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+A1:2009

Guidance on the use of BS EN 40-3-1 and BS EN 40-3-3

ICS 93.080.40

British Standards

Committees responsible for this Published Document

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Aluminium Federation

County Surveyors' Society

Galvanizers Association

Highways Agency, Department for Transport

Institution of Highways and Transportation

Lighting Column Manufacturers Association

UK Steel Association

Co-opted members

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A1	31 July 2009	See foreword.

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Contents

Foreword

This Published Document was prepared by Technical Committee B/509/50, Street lighting columns. It gives guidance on the use of BS EN 40-3-1 and BS EN 40-3-3, which were prepared by CEN/TC 50, Lighting columns and spigots.

The start and finish of text introduced or altered by Amendment No. 1 is indicated in the text by tags [A1⟩ ⟨A1].

This Published Document is not to be regarded as a British Standard.

PD 6547:2004+A1:2009, supersedes PD 6547:2004, which is withdrawn.

BS EN 40 is a more complicated design standard than BS 5649, the British Standard which specifies the design of lighting columns, so this Published Document gives guidance on the additional information that is required to allow a suitable lighting column to be designed.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

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1 Scope

This Published Document gives guidance and background information to specifiers and manufacturers of lighting columns on the use of BS EN 40-3-1 and BS EN 40-3-3, which specify the design of lighting columns. In particular, it gives guidance on the information which the specifier is required to give to the manufacturer to allow a suitable lighting column to be designed, such as the topography factor, site wind speed, site altitude and terrain category, which are used to determine the design wind pressure.

2 Background information on the design wind loadings in EN 40-3-1

The current standard for deriving the wind loads on a lighting column is BS EN 40-3-1:2000, which superseded BS 5649-6:1982 and requires that the wind speed information be derived from DD ENV 1991-2-4. The reference in BS EN 40-3-1 to DD ENV 1991-2-4 is [A1] *text deleted* [A1] out of date and is to be revised at the earliest opportunity [A1] to BS EN 1991-1-4 [A1].

[A1] Wind speed data for the design of lighting columns should be taken from the National Annex of BS EN 1991-1-4:2005, Figure NA.1. [A1]

[A1] *Note deleted* [A1]

3 Wind pressures

3.1 General

BS EN 40-3-1:2000, **3.2.1**, specifies an equation for calculating the characteristic wind pressure, $q(z)$, in N/m^2 for any particular height above ground, z:

$$q(z) = \delta \times \beta \times f \times Ce_{(z)} \times q_{(10)}$$

where:

- $q_{(10)}$ is the reference wind pressure;
- δ is a factor depending on the column size;
- β is a factor depending on the dynamic behaviour;
- f is a topography factor, which is taken as 1 unless otherwise specified or where a lighting column is installed on a slope with a height of less than 5 m;
- $Ce_{(z)}$ is a factor depending on the terrain of the site and the height above ground z.

3.2 Reference wind pressure $q_{(10)}$

[A1] The reference wind pressure should be determined using the fundamental basic wind velocity, $V_{b,0}$ (see BS EN 1991-1-4:2005 Clause **4.2**(1)P Note (2) – The Fundamental value of the basic wind velocity $V_{b,0}$).

Expression NA1 $$V_{b,0} = V_{b,map} \times C_{alt}$$

where: $V_{b,map}$ is the value of the fundamental basic wind velocity before the altitude correction is applied, and should be taken from Figure NA1 of BS EN 1991-1-4:2005

C_{alt} is the altitude factor

$$C_{alt} = 1 + 0.001A$$

where:

A is the altitude of the site in meters above mean sea level. [A1]

NOTE 1 Many administrative authorities are able to select one value of [A1] $V_{b,map}$ [A1] which covers most situations within their boundaries. In the interests of standardization, administrative authorities may select a maximum altitude to be used in specifications that cover the majority of lighting column locations within their boundaries. A table of such altitudes by administrative authority is given in Annex A.

[A1] NOTE 2 In BS EN 40-3-1:2000, $V_{b,0}$, is equivalent to V_{ref} and $V_{b,map}$, is equivalent to $V_{ref,0}$. [A1]

3.3 Exposure coefficient $Ce_{(z)}$

3.3.1 *Terrain categories*

The exposure coefficient $Ce_{(z)}$ is a factor varying with height above ground and is dependent on the terrain category of the site where a lighting column is to be installed, as determined by reference to BS EN 40-3-1:2000, Table 1.

Where specific information about terrain is available for the site where a lighting column is to be installed, this should be specified to the manufacturer.

