED D35.....	86
Tableau 17 – Diamètre intérieur maximal de l'OCA	87
Tableau 18 – Hauteur minimale et maximale de l'OCA.....	88
Tableau 19 – Hauteur maximale de l'élément interne (<i>b</i>).....	89
Tableau 20 – Spécifications des catégories de LES circulaire pour les modules à LEDni	90
Tableau 21 – Valeurs des dimensions relatives aux catégories de modules à LEDni ^a	92
Tableau 22 – Valeurs dimensionnelles de la zone de limitation d'inclusion $\phi_{\text{keep-in}}$ relatives au module à LEDni et à la catégorie de LES	98

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

CARACTÉRISTIQUES DE SOURCE LUMINEUSE À LED –

Partie 2: Paramètres et valeurs de conception

AVANT-PROPOS

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Cette deuxième édition annule et remplace la première édition parue en 2022. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) un nouvel article 6 relatif aux modules à LED circulaires avec une surface électroluminescente circulaire pour l'éclairage par spots a été ajouté ;

- b) un nouvel article 7 relatif aux modules à LEDni de forme rectangulaire avec une surface électroluminescente circulaire a été ajouté.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
34A/2405/FDIS	34A/2412/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, et a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

Une liste de toutes les parties de la série IEC 63356, publiées sous le titre général *Caractéristiques de source lumineuse à LED*, peut être consultée sur le site web de l'IEC.

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CARACTÉRISTIQUES DE SOURCE LUMINEUSE À LED –

Partie 2: Paramètres et valeurs de conception

1 Domaine d'application

La présente partie de l'IEC 63356 spécifie les paramètres et valeurs de conception d'une source lumineuse à LED ou les caractéristiques d'interface associées.

NOTE 1 Les caractéristiques d'interface peuvent couvrir les interfaces entre la source lumineuse à LED et le luminaire ou l'appareillage, ou entre la source lumineuse à LED et d'autres accessoires.

NOTE 2 Les interfaces peuvent être liées, par exemple, à des aspects électriques, mécaniques ou optiques.

Le présent document ne couvre pas l'interchangeabilité entre les produits de différents fabricants de sources lumineuses à LED.

NOTE 3 L'interchangeabilité est couverte par l'IEC 63356-1.

Les culots de lampes et les douilles spécifiés dans la série IEC 60061 ne font pas partie du domaine d'application du présent document.

Les critères de conformité relatifs aux paramètres du présent document sont couverts par les documents suivants:

- IEC 62031:—¹, Modules à LED – Exigences de sécurité, ou;
- IEC 63554:—², Lampes LED – Exigences de sécurité, ou;
- IEC 63555:—³, Sources de lumière LED – Exigences de performances.

2 Références normatives

Le présent document ne contient aucune référence normative.

3 Termes et définitions

Pour les besoins du présent document, les termes et définitions suivants s'appliquent.

L'ISO et l'IEC tiennent à jour des bases de données terminologiques destinées à être utilisées en normalisation, consultables aux adresses suivantes:

- IEC Electropedia: disponible à l'adresse <https://www.electropedia.org/>
- ISO Online browsing platform: disponible à l'adresse <https://www.iso.org/obp>

¹ Troisième édition en préparation. Stade au moment de la publication IEC CCDV 62031:2024.

² Première édition en préparation. Stade au moment de la publication IEC CCDV 63554:2024.

³ Première édition en préparation. Stade au moment de la publication IEC CCDV 63555:2024.

3.1

matériau d'interface thermique

TIM

matériau présentant une conductivité thermique spécifiée, assemblé entre un module à LED et un luminaire pour améliorer la dissipation de la chaleur

Note 1 à l'article: L'abréviation "TIM" est dérivée du terme anglais correspondant "*thermal interface material*".

4 Vue d'ensemble et informations communes

4.1 Généralités

Les dimensions sont spécifiées à une température de $(25 \pm 5) ^\circ\text{C}$, sauf spécification contraire.

Toutes les valeurs des dimensions fournies sans indication explicite d'unité sont exprimées en millimètres.

4.2 Système de numérotation

Les produits dont les interfaces sont comparables sont regroupés dans des articles distincts.

5 Modules à LED rectangulaires à surface électroluminescente non définie

NOTE L'Article 5, y compris les démarcations des modules à LED spécifiées de 5.3.2 à 5.3.19, est tiré du Livre 7 de Zhaga, édition 1.7.

5.1 Généralités

Les modules à LED rectangulaires à surface électroluminescente non définie (LES, en anglais *light emitting surface*) sont destinés à être montés dans un luminaire. La Figure 1 illustre un exemple de combinaison module à LED-luminaire. Dans cet exemple, le luminaire contient deux modules à LED. Dans la pratique, un luminaire peut maintenir autant de modules à LED que nécessaire.

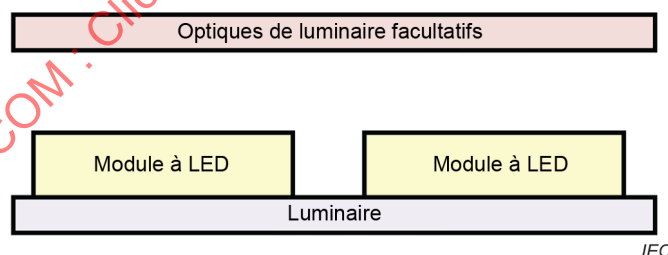


Figure 1 – Exemple de luminaire avec deux modules à LED

Le luminaire est généralement équipé d'optiques de luminaire qui façonnent le flux lumineux du ou des modules à LED.

