STREET LIGHTING GROUP

NOTES FOR GUIDANCE
on
THE SPECIFICATION OF STREET LIGHTING COLUMNS

September 2010
Notes for Guidance
On
The Specification of Street Lighting Columns

Issue and Revision Record
First Published by the Association of Directors of Environment, Economy, Planning and Transportation (Adept) September 2010.

Panel members:
Mel Harwood (Dudley Metropolitan Borough Council – Chair)
Peter Hosking (Leicestershire County Council – Secretary)
Alan Micklethwaite (Roads Service Northern Ireland)
Andy Hart (Amey)
Graham Scragg (Amey)
Haydn Yeo (A-One+)
Lindsay McGregor (Dundee City Council)
Simon Hayman (DW Lighting)
Steve Reed (Southern Electric Contracting)
Representatives from the Lighting Column Technical Forum
Notes for Guidance
On
The Specification of Street Lighting Columns

Introduction

This report is a culmination of a research project funded by the Association of Directors of Environment, Economy, Planning and Transportation (Adept) Street Lighting Working Group.

The report seeks to inform specifiers of “standard” steel street lighting columns of the specification choices available to them. The report recognises that certain variations to specifications across the Country are inevitable to comply with British and European Standards. It does though provide advice to specifiers regarding those areas of the specification where they do have discretion and provides the industry best practice in these areas.

By all specifiers applying this industry best practice to their specifications the requirement for manufacturers and contractors to manufacture and stock lighting columns to multiple specifications will be reduced.

This simple step will aid our industry to become more streamlined for the benefit of all concerned.

Dana Skelley
Chair, Adept Street Lighting Working Group
September 2010
1. **Background**

1.1 During 2007 lighting contractors and clients were expressing concern about long delivery times for lighting columns. This was having a major effect on both budgets and contract periods and both client and contracting bodies felt the need for a solution to the problem. In the main this was being caused by a number of large PFI projects coming on stream within a short period, exacerbated by the relocation of a major manufacturer, but an additional factor was also identified.

1.2 In conversation with a number of lighting column manufacturers it was established that there was a potential for delay caused, in part, by the variation in lighting column designs specified in the main by local authorities. This variation is to an extent prescribed by the British and European Standard EN 40 as a requirement for the environment in which the column is to be installed, but other variations are caused by options allowable within EN 40. If the number of variations were reduced this could create more congruency in designs. It was believed it would be mutually beneficial to all parties if a standard specification could be determined. This could also benefit Local Authorities and other clients looking to make efficiency savings.

1.3 At one time changes in lighting column design between production runs would have involved a considerable amount of retooling. However, with changing manufacturing techniques involving automation, including laser cutting and welding, a number of variations are now achievable at the touch of a button with relatively little delay. Nevertheless, while variations in manufacturing may not cause significant delay during the manufacturing process, the availability of tube stock and delivery time for a particular size and thickness can be a major influence on the manufacturing period required. Variations of lighting column specifications may also cause problems for maintenance contractors who have multiple clients, requiring multiple variations of column type, effectively for the same mounting height and configuration.

1.4 The Research Project was approved at the CSS Street Lighting Working Group Meeting on 18th June 2008.
2. **Terms of Reference**

2.1 The members of the research project acknowledge that the lighting column is an integral part of the street scene and, as such, certain locations could dictate the type of column required, for example conservation areas. For the vast majority of locations though a “standard” lighting column would be perfectly acceptable.

2.2 The following terms of reference define both the “in-scope” and “out-of-scope” products:

“In-Scope”
- “Standard” rooted, post top mounted tubular steel road lighting columns, up to a nominal height of 15m, for general use to EN 40.