[A1) *Text deleted* (A1]

Lighting columns of nominal height below 8 m are generally installed in less exposed locations more suitable to the terrain category III classification. Therefore, if the terrain category is not specified it is recommended that the terrain categories given in Table 1 should be used, [A1) however, it should be noted that BS EN 40-3-1:2000, **3.2.6**, recommends that the calculation should be carried out using category II. (A1]

Table 1 — Terrain categories by lighting column height

Lighting column height	Terrain category
Below 8 m	III
8 m and above	II

[A1) NOTE Examples of the different terrain categories are given in BS EN 1991-1-4:2005, Annex A.

It should be noted that terrain category 0 is not used in BS EN 40. (A1]

3.3.2 *Columns mounted on structures*

Where lighting columns are mounted in an elevated location, such as on a bridge or multi level building, the increased height above ground level should be taken into account in calculating the exposure coefficient $Ce_{(z)}$.

Special allowance might be necessary for a lighting column positioned at the edge of a tall structure, and specialist advice should be obtained.

3.3.3 *Exposed locations*

Where a lighting column is to be installed in an exposed site, for example a coastal location, a site subject to local wind funnelling or a site 250 m above sea level, specialist advice should be sought in determining the terrain category to be used in the calculation of the exposure coefficient $Ce_{(z)}$.

[A1) When a lighting column is to be used in coastal applications, it is necessary to consider the higher wind loadings as a result of an increase in Terrain Category. It is recommended that the Terrain Category be moved up by one level from the recommendations in Table 1. A coastal application is defined as being within 5 km of the mean high water spring tide height. Care should be taken where the column is installed in a location where topography is significant, see BS EN 40-3-1:2000, **3.2.5**. The wind speed and altitude defined in Table A.1 should be used when the site altitude is not defined. (A1]

4 Rationalized wind loading factors (R_{wf})

As an alternative to specifying the information detailed in Clause **3**, the specifier may use rationalized wind loading factors (R_{wf}). These have been calculated using the 10 minute mean wind velocity specified for each administrative region of the United Kingdom and adjusted for altitude, as detailed in Annex A. In the interests of standardization [A1) five (A1] factors have been used for the UK, and the maximum altitude for each administrative area has been increased to take into account any additional loading capacity arising as a result of standardization.

The rationalized wind loading factor R_{wf} in N/m^2 is given by the following equation.

$$R_{wf} = (V_{\text{ref altitude adjusted}})^2 \times 0.564$$

where:

0.564 is a factor which takes into account C_s for a mean return period of 25 years and is equal to $\sqrt{0.92}$ and ρ the air density taken as 1.226 kg/m^3, [A1) from BS EN 1991-1-4. (A1]

The rationalized wind loading factor is substituted for $q_{(10)}$ in the formula to find the characteristic wind pressure:

$$q(z) = \delta \times \beta \times f \times Ce_{(z)} \times R_{wf}$$

[A1] NOTE 1 The value of ρ in BS EN 40 is specified as 1.25 kg/m^3 however, this will be changed to bring it into line with BS EN 1991-1-4 Part 1.4, General actions – Wind Actions – NA 2.18, Clause 4.5(1), Note 2 – Value to be used for air density p = 1.226 kg/m^3.

NOTE 2 The use of rationalized wind loading factors should be limited to a maximum site altitude of 250 m above sea level. For sites above this height expert guidance should be sought.

NOTE 3 For columns in elevated situations, where special measures are not deemed necessary (see **3.3.2** and **3.3.3**), the wind loading factor may be increased by the ratio of the wind pressure at a height of 10 m above the column flange and the wind pressure at 10 m above ground level, calculated in accordance with BS EN 40-3-1:2000, **3.2.2**.

NOTE 4 The rationalized wind loading factors in Annex A are all stated at 10 m above ground level, and for a mean return period of 25 years. [A1]

5 Design loads and horizontal deflection

5.1 General

In addition to the data required to determine the characteristic wind loadings on a lighting column the classes of partial load (see **5.2**) and horizontal deflection (see **5.3**) are required by BS EN 40-3-3:2003, **5.4** and **6.5.1**, respectively, to be specified to the column manufacturer.

5.2 Partial safety factors on loads γ_f

Two classes of partial load factors γ_f are specified in BS EN 40-3-3:2003, **5.4**. It is recommended that Class B (wind load: $\gamma_f = 1.2$, dead load: $\gamma_f = 1.2$) is specified [A1] *text deleted* [A1].

5.3 Deflection classes

BS EN 40-3-3:2003, **6.5.1**, requires the horizontal deflection of a lantern fixing to conform to one of three classes of maximum horizontal deflection specified in BS EN 40-3-3:2003, Table 3. Of these, it is recommended that Class 3 is used in the UK:

$$0.10 \times (h + w)$$

where:

h is the nominal height of the lighting column (in m), as defined in BS EN 40-1;
w is the bracket projection (in m), as defined in BS EN 40-1.

6 Lighting column foundations

6.1 Planting depth

Where a lighting column is to be planted into the ground, the planting depth ought to be selected from the centre column of Table 7 in BS EN 40-2:2004, taking into account the nominal height of the lighting column.