5.2 Références mécaniques

Le plan de référence et le point de référence d'un module à LED, y compris du TIM (facultatif), sont définis à la Figure 2. Sauf indication contraire, les dimensions sont spécifiées par rapport au point de référence ou au plan de référence. De plus, les dimensions sont spécifiées de sorte à inclure l'épaisseur du TIM (le cas échéant).

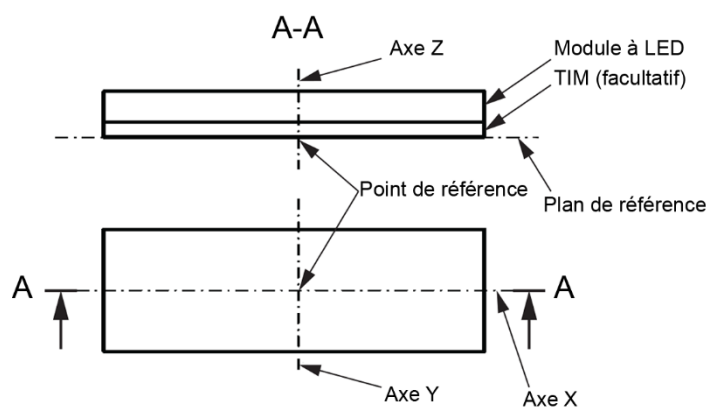


Figure 2 – Position du point de référence et du plan de référence du module à LED

5.3 Catégories de modules à LED

5.3.1 Généralités

Le paragraphe 5.3 spécifie un certain nombre de catégories de modules à LED identifiées par une désignation. Les démarcations des modules à LED de ces catégories sont spécifiées du 5.3.2 au 5.3.19.

L'objectif du modèle de démarcation est de visualiser les zones ou volumes restreints qu'il convient qu'aucune partie d'un luminaire ne traverse. La zone hachurée indique les limites de la zone d'inclusion de la conception du module à LED et la zone d'exclusion de la conception du luminaire.

Sauf mention contraire, tous les trous sont disponibles, et pour chaque trou, au moins 25 % de la circonférence du trou sont présents dans le module à LED. Le modèle de démarcation spécifie le diamètre minimal des trous de montage à une position donnée.

NOTE Dans les conceptions classiques, le diamètre de ces trous peut être plus grand, afin de permettre une certaine tolérance sur la position des trous.

Si un TIM est associé au module à LED, ce matériau est défini comme faisant partie du module à LED. Ainsi, il convient que la hauteur totale du module et du TIM ne dépasse pas la hauteur maximale H (voir 5.3.2 à 5.3.19).

5.3.2 L6W6

La désignation pour cette catégorie est "L6W6".

La démarcation du module à LED de la catégorie L6W6 est définie dans le Tableau 1 et la Figure 3.