“Out-of-Scope”
- Heritage/Architectural/Embellished lighting columns
- Raising and lowering lighting columns
- Flange base lighting columns
- Bracketed and Double Arm lighting columns
- Conical lighting columns
- Sheet steel lighting columns
- Aluminium lighting columns
- Passively safe lighting columns
- Lighting columns with “non-standard” foundations

2.3 This document seeks to inform specifiers of lighting columns of the choices available to them. It recognises that certain variations to specifications are compulsory due, for example, to environmental considerations; but also advises specifiers of the industry best practice where variations in specification are permitted within EN 40 and the National Application Document. By standardising on these permitted variations benefits will be achieved within the industry. As such the following areas are to be considered:

- Reference to the base documents – EN 40 and the National Application Document PD 6547
- Basic surface treatment of the steel components of the lighting column
- Effect on the various lighting column components – base & shaft – and other elements intrinsic to the manufactured lighting column
- Consideration of the finish applied

2.4 Health and Safety and CDM Regulations are not taken into account by this Guidance Note. Each organisation involved in manufacturing, delivering, installing, maintaining and removing lighting columns should produce their own risk assessments for the operations they are undertaking.
3. **The documents: EN 40 and PD 6547**

3.1 EN 40, the Standard for the manufacture of lighting columns, governs the production of all types of lighting column and in all materials. Given the limited scope of these Notes for Guidance, however, the parts that most concern this document are EN 40-2:2004 (General Requirements and Dimensions) and EN 40-5:2002 (Requirements for Steel Lighting Columns).

3.2 EN 40-3 sets out the requirements for the design of lighting columns, and as such these Notes for Guidance do not seek to change the Standard in this regard. However, local climatic conditions have a bearing on the requirements when assessing the factors influencing column design (for example, EN 40-3-1 considers wind pressure) and the BSI Technical Committee responsible for implementation of EN 40 thought it necessary to issue their own guidance pertaining to factors present in the UK climate and topography required by the Standard. This led to the BSI Published Document PD 6547:2009, not in itself a Standard but giving guidance to manufacturer and specifier alike.

3.3 Reference to the various parts of EN 40 and to PD 6547 will be made throughout these Notes for Guidance.
4. **Basic Surface Treatment**

4.1 Historically, the surface treatment applied to the steel components of lighting columns was minimal or in some cases (such as the interior sections of lighting column shafts) non-existent. This led in later years to substantial corrosion of structural steel with thinning of sections leading to eventual catastrophic failure. In addition the properties of some treatments, particularly the thermoplastic coatings applied to untreated mild steel, which then split and allowed ingress of moisture causing corrosion, led to premature failure of columns. By the 1990s both of these factors had led to a substantial number of lighting column failures and substantial capital investment was required to replace the installations that were either unsafe or potentially so.

4.2 Some lessons were learnt from the experience. Manufacturing processes such as hot swaging of shaft sections onto bases had given rise to concerns, particularly on non-galvanised lighting columns and consideration was given to the surface treatment of steel sections, both internal and external, to inhibit corrosion. EN 40-5 (Part 11 and Annex A) gives a number of methods as to how this could be achieved, but the most widespread of these in use in the UK utilises hot dip galvanising as given in Annex A1. This basic treatment, allowing for the entire structure both inside and out to be galvanised, is the one recommended as it is both effective and widely available from UK manufacturers.

4.3 Additional coatings may be considered for lighting columns and the options available are listed in Chapter 6 of this document.
5. The basic components of the column structure

5.1 Base Section

5.1.1 General

5.1.1.1 The vast majority of street lighting columns have a base section, the functions of which are to provide the foundation root for the lighting column and to provide an enclosure (base compartment) for the supply fuse unit and other electrical equipment, readily available for access from ground level.

5.1.1.2 Historically, the design of the base compartment has varied dependent upon the nature of the equipment being supplied; whether or not the luminaire had its control gear in the base; whether a single luminaire or multiple luminaires were fixed to the column; or the aesthetics of the overall installation. Modern practices such as the location of control gear within the luminaire have rendered some of these considerations obsolete. Some, such as the ergonomics of gaining access to the base, remain and will be considered by these Notes for Guidance.

5.1.2 Lighting Column root

5.1.2.1 The root length (below ground level) is dependent upon the nominal height of the lighting column. A table of minimum planting depths is given by clause 4.5.1 of EN 40-2 giving three options for each nominal height of lighting column. The selection of root length is dependent on a number of factors such as column design, the ground conditions, any attachments to the lighting column, other windage factors and luminaire weight. The Group’s research has indicated that the middle option taken from Table 7 in EN 40-2 is utilised by most specifiers as this is recommended in PD 6547, clause 6.1. This is, therefore, the set of depths recommended by these Notes for Guidance, although it is recognised that certain environmental or structural conditions may require the selection of alternatives.

