BRITISH STANDARD

BS EN
40-2:2004

Lighting columns —

Part 2: General requirements and dimensions

The European Standard EN 40-2:2004 has the status of a British Standard

ICS 93.080.40

National foreword

This British Standard is the official English language version of EN 40-2:2004. It supersedes BS 5649-2:1978 which is withdrawn. It will partially supersede BS 5649-5 by amendment.

The UK participation in its preparation was entrusted to Technical Committee B/509, Road equipment, which has the responsibility to:

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 24, an inside back cover and a back cover.

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Amendments issued since publication

Amd. No.	Date	Comments

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 13 October 2004

ISBN 0 580 44591 7

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 40-2

October 2004

ICS 93.080.40

Supersedes EN 40-2:1976

English version

Lighting columns - Part 2: General requirements and dimensions

Candélabres d'éclairage public - Partie 2: Prescriptions générales et dimensions

Lichtmaste - Teil 2: Allgemeine Anforderungen und Maße

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EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 40-2:2004: E

Contents

Foreword

This document (EN 40-2:2004) has been prepared by Technical Committee CEN/TC 50 "*Lighting columns and spigots*", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2005, and conflicting national standards shall be withdrawn at the latest by April 2005.

This document supersedes EN 40-2:1976.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This Part gives the necessary requirements for specifiers and manufacturers of columns. The majority of lighting columns are made from steel, aluminium or concrete and are normally of a stepped tubular, round, octagonal or polygonal cross-section. They are usually of neutral design with a lantern spigot either at the post top or at the end of a bracket and are produced to certain standard dimensions and tolerances.

This Part of EN 40 is the second in a series relating to specifications for lighting columns. When complete, EN 40 will consist of the following Parts:

Part 1: Definitions and terms

Part 2: Dimensions and tolerances

Part 3: Design and verification
3-1 Specification for characteristic loads
3-2 Verification by testing
3-3 Verification by calculation

Part 5: Requirements for steel lighting columns

Part 6: Requirements for aluminium lighting columns

Part 7: Requirements for fibre reinforced polymer composite lighting columns

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1 Scope

This document specifies the requirements and dimensions for lighting columns, brackets, base compartments, cableways and earthing terminals. It applies to post top columns not exceeding 20 m height for post top lanterns and columns with brackets not exceeding 18 m height for side entry lanterns.

This Part does not attempt to restrict the actual appearance or shape of the column or bracket. The majority of lighting columns are normally of a stepped tubular, round, octagonal or polygonal cross-section. Lighting columns may be manufactured from materials other than those listed in the foreword (e.g. wood, plastic, cast iron) or in other forms (e.g. lattice and telescopic).

This document specifies performance related to the essential requirements of resistance to horizontal (wind) loads and performance under vehicle impact (passive safety) in support of the Essential Requirement No 4 Safety in use measured according to the corresponding test methods included in this document or available in separate documents.

2 Normative references

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

EN 40-1:1991, *Lighting columns — Part 1: Definitions and terms*

EN 755-8:1998, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 8: Porthole tubes, tolerances on dimensions and form*

EN 10051, *Continuously hot-rolled uncoated plate, sheet and strip of non-alloy and alloy steels — Tolerances on dimensions and shape*

EN 10210-2:1997, *Hot finished structural hollow sections of non-alloy and fine grain structural steels — Part 2: Tolerances, dimensions and sectional properties*

EN 10219-2:1997, *Cold formed welded structural hollow sections of non-alloy and fine grain steels — Part 2: Tolerances, dimensions and sectional properties*

EN 12767, *Passive safety of support structures for road equipment — Requirements and test methods*

EN 50102, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN ISO 7091, *Plain washers — Normal series — Product grade C (ISO 7091:2000)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 40-1:1991 apply.

4 Main dimensions

4.1 Post top columns

The nominal height (*h* in m) shall be the height from ground level to the spigot as shown in Figure 1.

Values of *h* should be selected from Table 1.