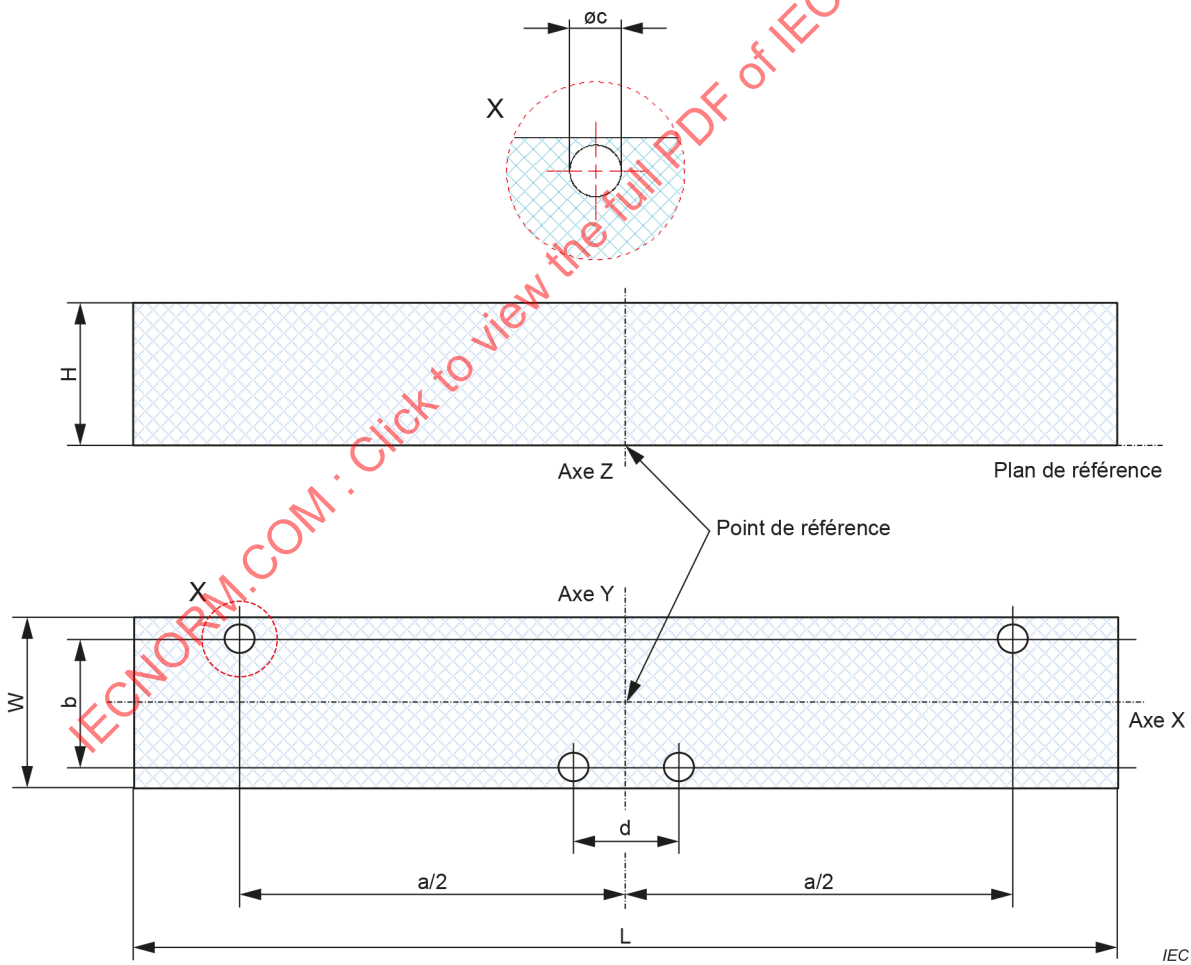
5.3.3 L14W2

La désignation pour cette catégorie est "L14W2".

La démarcation du module à LED de la catégorie L14W2 est définie dans le Tableau 2 et la Figure 4.

Tableau 2 – Démarcation du module à LED de la catégorie L14W2

Dimension	Valeur
L	140
W	24
H	20
a	110
b	18,4
d	15
$\varnothing c$	4,3



NOTE Le dessin du haut montre le détail de X.

Figure 4 – Démarcation du module à LED de la catégorie L14W2

Les axes X et Y sont les axes de symétrie pour le contour et les lignes de réticule des trous de montage.

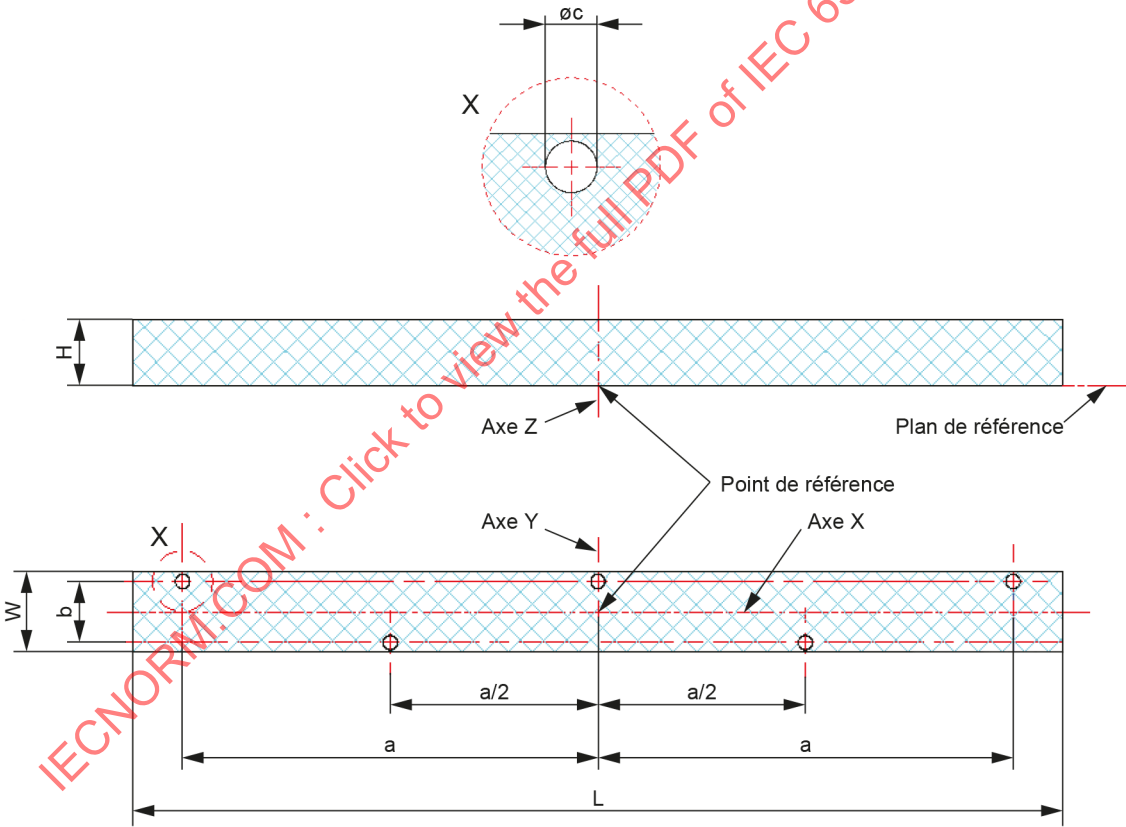
5.3.4 L28W2

La désignation pour cette catégorie est "L28W2".

La démarcation du module à LED de la catégorie L28W2 est définie dans le Tableau 3 et la Figure 5. Les deux trous de montage en bas du schéma de la Figure 5 sont facultatifs.

Tableau 3 – Démarcation du module à LED de la catégorie L28W2

Dimension	Valeur
L	280
W	24
H	20
a	125
b	18,4
$\varnothing c$	4,3



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NOTE Le dessin du haut montre le détail de X.

Figure 5 – Démarcation du module à LED de la catégorie L28W2

L'axe X est l'axe de symétrie pour le contour et les lignes de réticule des trous de montage.

L'axe Y est l'axe de symétrie pour le contour et les trous de montage.