5.1.3 Backboard

5.1.3.1 To allow the supply cut-out and isolator, if fitted, to be fixed within the base compartment, a method of fixing them has to be provided. EN 40-2, clause 4.4.3, sets out the requirement for metal trays or backboards. Historically, backboards have always been manufactured in wood (non-hygroscopic as required by EN 40-2) by UK manufacturers, and given the lack of a viable alternative this should continue to be the norm. Its size should be dictated at least by the equipment to be attached to it, but given that the size and quantity of these components vary according to local demands no dimension can be applied in this respect. Logically, it would be difficult to attach any component for which its fixings are not accessible by the door aperture, and hence the dimension of the backboard should approximate to that of the aperture to allow its full length and breadth to be utilised.
5.1.4 **Door Aperture**

5.1.4.1 This leads to the question of the size of the door aperture. EN 40-2 clause 4.3.1 offers no fewer than twelve options for steel lighting columns, for which the past preferences of UK specifiers appear to be 500 x 100 mm for columns under 8 metres nominal height and 600 x 115 mm for 8m and above. When considering the ergonomics of either installing or working upon the components installed within the base compartment, the governing factors would appear to be the size (particularly width) of the components and the ability of the operative to work with both hands within the base. This would suggest that the latter dimension of 600 x 115 is to be recommended as affording better access. It does, however, increase the minimum diameter of the base section, may increase the cost of lower height columns and potentially reduce the number of columns per delivery load.

5.1.5 **Base Section Diameter**

5.1.5.1 There are two factors that decide selection in addition to the structural requirements, namely; the dimensions of available tubestock from the steel manufacturers and the dimensions of the door aperture. The standard sizes of manufactured tube commonly used in relation to column structural manufacture in the UK are 76, 89, 114, 139, 168, 194 and 219 mm. While the first three sizes lend themselves neatly to shaft diameter, base construction is restricted to the latter four.

5.1.5.2 The nominal height of the column to an extent dictates the base diameter as structural considerations determine that larger bases are required by taller columns. However, if the door aperture width of 115mm is taken into account, structural calculations may disallow the use of 139mm tubestock to form the base, and given the historical requirement for 139mm bases for 5/6m columns by some specifiers – largely on the grounds of aesthetics – this needs to be taken into account. It is thought by this Group, though, that in all but the most exacting locations aesthetics are a secondary consideration and for most practical applications a 5 or 6m column would not look out of place with a 168mm base. While we would like to recommend 168mm as a minimum base diameter for ease of access, it should be recognised there could be a cost increase when compared to 139mm diameter.

5.1.6 **Door mounting height**

5.1.6.1 The height of the door aperture above ground is specified by EN 40-2 as a minimum of 300mm and with a recommendation of 600mm (clause 4.3.1). However, ergonomics may dictate that a greater height is specified, and due consideration should be given to the physical demands upon those who need to gain access to the base compartment. To this end a consultation document was sent to the Association of Signals, Lighting and other highway Electrical Contractors (ASLEC). Although the response from ASLEC members was limited, there was a clear preference for a raising of the dimension above the 300mm minimum to the 600mm dimension recommended by EN 40-2 or even 1000mm. The aesthetics of lighting column design of 6m nominal height or below would,
though, make an increase to 1000mm difficult without compromising the looks of the column by making the length of base disproportionate to the shaft. It is therefore concluded that units of 6m nominal height or below should have the ground to door aperture dimension set at 600mm, while for lighting columns above this height the dimension should be 1000mm.

5.1.7  **Door**

5.1.7.1 To segregate the public and the typical British weather from live electrical equipment is an essential requirement, and a removable key operated door is the way to achieve it traditionally. No direction being given by EN 40 as to its type (other than its corrosion protection), the major choice to be made in respect of door provision is its resistance to vandalism. While traditional overlapping doors have proven to be vulnerable to vandal attack in some areas, flush fitting doors – the type often manufactured from the ‘blank’ removed when cutting the door aperture – have a greater intrinsic cost owing to the requirement to weld weather strips to the door aperture. This therefore needs to be taken into account when specifying.