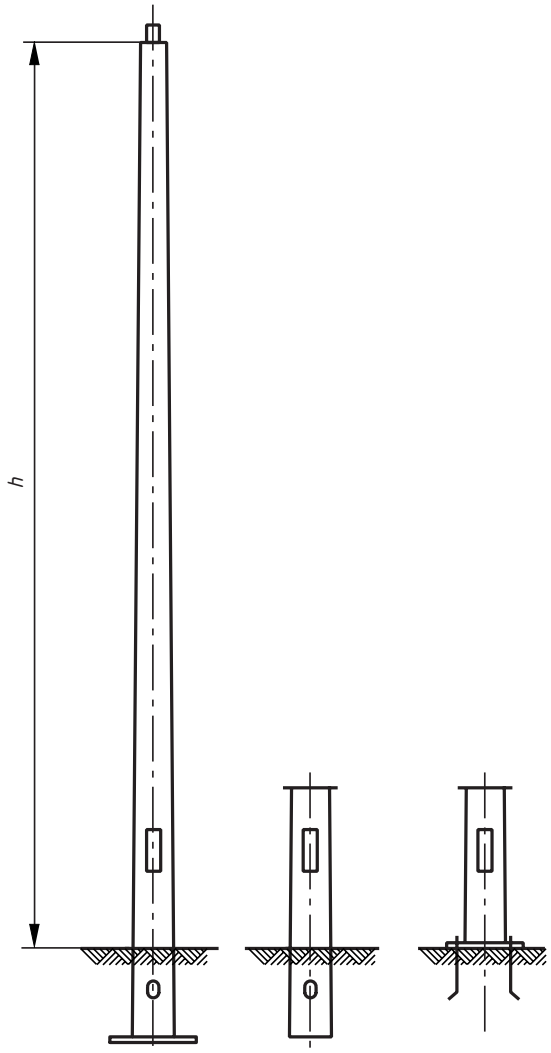


Table 1 — Nominal height for post top columns

h in m
3
4
5
6
7
8
9
10
12
14
15
16
18
20

Figure 1 — Nominal height (the shape of the column is not specified in this document)

4.2 Columns with brackets

4.2.1 The nominal height (*h* in m) shall be the height from ground level at the column to the height of the point of entry to the lantern as shown in Figure 2.

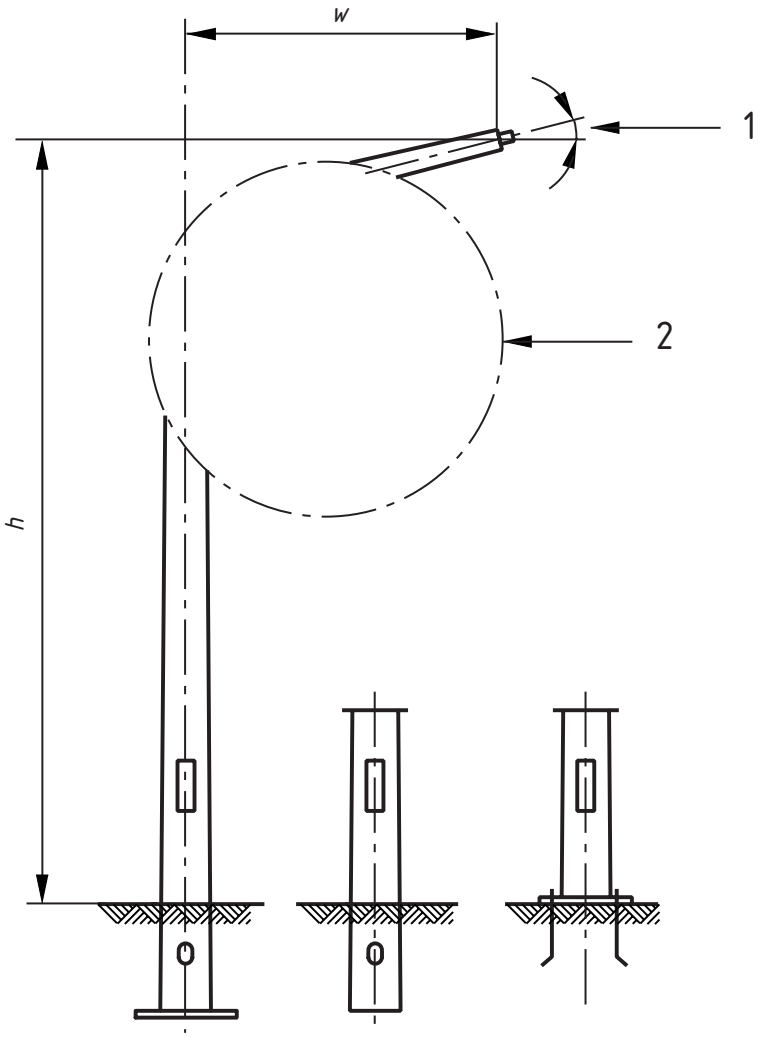
Values of *h* should be selected from Table 2.

4.2.2 The bracket projection (*w* in m) shall be the horizontal dimension from the column axis to the point of entry to the lantern as shown in Figure 2.

Values for *w* should be selected from Table 3.

NOTE It is recommended that *w* should be equal to or less than *h*/4.

4.2.3 The lantern fixing angle (α in degrees) shall be as shown in Figure 2. Values of α should be selected from Table 4.