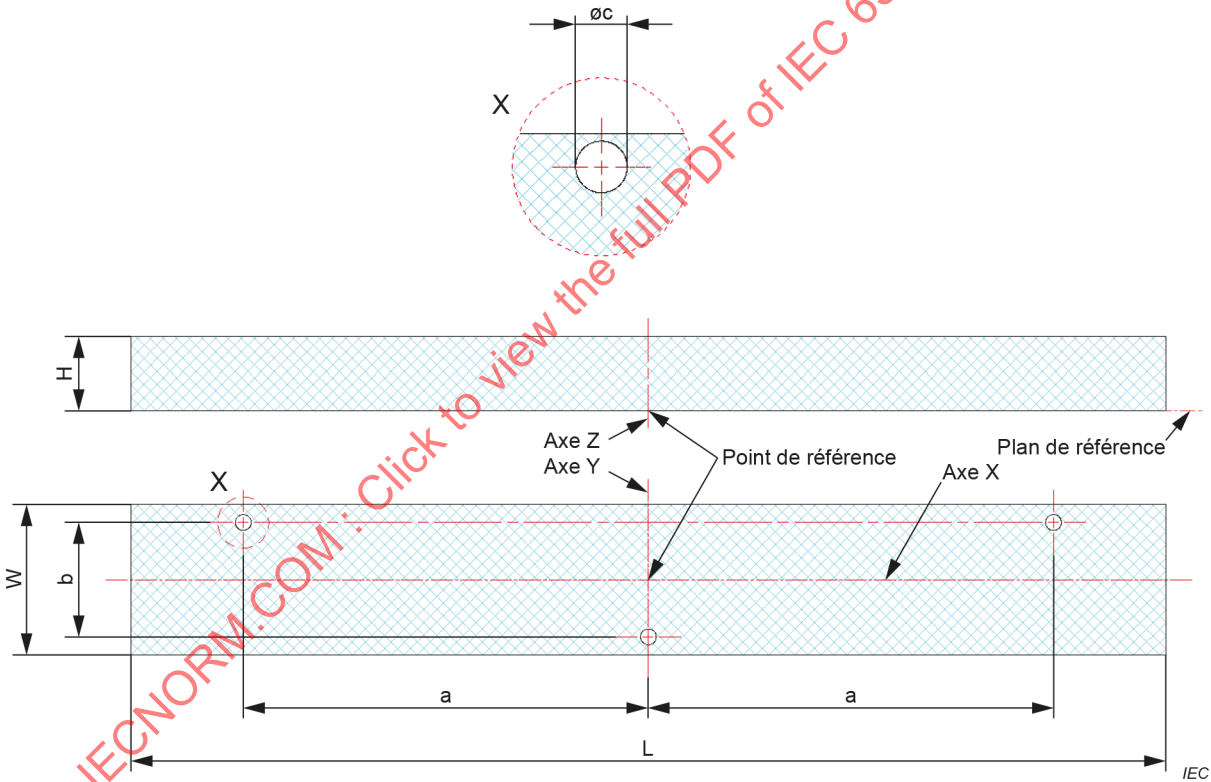
5.3.5 L28W4

La désignation pour cette catégorie est "L28W4".

La démarcation du module à LED de la catégorie L28W4 est définie dans le Tableau 4 et la Figure 6.

Tableau 4 – Démarcation du module à LED de la catégorie L28W4

Dimension	Valeur
L	281
W	41
H	20
a	110
b	31
$\varnothing c$	4,3



NOTE Le dessin du haut montre le détail de X.

Figure 6 – Démarcation du module à LED de la catégorie L28W4

L'axe X est l'axe de symétrie pour le contour et les lignes de réticule des trous de montage.

L'axe Y est l'axe de symétrie pour le contour et les trous de montage.