5.1.8  **Door fixings**

5.1.8.1 No direction is again given by EN 40 other than the locking mechanism should ‘resist unauthorised entry’, and the traditional triangular headed bolt that is a feature of UK designs is stipulated by the Highways Agency in its Specification for Highway Works (SHW). Unfortunately its design has been acquired for a number of other electrical enclosures required to be secure, including household meter boxes, the consequence being that most households now have a key capable of opening a lighting column door. This has been acted upon by a number of specifiers, who have specified a selection of anti vandal headed bolts to secure the door, and while both the Torx and Allen Pin Head are frequently utilised in this respect the latter is the most common. Therefore the Notes for Guidance has no hesitation in suggesting that the Allen Pin Head bolt should become standard. However, owing to the M8 size of the conventional triangular head bolt and the relative smallness of the head of the equivalent Allen Pin Head bolt, resulting in difficulty or even damage to bolt head or tool if a door fixing is at all stiff, the Notes for Guidance recommends that the bolt size is increased to M10 for door fixings.

5.1.8.2 While traditionally a single bolt fixing is supplied, some specifiers have shown a preference for two fixings, at the top and bottom of each door, to attempt to prevent vandalism. While taking this into account this is thought unnecessary for most situations and so the recommendation of the Notes for Guidance is for a single fixing.

5.1.9  **Earthing**

5.1.9.1 Requirements for earthing terminals for steel lighting columns is given in clause 4.4.6 of EN 40-2, and no changes are proposed by the Notes for Guidance. However, as advice varies concerning the requirement to earth removable (as
opposed to hinged) lighting column doors, a facility to earth the lighting column door should be provided. This should have the same characteristics of the column main earthing terminal and be at least of the same dimension to allow for an earth lead of similar size to be installed.

5.1.10 Underground cable entry

5.1.10.1 The cable entry slot, as provided for in section 4.3.2 of EN 40-2, allows access into the base for the supply cable. Three options are given of which 150 x 75 is the most popular and the largest size available. There may be a case for larger cable entry slots being made available, not least because of the difficulty in terminating typically sized polythene cable ducts within the column, but any increase would at present take the design outside of EN40 and this may be a matter for consideration when reviewing the Standard. Other than this the Notes for Guidance has no hesitation in recommending 150 x 75 as the chosen cable entry slot size.

5.2 Shaft

5.2.1 General

5.2.1.1 The purpose of the lighting column shaft is merely to gain height above ground to allow mounting of the luminaire at the correct height. As such it does not have the technical complexity of the base section and fewer requirements are laid down for its construction. It does, however, have limitations relating to stress loading and its size and material thickness are governed by structural calculation. It therefore has to be designed according to the requirements placed upon it by its environment and attachments.

5.2.1.2 As such, the specifier has to lay down the loading factors for the lighting column:

- Terrain category
- 10 minute mean wind velocities
- Maximum altitude for the installation
- Category of rationalised wind loading
- Rationalised wind loading factor
- Ground type into which the lighting column is planted
- Lighting column nominal height
- Bracket projection (if required)
- Luminaire weight
- Size and weight of any attachments

The first five of these loading factors may be obtained by calculation and both EN 40-3 and PD 6547 offer advice on this. However, PD 6547 makes this simpler for UK applications by determining figures for each local authority area which are given in Annex A of PD 6547 (a single figure is given for regions such as Merseyside and the West Midlands). These may be utilised for most practical purposes when supplying design data to manufacturers but for special locations or scenarios involving substantial additional attachments calculation may still be
necessary. Ground type is given in Table 2 of PD 6547 and the last four loading factors are simply quoted from installation design data.

5.2.1.3 Historically, lighting columns have been fitted with projection brackets to enable the optical centre of the lamp or luminaire to be perpendicular to the kerb edge while siting the lighting column at the rear of the footway or in the central reservation of dual carriageway roads. This is now considered unnecessary as optical control of luminaires has advanced considerably and these Notes for Guidance consider that there should be no normal requirement for a lighting column bracket. However, for tall (typically 12m and above) tubular lighting columns in exposed sites the lack of a bracket may result in increased vibration and reduced lamp life.