Key

1 Lantern fixing angle α in degrees
2 The shape of the bracket is not specified in this standard

Table 2 — Nominal height for columns with brackets

h in m
5
6
7
8
9
10
12
14
15
16
18

Table 3 — Bracket projection

w in m
0,3
0,5
0,75
1,0
1,25
1,5
2,0
2,25
2,5
3,0
3,5
4,5

Table 4 — Lantern fixing angle

α in degrees
3
5
10
15

Figure 2 — Nominal height, bracket projection and lantern fixing angle (the shape of the column and bracket is not specified in this standard)

4.3 Door openings and cable entry slots

4.3.1 Door openings

The position of the door opening or openings shall be as shown in Figure 3. Dimension *c* shall be not less than 300 mm. No maximum dimension is specified.

It is recommended that dimension *c* should be approximately 600 mm.

The door opening dimensions shall be *a* and *b* as shown in Figure 3.

Typical door opening dimensions are shown in Table 5.

Table 5 — Door opening dimensions

a **in mm**	***b*** **in mm**
132	38
186	45
200	75
300	85
400	60
400	85
400	90
400	100
500	100
500	120
600	115
600	130
680 [a]	95 [a]
680 [a]	130 [a]
900 [a]	130 [a]
[a] For concrete only.	

In the interest of safety the door opening should be positioned parallel to the bracket on the side away from the direction of traffic. Figure 2 shows the position for right hand drive roads.

Door openings should be smooth and free from obstructions with no sharp edges, flashes or burrs, which could cause injury.

For metal columns the door opening corner radius *N* shall be a minimum of 20 mm or half the door width *b.*

4.3.2 Cable entry slots

The position of the cable entry slot if required shall be as shown in Figure 3.

The cable entry slot dimensions *x* and *y* should be selected from Table 6.

Dimensions in millimetres

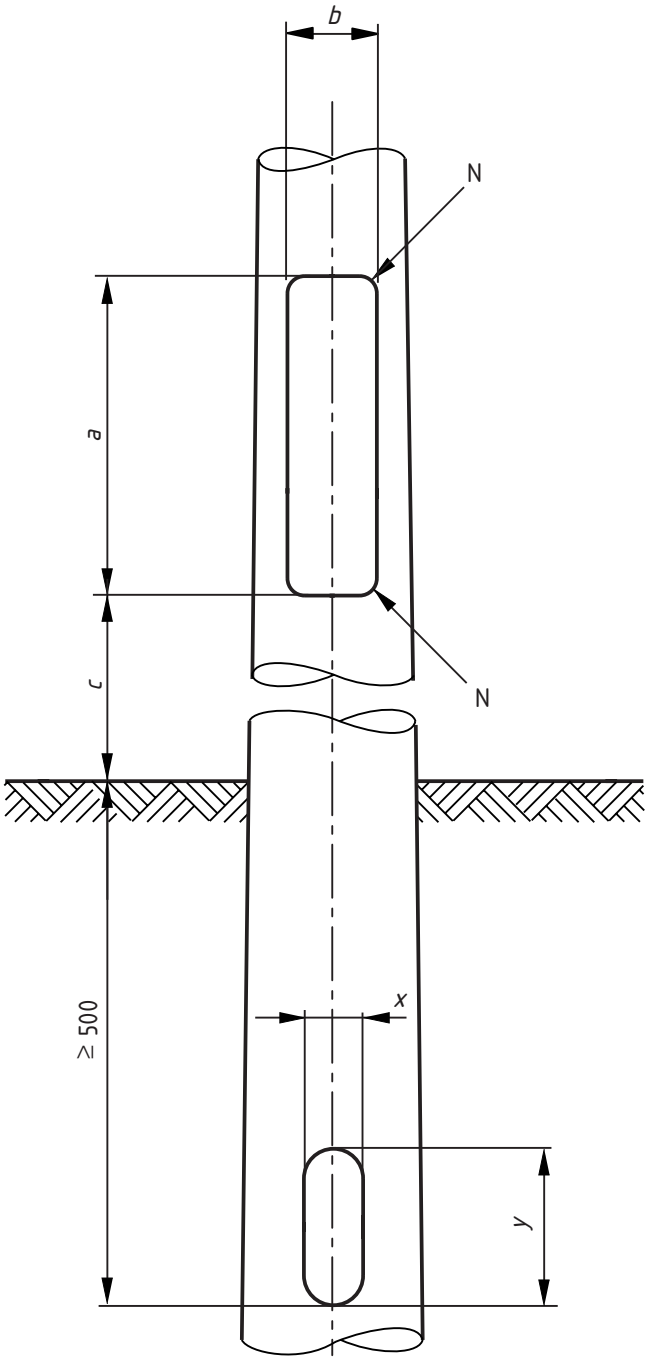


Figure 3 — Door openings and cable entry slots

Table 6 — Cable entry slot dimensions

x in mm	*y* in mm
50	150
60	150
75	150

4.4 Base compartments and cableways

4.4.1 Compartment dimensions

When a base compartment is supplied its free space, height, width and depth dimensions shall be stated.