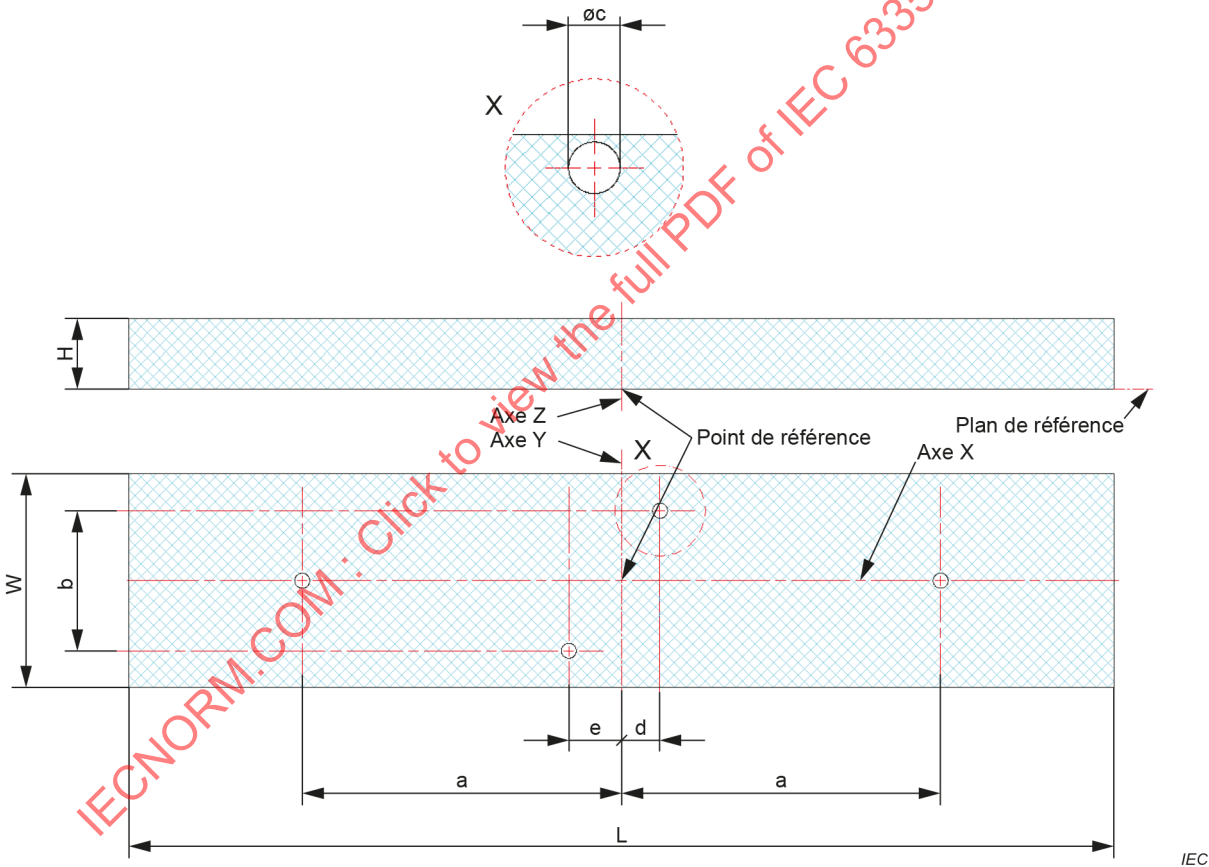
5.3.6 L28W6

La désignation pour cette catégorie est "L28W6".

La démarcation du module à LED de la catégorie L28W6 est définie dans le Tableau 5 et la Figure 7.

Tableau 5 – Démarcation du module à LED de la catégorie L28W6

Dimension	Valeur
L	281
W	61
H	20
a	91
b	40
$\varnothing c$	4,3
d	11
e	15



NOTE Le dessin du haut montre le détail de X.

Figure 7 – Démarcation du module à LED de la catégorie L28W6

L'axe X est l'axe de symétrie pour le contour et les lignes de réticule des trous de montage.

L'axe Y est l'axe de symétrie pour le contour et les trous de montage le plus à gauche et le plus à droite.

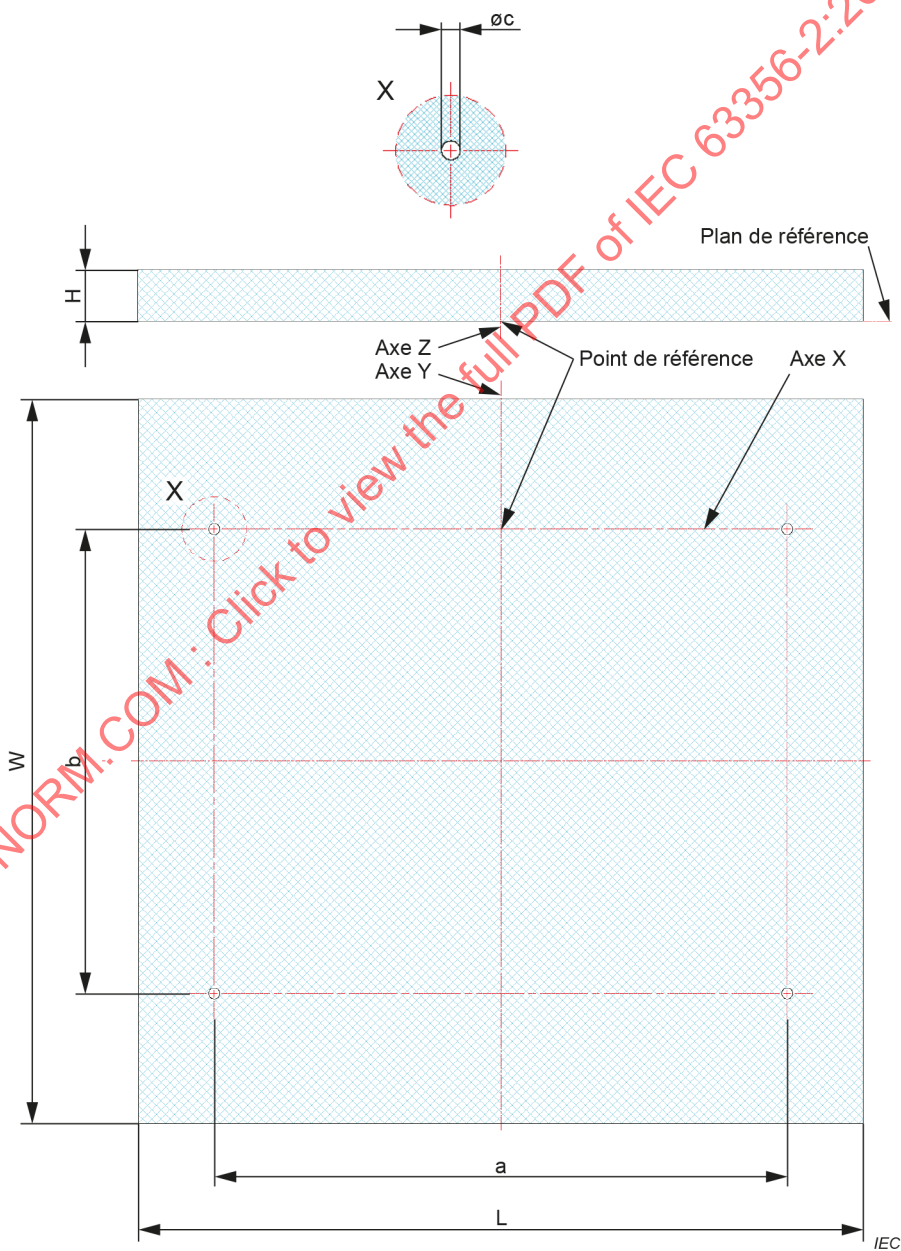
5.3.7 L28W28

La désignation pour cette catégorie est "L28W28".