5.2.2 Attachments

5.2.2.1 For most columns in general use, the attachment of items other than traffic signs may be discounted as items such as flower baskets or festive decorations will be limited to urban centres. These can then be removed from consideration for practical purposes with the proviso that, for any lighting column installation where this requirement is likely, the lighting columns will have to be specially designed.

5.2.2.2 However, traffic sign attachment is something that could occur almost anywhere and needs to be considered for any column in the normal run of installations. PD 6547 again helps by setting out three sign classes, with accompanying dimensions, in clause 7 of the document. As for most practical purposes the largest sign likely to be fixed to a column is a 600mm plate, either circular or triangular, by calculation of the plate surface area this fits sign class A in Table 3 (weight and windage of the luminaire for a sign, if fitted, is comparatively negligible and may be discounted). Owing to the increased requirements of manufacture (and consequent increase in cost of supply) of lighting columns required to support signs of classes B or C, it is not thought practical to include them as standard fitments.

5.2.3 Spigot

5.2.3.1 This is anticipated by EN 40-2 which gives dimensions of spigot diameter and length in clause 4.7.2, Table 9. Seven different combinations are suggested by Table 9 but in the UK, for practical purposes, most luminaires are designed with a 76mm post top fixing. It is therefore logical to suggest a 76mm diameter/130mm long spigot for all column shafts of greater than 76mm diameter. Specifiers should though consider the aesthetics of the final installation. Some modern lanterns will accept a shorter spigot length than 130mm and this will need to be specified if the final customer does not wish to see a short length of spigot showing between the lantern and the lighting column shaft.
6. **Finish**

6.1 The requirement (or otherwise) for a finish coat is not a structural consideration and hence does not figure in structural calculations. However, the choice of finish can have some bearing on delivery lead times for lighting columns – as, naturally, finishes take time to apply – and as such should be considered by these Notes for Guidance, while not expressing any preference.

6.2 While the hot dip galvanising called for by Chapter 4 of this document may be considered sufficient to inhibit corrosion for the design life of the lighting column, other factors need to be considered. Annex A1 of EN 40-5 recommends an optional additional bitumen coat of the external root section to 250mm above ground level. This is not thought today to be best practice owing to the likely effects of age and mechanical damage, and more robust alternatives to bitumen such as two pack high build epoxy coatings are recommended by ILE Technical Report TR26 (The Painting of Lighting Columns) Section 9.

6.3 Annex A1 of EN 40-5 also allows for a further optional protective coating of the whole of the column structure to 0 – 200mm above ground level. Whether this is considered a requirement or not is largely down to preference of the lighting column owner – or for aesthetic reasons – but for practical purposes this may be limited only to finish texture and colour. Technical requirements for the finish coating though should be considered in relation to future maintenance of that coating and its attendant cost. For this reason many lighting column owners now specify no additional coating over and above that required for protection of the root section.

6.4 The Specification for Highway Works recommends a number of different finish categories for selection according to requirements; the main categories offered are G1 (galvanised only with root protection) and the two G2 categories, G2a and G2b. However, painting and other finish technologies are changing all the time and a number of alternatives are offered by ILE Technical Report TR26. Manufacturers have their own preferences for finish systems and can advise accordingly, but specifiers should stipulate at the outset the requirements for future maintenance so that an appropriate finish type can be agreed upon.
7. **Summary**

7.1 The preferred options suggested by these Notes for Guidance are summarised at Annex A and shown on drawing Annex B.
## Annex A