4.4.2 Compartment door

The door shall either be made from the materials specified in the relevant part of EN 40, or from other materials for which the requirements shall be specified.

On metal columns the doors shall have an equivalent degree of corrosion protection to that provided for the column. On concrete columns the doors shall have an equivalent degree of corrosion protection to that provided for doors on metal columns.

The door shall be secured by a locking mechanism to resist unauthorized entry.

NOTE For the protection category of the door see 4.4.5.

4.4.3 Attachment of electrical equipment

The compartment shall be provided with means of attaching electrical equipment. Where a metal tray is used, it should be given the same degree of corrosion protection as that provided for metal compartment doors. Where a baseboard is used, it should be manufactured from material, which is non-hygroscopic.

4.4.4 Electrical cableways

Cableways from the base compartment to the lantern connection shall have a containing diameter of not less than 18 mm.

Cableways from the cable entry slot to the base compartment shall have a containing diameter of not less than 50 mm.

All cableways should be smooth and free from obstruction with no sharp edges, flashes or burrs which might cause abrasion to the cables.

4.4.5 Protection category

Parts of the column above ground level including the door when fitted shall conform to the following protection categories in EN 60529.

a) All door openings irrespective of their height above ground level IP 3X.

b) Up to 2,5 m above ground level IP 3X.

c) More than 2,5 m above ground level IP 2X.

A type test shall be carried out on one sample of each type and size of door when fitted to a column, or part column, and shall conform to an impact protection category of IK08 as specified in EN 50102.

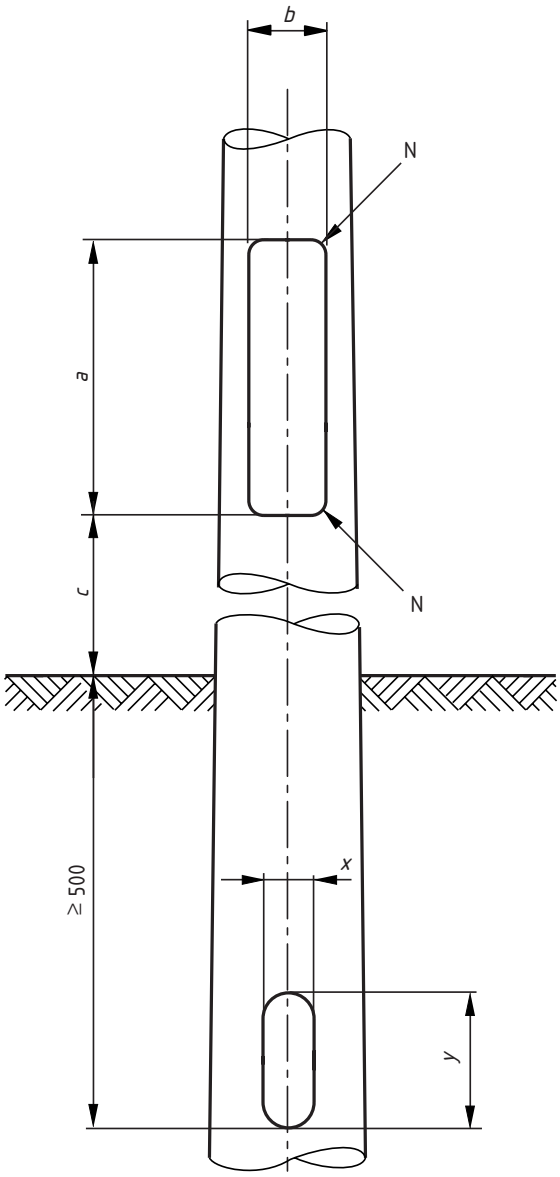
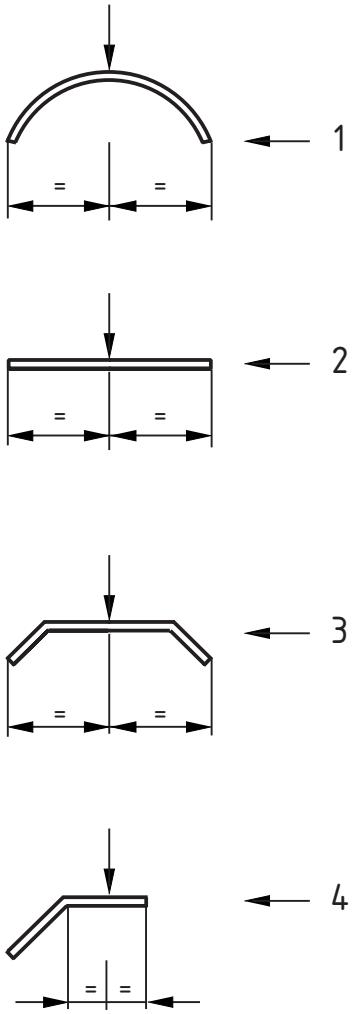


Figure 4 — Vertical position for door impact test



Key
1 Curved door
2 Flat door
3 3-sided door
4 2-sided door

Figure 5 — Horizontal position for door impact test

NOTE Protection against mechanical impact for the lighting column base is covered in parts EN 40-5 to EN 40-7.