La démarcation du module à LED de la catégorie L28W28 est définie dans le Tableau 6 et la Figure 8.

Tableau 6 – Démarcation du module à LED de la catégorie L28W28

Dimension	Valeur
L	281
W	281
H	20
a	222
b	180
$\varnothing c$	4,3



NOTE Le dessin du haut montre le détail de X.

Figure 8 – Démarcation du module à LED de la catégorie L28W28

Les axes X et Y sont les axes de symétrie pour le contour et les trous de montage.

5.3.8 L38W38

La désignation pour cette catégorie est "L38W38".

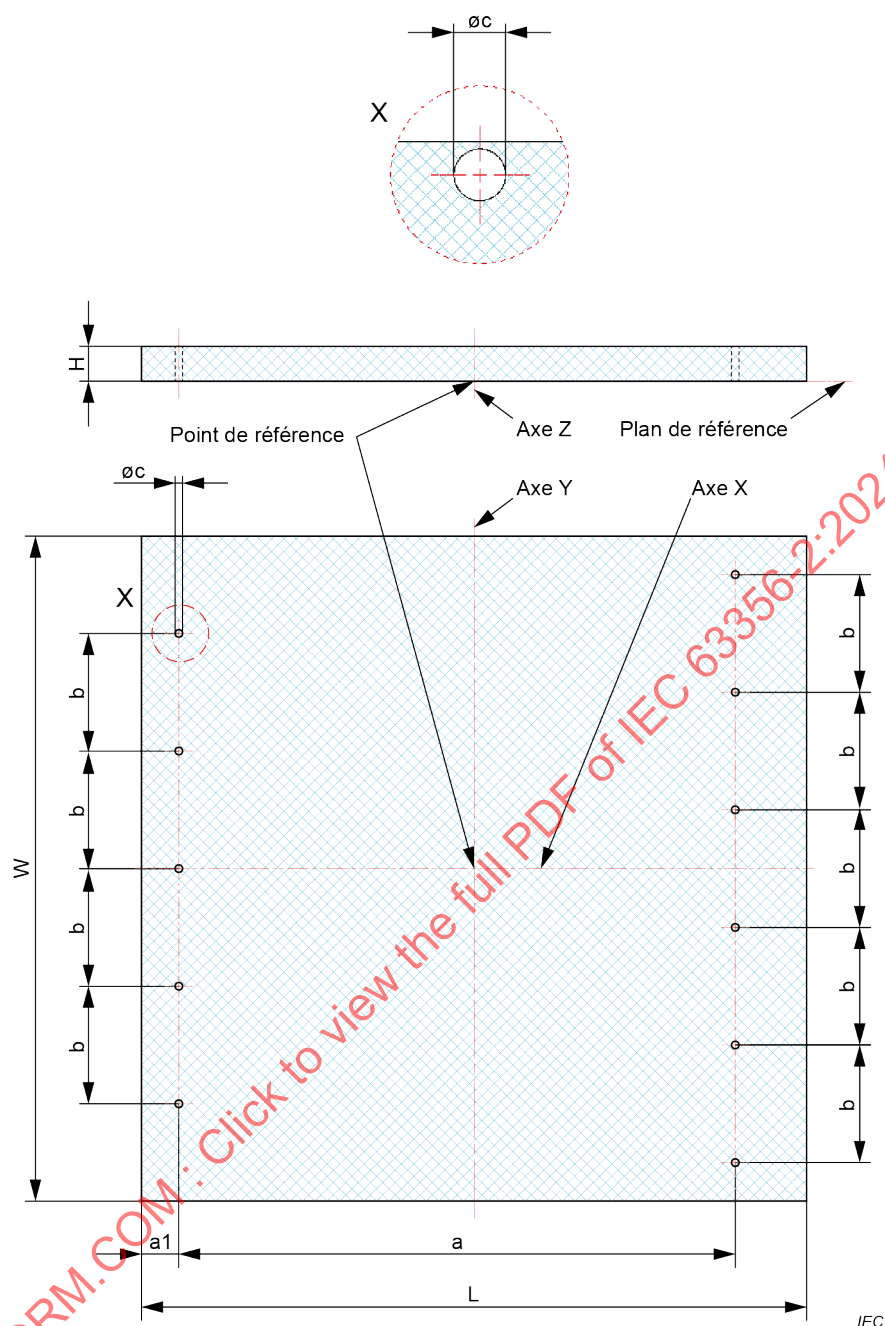
La démarcation du module à LED de la catégorie L38W38 est définie dans le Tableau 7 et à la Figure 9.

Les trous de montage situés ailleurs que dans les angles du module à LED sont facultatifs.

Tableau 7 – Démarcation du module à LED de la catégorie L38W38

Dimension	Valeur
L	381
W	381
H	20
a	371,9
$a1$	21,3
b	67,2
$\varnothing c$	4,3

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NOTE Le dessin du haut montre le détail de X.

Figure 9 – Démarcation du module à LED de la catégorie L38W38

L'axe X est l'axe de symétrie pour le contour et les trous de montage.

L'axe Y est l'axe de symétrie pour le contour et les lignes de réticule des trous de montage.