<table>
<thead>
<tr>
<th>Column feature</th>
<th>Advice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base compartment</td>
<td>168mm minimum diameter is recommended although 139mm could be considered. Should be of sufficient size to accommodate cable arrangements and necessary equipment.</td>
</tr>
<tr>
<td>Backboards</td>
<td>Size approximate to door aperture</td>
</tr>
<tr>
<td>Door aperture</td>
<td>See 5.1.4.1</td>
</tr>
<tr>
<td>Door type</td>
<td>Optional – overlapping or flush fitting</td>
</tr>
<tr>
<td>Door lock</td>
<td>Pin Allen M10</td>
</tr>
<tr>
<td></td>
<td>Single lock at top of door</td>
</tr>
<tr>
<td>Height of bottom of door aperture above ground level</td>
<td>&lt;= 6m: 600mm</td>
</tr>
<tr>
<td></td>
<td>&gt; 6m: 1000mm</td>
</tr>
<tr>
<td>Column earth bolt</td>
<td>As EN40</td>
</tr>
<tr>
<td>Door earth bolt</td>
<td>Commensurate with EN40</td>
</tr>
<tr>
<td>Cable entry slot</td>
<td>150mm x 75mm</td>
</tr>
<tr>
<td>Planting depth</td>
<td>EN40 mid depth as advised by PD6547</td>
</tr>
<tr>
<td>Material thickness</td>
<td>To be determined by the manufacturer depending on weight and windage calculation and National Application Document</td>
</tr>
<tr>
<td>Sign attachments</td>
<td>Class A Table 3 of PD6547</td>
</tr>
<tr>
<td><strong>Column feature</strong></td>
<td><strong>Advice</strong></td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Flower baskets/seasonal decorations/banners | Design consideration not required for most general use lighting columns. See 5.2.2.1  
Incorporate in design if known at design stage |
| Projection brackets                        | No longer required  
An added extra not needed in most cases. If brackets are ordered the design will be determined by discussion between specifier/ manufacturer |
| Spigots                                   | 5/6m columns – 76mm Diameter X 130mm Long  
8/10/12m – spigot reducing to 76mm Diameter X 130mm Long  
Spigot to be welded to column shaft. See 5.2.3.1 |
| Whole column                              | Hot dipped galvanising                                                   |
| Additional root protection                 | ILE Technical Report TR26, Section 9                                     |
Technical Information

Design
Standard: BSEN40, BD94/07

Finish
Galvanised to BSEN 1461:1999
& TR 26

Welding
In accordance with BSEN1011
Procedures to BSEN ISO 15614-1:2004
Welders qualified to BSEN 287-1:2004

Door Aperture - 500 x 100mm
Spigot Diameter - Ø60.3
Base Diameter - Ø139.7

All dimensions are the recommended minimum however the following alternatives can be used if/where the design & equipment allows:

Base Diameter - Ø139.7
Spigot Diameter - Ø60.3
Door Aperture - 500 x 100mm

<table>
<thead>
<tr>
<th>Column</th>
<th>A (Root)</th>
<th>B (Mounting Height)</th>
<th>C (Distance above G.L to Bottom of Door)</th>
<th>ØD (Base Diameter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5m</td>
<td>800</td>
<td>5000</td>
<td>600</td>
<td>Ø168.3</td>
</tr>
<tr>
<td>6m</td>
<td>1000</td>
<td>6000</td>
<td>600</td>
<td>Ø168.3</td>
</tr>
<tr>
<td>8m</td>
<td>1200</td>
<td>8000</td>
<td>1000</td>
<td>Ø168.3</td>
</tr>
<tr>
<td>10m</td>
<td>1500</td>
<td>10000</td>
<td>1000</td>
<td>Ø168.3</td>
</tr>
<tr>
<td>12m</td>
<td>1700</td>
<td>12000</td>
<td>1000</td>
<td>Ø192</td>
</tr>
<tr>
<td>15m</td>
<td>2000</td>
<td>15000</td>
<td>1000</td>
<td>Ø192</td>
</tr>
</tbody>
</table>

All Dimensions are the recommended minimum however the following alternatives can be used if/where the design & equipment allows:

Base Diameter - Ø139.7
Spigot Diameter - Ø60.3
Door Aperture - 500 x 100mm

Notes
All dimensions in millimetres unless stated otherwise.
When multiple views are shown 3rd Angle Projection is assumed.

Title
Stepped Tubular Steel Lighting Column up to a Nominal Height of 15m

Drg No. 21087-2
Scale: 1:50
Sheet 1 of 1

Drawn By: sc | Chk'd: mhw
Ref. General Arrangement
Contract:
Customer: C.S.S. | Date: 02/06/2010

2010 © Copyright