The test equipment shall be either impact pendulum hammer or vertical free fall hammer and the number of impacts shall be three at the same location. The location for impact shall be at the centre for curved, flat or three-sided doors. For two-sided doors the location shall be at the centre of the largest, or equal, side (see Figures 4 and 5).

After testing:

1) locking mechanism on the door shall remain effective;

2) door shall comply with the defined protection category;

3) there shall be no visible signs of fracture on the door.

4.4.6 Earthing terminals

Where columns are to be earthed by means of an earthing terminal on the column or baseboard, the following requirements shall apply:

a) earthing terminal provided shall not corrode;

b) it shall have substantial contact surfaces for the attachment of an earthing conductor;

c) it shall be readily visible and accessible.

With the exception of doors there shall be reliable electrical contact between all exposed metal parts of the column and bracket where fitted, and the earthing terminal.

The requirement for electrical contact does not include metal reinforcement in concrete columns.

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

If the fixed part of the terminal consists of a bolt, the dimensions shall be not less than M8.

The clamping part should be designed so as to avoid any damage to the earth conductor or its insulation during tightening or loosening. The earthing terminal, or the column or baseboard adjacent to the terminal shall be visibly and durably marked with the symbol ⏚.

4.5 Column planting depth and base plate

4.5.1 Planting depth

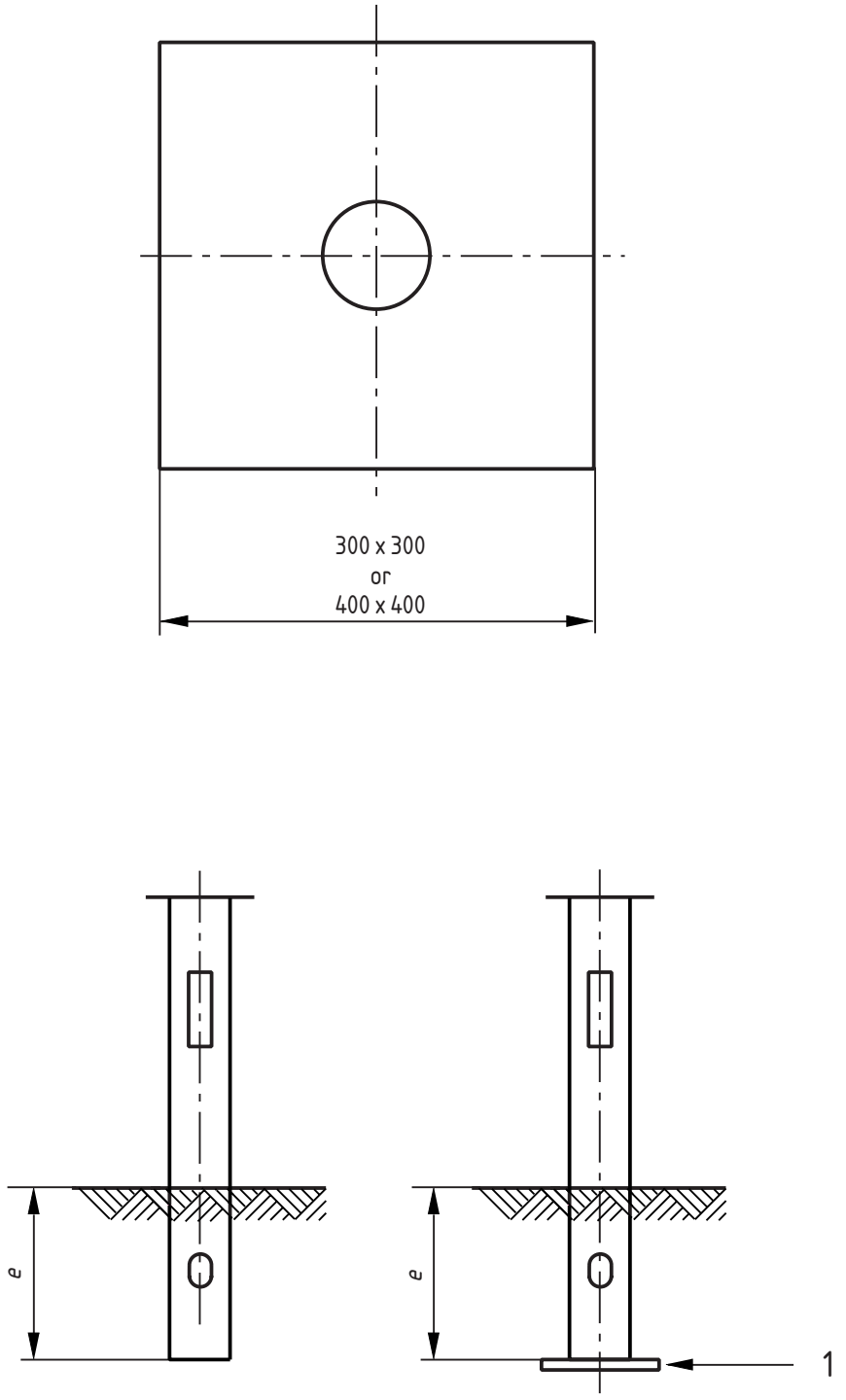
For columns planted in natural ground with or without a concrete surround the planting depth e shown in Figure 6 shall be selected from the values given in Table 7, taking into consideration the design calculations made beforehand or the test measurements carried out and the ground conditions.