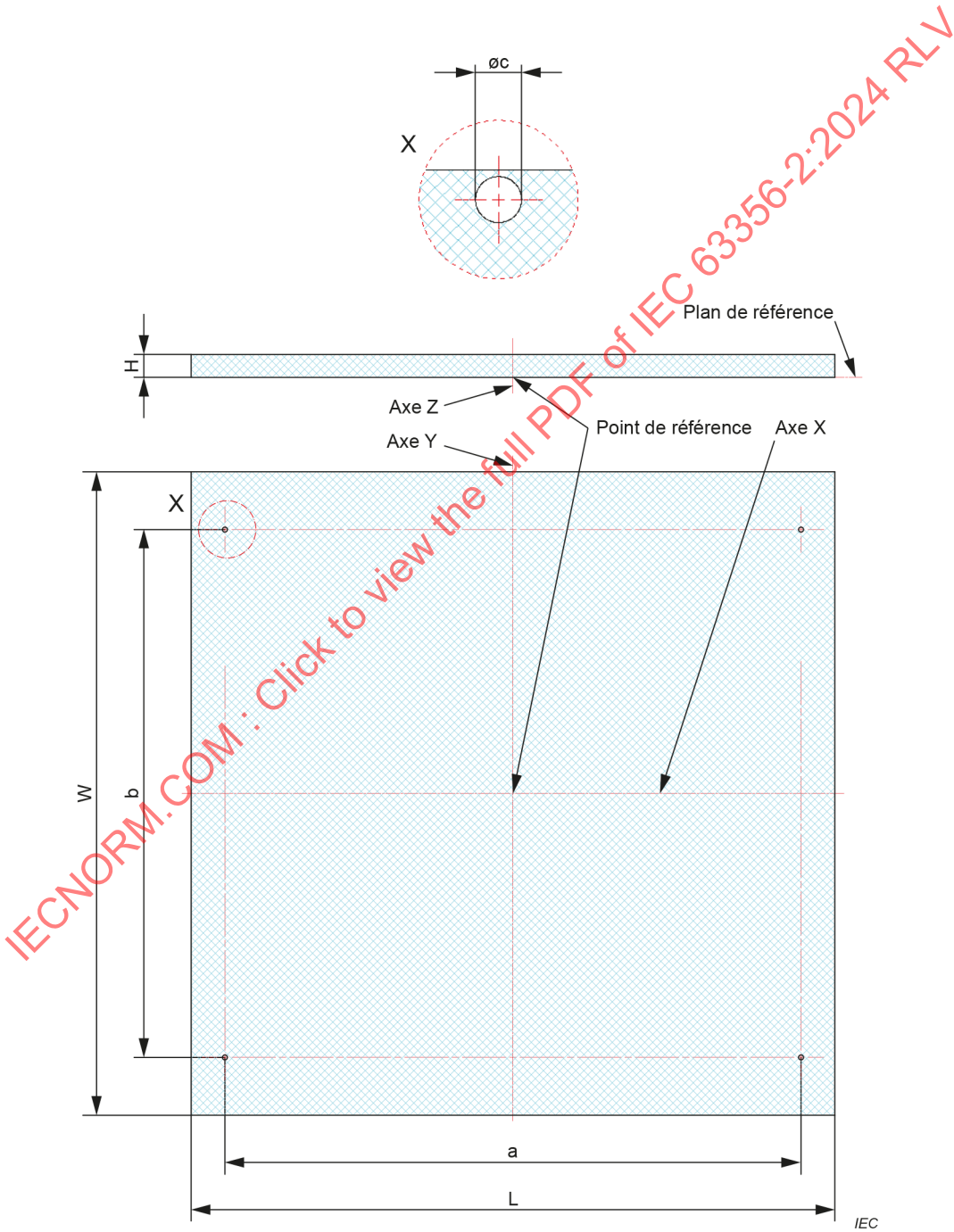
5.3.9 L56W56

La désignation pour cette catégorie est "L56W56".

La démarcation du module à LED de la catégorie L56W56 est définie dans le Tableau 8 et à la Figure 10.

Tableau 8 – Démarcation du module à LED de la catégorie L56W56

Dimension	Valeur
L	562
W	562
H	20
a	503
b	461
$\varnothing c$	4,3



NOTE Le dessin du haut montre le détail de X.

Figure 10 – Démarcation du module à LED de la catégorie L56W56

Les axes X et Y sont les axes de symétrie pour le contour et les trous de montage.