For columns planted in a structural foundation the planting depth e may be less than shown in Table 7 but shall be checked by calculation or testing.

4.5.2 Base plate

If required the base plate should be either 300 mm × 300 mm or 400 mm × 400 mm with minimum thickness of 4 mm (see Figure 6).

Dimensions in millimetres



Key
1 Base plate

Figure 6 — Planting depth and base plate

Table 7 — Planting depths

Nominal height	Minimum planting depth		
h in m	*e* in mm		
≤ 5	600	800	1 000
6	800	1 000	1 200
7 and 8	1 000	1 200	1 500
9 and 10	1 200	1 500	1 700
12	1 500	1 700	2 000
14	1 500	2 000	2 500
15	1 500	2 000	2 500
16	1 500	2 000	2 500
18	1 500	2 000	2 500
20	1 800	2 000	2 500

4.6 Flange plates

The design of the flange plate and fixing bolts shall be checked by calculation or testing.

Flange plates should be as shown in Figure 7. For square flange plates with 4 holes dimensions a_1 and a_2 will be equal and should be selected from Table 8.

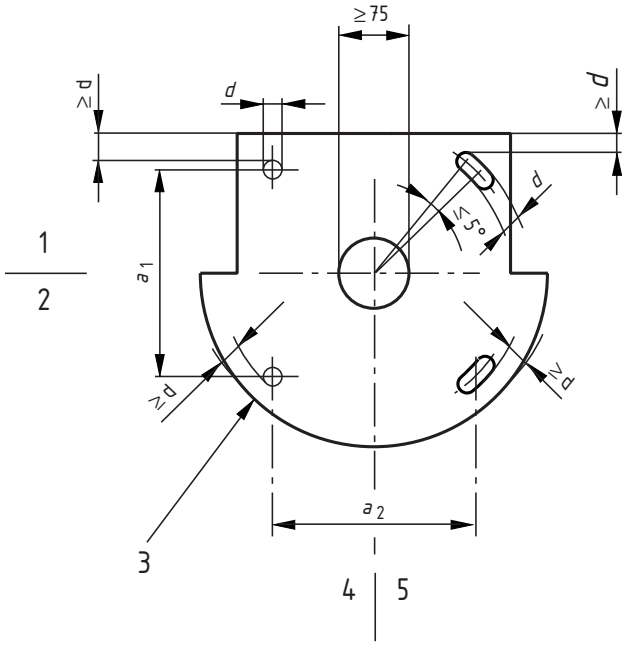
Either holes of diameter *d* or slotted holes of width *d* shall be used. The minimum dimensions between the edge of the hole or slot and any edge of the flange plate shall be *d*.

If slotted holes are used the maximum rotation allowed shall be ± 5°.

Washers conforming to EN ISO 7093 shall be used between the nuts and the flange plate. Alternatively washers conforming to EN ISO 7091 or square plate washers may be used and shall be subject to calculation or testing.

NOTE The external shape of the flange plate is not specified in this standard.

Dimensions in millimetres



Key
1 Square flangeplate
2 Circular flangeplate
3 See note
4 Round holes
5 Slotted holes

Figure 7 — Flange plate details

Table 8 — Fixing bolt centres a_1 and a_2 in mm

200
215
250
285
300
325
400
450
500
550

4.7 Connection dimensions for lanterns

4.7.1 General

Lantern fixings may be in the form shown in Figures 8 and 9 but may also be by means of bolted or clamped connections.

When connections are as in Figures 8 and 9 they shall comply with 4.7.2 or 4.7.3.

4.7.2 Post top lanterns

Lantern fixings for post top lanterns shall conform to Figure 8.

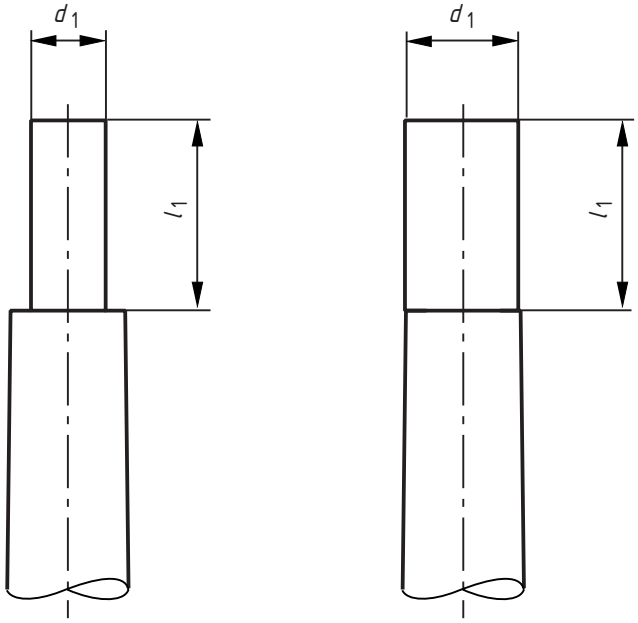


Figure 8 — Post top lantern fixings

Values should be selected from Table 9.

Table 9 — Post top lantern fixing dimensions

d_1 nom mm	l_1 mm
60	70
62	70
76	130
78	130
89	130
102	250
108	250

4.7.3 Side entry lanterns

Lantern fixings for side entry lanterns shall conform to Figure 9.

Values should be selected from Table 10.

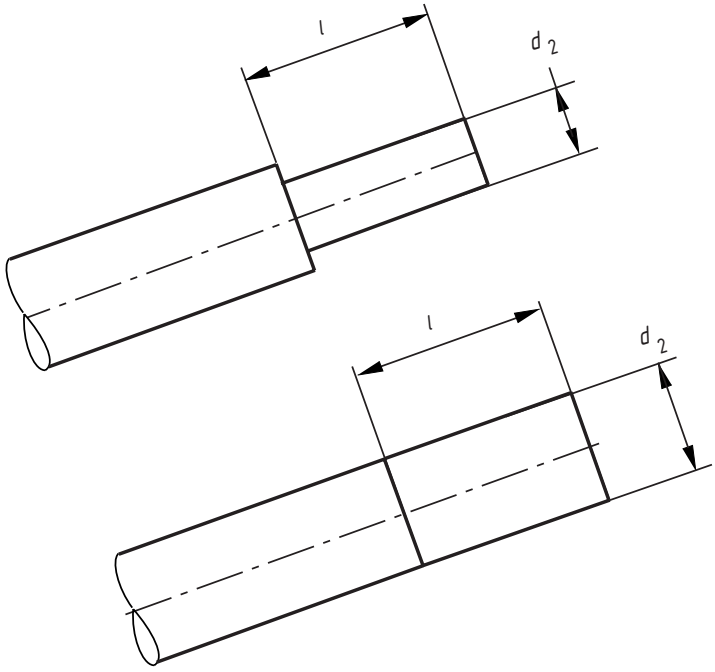


Figure 9 — Side entry lantern fixings

Table 10 — Side entry lantern fixing dimensions

d_2 nom mm	l_2 mm
42	100
42	250
42	400
60	100
60	250
60	400
62	100
62	250
62	400

5 Tolerances

5.1 Straightness

The tolerances for straightness shall be measured with the column in the unloaded state (column horizontal) and shall comply with the following formulae and Figure 10.

$x \leq 0{,}003\ l$; where $l = h + e$

$\Delta x \leq 0{,}003\ \Delta l$, where $\Delta l \geq 1$ m

where x is: the offset dimension over total length;

Δx is: the offset dimension over a segment of total length.