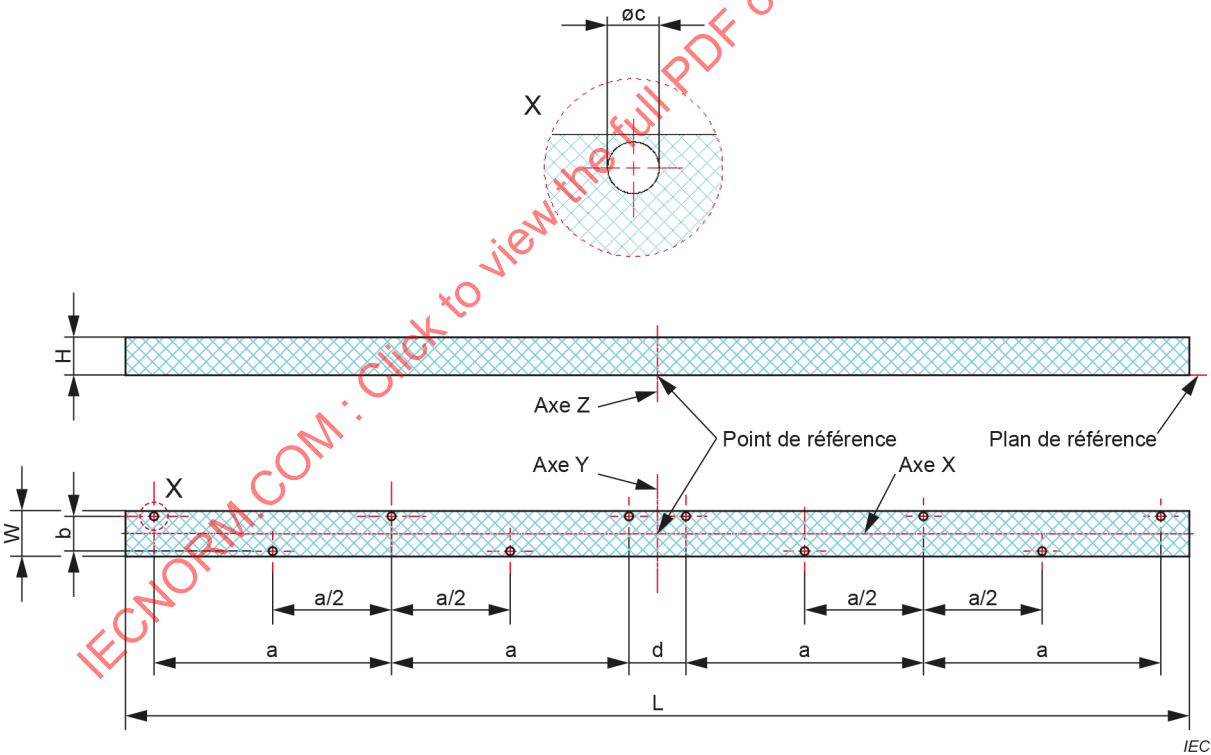
5.3.10 L56W2

La désignation pour cette catégorie est "L56W2".

La démarcation du module à LED de la catégorie L56W2 est définie dans le Tableau 9 et à la Figure 11. Les quatre trous de montage en bas du schéma de la Figure 11 sont facultatifs.

Tableau 9 – Démarcation du module à LED de la catégorie L56W2

Dimension	Valeur
<i>L</i>	560
<i>W</i>	24
<i>H</i>	20
<i>a</i>	125
<i>b</i>	18,4
<i>d</i>	30
$\varnothing c$	4,3



NOTE Le dessin du haut montre le détail de X.

Figure 11 – Démarcation du module à LED de la catégorie L56W2

L'axe X est l'axe de symétrie pour le contour et les lignes de réticule des trous de montage.

L'axe Y est l'axe de symétrie pour le contour et les trous de montage.

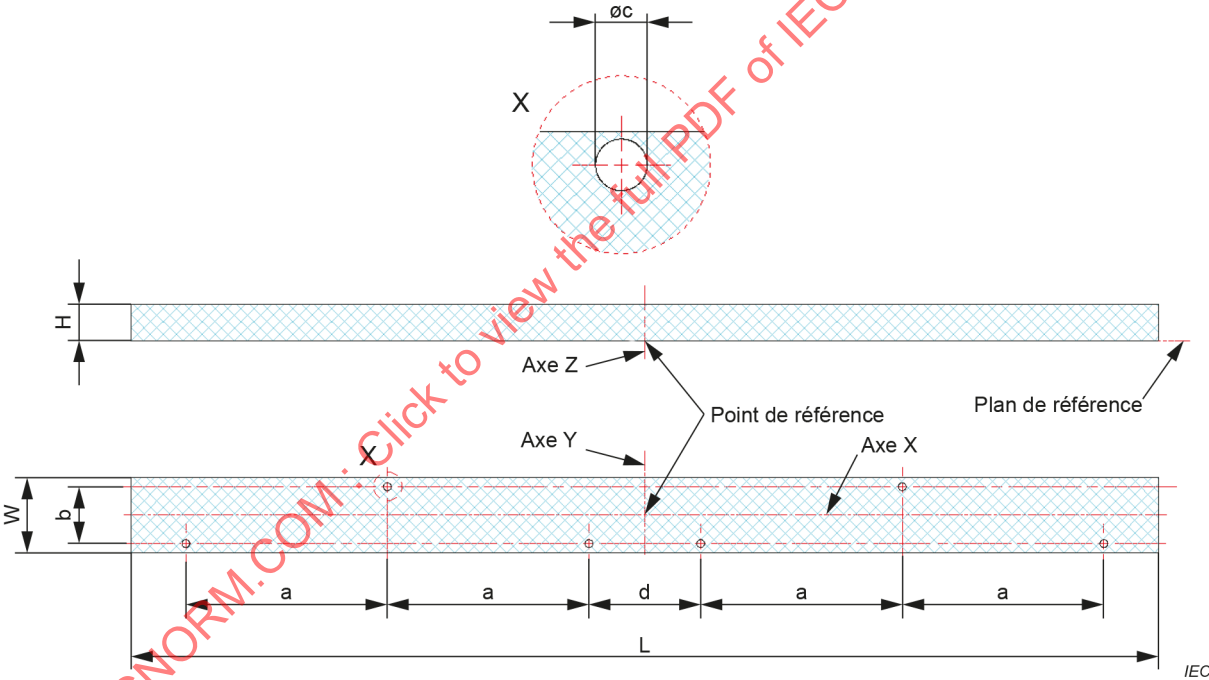
5.3.11 L56W4

La désignation pour cette catégorie est "L56W4".

La démarcation du module à LED de la catégorie L56W4 est définie dans le Tableau 10 et à la Figure 12.

Tableau 10 – Démarcation du module à LED de la catégorie L56W4

Dimension	Valeur
L	561
W	41
H	20
a	110
b	31
$\varnothing c$	4,3
d	61



NOTE Le dessin du haut montre le détail de X.

Figure 12 – Démarcation du module à LED de la catégorie L56W4

L'axe X est l'axe de symétrie pour le contour et les lignes de réticule des trous de montage.

L'axe Y est l'axe de symétrie pour le contour et les trous de montage.

5.3.12 L112W2

La désignation pour cette catégorie est "L112W2".

La démarcation du module à LED de la catégorie L112W2 est définie dans le Tableau 11 et à la Figure 13.