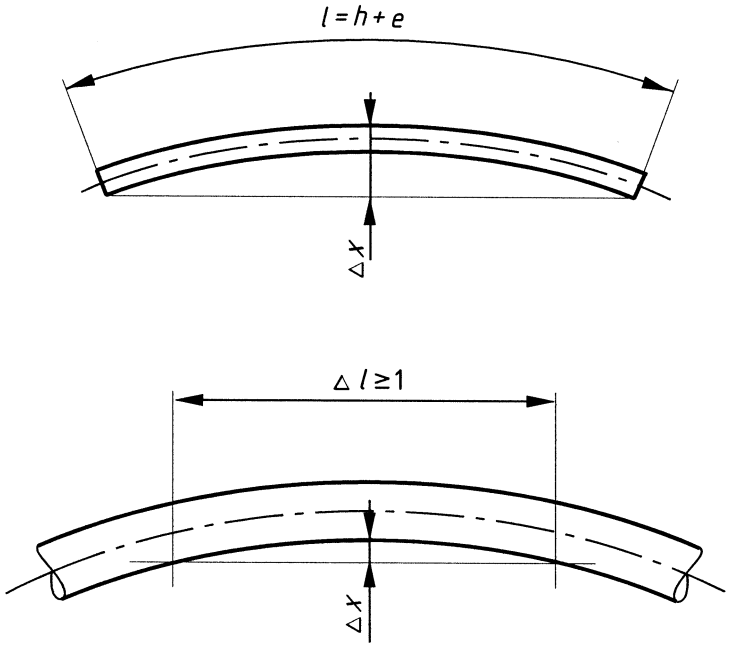


Figure 10 — Straightness tolerance (dimensions in metres)

5.2 Total length of post top columns

The tolerance on the total length of one piece of a post top column shall be:

a) columns of 10 m nominal height and under: ± 25 mm;

b) columns greater than 10 m nominal height : ± 0,6 %.

The total length is:

1) columns with flange plates the dimension *h*;

2) columns with planted section the dimension *h* + *e*.

5.3 Total length of columns with brackets

The tolerance on the total length of a column with brackets shall be:

a) columns of 10 m nominal height and under: ± 1 %;

b) columns greater than 10 m nominal height: ± 1,2 %.

The total length is:

1) columns with flange plates the dimension *h*;

2) columns with planted section the dimension *h* + *e*.

5.4 Bracket projection

The tolerance on the projection shall be ± 2 %.

5.5 Lantern fixing angle

The tolerance on the fixing angle of the lantern fixing axis, from the horizontal, shall be ± 2° when not under load; the deviation between the bracket axis and fixing axis shall also not exceed ± 2°.

5.6 Door opening and cable entry slot

The dimensional tolerance for both door opening and cable entry slot shall be:

+ 10 mm

- 0 mm

5.7 Column cross-section

5.7.1 Metal columns

5.7.1.1 The tolerance on the column circumference shall be ± 1 %.

5.7.1.2 The tolerance for deviation in shape for a circular cross-section shall be ± 3 % of the diameter calculated from the measured circumference (disregarding a welded seam bead).

5.7.1.3 The tolerance for deviation in shape for a polygonal cross-section shall be ± 4 % of the nominal value over the flats of the polygon.

5.7.2 Concrete columns

5.7.2.1 The tolerance on the column circumference shall be ± 2 %.

5.7.2.2 The maximum deviation in shape for the cross-section shall be ± 5 % of the nominal value or ± 10 mm whichever is the smaller.

5.8 Connection dimensions for lantern fixing

5.8.1 The tolerances on the length of lantern fixing for l_1 or l_2 shall be ± 2 mm.

5.8.2 The tolerances on the diameters of lantern fixings for d_1 or d_2 shall be:

— in accordance with EN 10210-2:1997, Table 2 or EN 10219-2:1997, Table 2 if the lantern fixings are manufactured from steel tubes, or;

— in accordance with EN 755-8:1998, Table 1 if the lantern fixings are manufactured from aluminium tubes, or;

— ± 2 % if the lantern fixing is an integral part of the lighting column and formed during the manufacturing process from the lighting column or bracket arm.

The final user has to ensure that the lantern can be fitted on the lighting column or bracket arm.

5.9 Twist in columns

5.9.1 Columns with roots

On the assembled column the angle between the bracket centre line and the radial line through the centre of the door opening shall not differ from the intended plan position by more than 5°.

5.9.2 Columns with flange plates

The construction of the column bracket and flange plate shall be such as to allow the bracket centre line to be positioned within ± 5° of the intended plan position relative to the flange plate.

5.10 Thickness tolerance

Thickness tolerances on materials which are subjected to a manufacturing process (such as forming of aluminium tube) shall be stated. For other materials used in column manufacture which are not modified in thickness or in section, the tolerance in EN 10051 and the other relevant material standards shall apply.

5.11 Verticality tolerance

For a column with a flange plate, the angle between the vertical axis of the column and the perpendicular axis to the plane of the flange plate shall not exceed 1°.

Annex A
(informative)

Passive safety

If required, the behaviour of the lighting column in passive safety terms when subjected to vehicle impact shall be in accordance with one of the classes given in EN 12767. If not required, the lighting column shall be declared of class 0 in conformity to EN 12767.

Bibliography

EN ISO 7093-1, *Plain washers — Large series — Product grade A (ISO 7093-1:2000).*

EN ISO 7093-2, *Plain washers — Large series — Product grade C (ISO 7093-2:2000).*

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