6.2 Planting depth suitability

To check the suitability of the selected planting depth for the ground conditions at the site, it is recommended that the calculation procedure given in **6.3** should be adopted, unless a more sophisticated foundation design approach is utilized.

6.3 Calculation of planting depth

6.3.1 Obtain from the lighting column designer, or otherwise calculate the overturning moment arising from the application of the full design wind pressure on the lighting column, bracket arm, luminaire and any other attachment, such as banners, about a fulcrum point located at $1/\sqrt{2}$ of the planting depth.

6.3.2 Multiply the overturning moment by a factor of safety of 1.25.

6.3.3 Calculate the ground resistance moment, *Mg*, using the following formula.

$$Mg = \frac{G \times D \times P^3}{10}$$

where:

G is a factor dependent on the ground in which the column is planted (in kN/m² per m) (see Table 2);

D is the minimum diameter (or minimum distance across flats for multi-sided sections) of the lighting column in the ground (in m);

P is the planting depth (in m).

6.3.4 If the overturning moment including the factor of safety exceeds the ground resistance moment (*Mg*), it is necessary to specify an increase in either the planting depth of the lighting column and/or the effective diameter of its foundation, until the ground resistance moment (*Mg*) exceeds the overturning moment including the factor of safety. The latter can be achieved by back-filling the excavation with mass concrete or appropriate fill material (see **6.4**) and the effective diameter of the column may be assumed to be the minimum diameter of the hole.

Table 2 — Ground factor *G*

G (kN/m²)	**Quality of soil**
630	Good: Compact, well-graded sand and gravel, hard clay, well-graded fine and coarse sand, decomposed granite rock and soil. Good soils drain well.
390	Average: Compact fine sand, medium clay, compact well-drained sandy loam, loose coarse sand and gravel. Average soils drain sufficiently well that water does not stand on the surface.
230	Poor: Soft clay, clay loam, poorly compacted sand, clays containing a large amount of silt and vegetable matter, and made-up ground. Poor soils are normally wet and have poor drainage.

6.4 Back-filling

The calculation in **6.3.3** is based on the hole into which the lighting column is planted being back-filled with the excavated material or material of better quality.

The following should be specified to the installer:

a) all back-filling material is to be placed in 150 mm thick layers and be well compacted;

b) during compaction, care is to be taken to ensure that the corrosion protection system of the lighting column is not damaged;

c) where the hole is back-filled with concrete, the concrete is to extend from the base of the lighting column to ground level;

d) where paving or bituminous surfacing is to be applied around the lighting column, the top level of the concrete may be lowered by the thickness of this surfacing; and

e) a duct with the same dimensions as the lighting column's cable entry slot is to be formed in the concrete using a suitable preformed lining tube.

7 Road signs, banners and other attachments to lighting columns

BS EN 40 does not give guidance on the method of calculating the additional wind loading effects of the attachment of road signs or banners, etc., but such guidance is given in [A1⟩BS ⟨A1] EN 1991-1-4: [A1⟩2005, Section 7. ⟨A1]

Sometimes, lighting columns in the UK have road signs attached to them. Typically, three sizes of sign have been used, and these are given in Table 3. If a lighting column is to be fitted with a road sign, the specifier should either specify the sign class or the dimensions, shape, height to the centre, offset dimension and orientation of the sign.

Table 3 — Road sign class

Sign class	Area of sign	Height to centre of sign	Sign shape	Offset dimension
A	0.3 m^2	2.5 m	Square	0.3 m
B	0.6 m^2	2.5 m	Square	0.3 m
C	1 m^2	2.5 m	Square	0.3 m

NOTE 1 For the purpose of lighting column design, the most onerous orientation of a road sign should be assumed unless otherwise stated.

NOTE 2 For the purpose of lighting column design, a road sign should be assumed to have a mass of 5 kg unless otherwise stated.

[A1⟩ NOTE 3 For signs a shape coefficient value of 1.8 should be used in accordance with BS EN 1991-1-4:2005. **7.4.3**. ⟨A1]

8 Assessment of fatigue

[A1⟩ BS EN 40-3-3:2003 does not specify any fatigue requirements, but Clause **8** states that the fatigue effects may be considered for lighting columns above 9 m nominal height. Annex A of BS EN 40-3-3:2003 provides a method of calculating the fatigue effects for steel lighting columns but for other materials, e.g. Aluminium and Fibre Reinforced Composites, reference should be made to the appropriate standard for such structures subject to fatigue loading:

BS EN 1999-1-3:2007, *Eurocode 9: Design of aluminium structures – Part 1–3:Structures susceptible to fatigue.*

BS ISO 13003:2003, *Fibre-reinforced plastics – Determination of fatigue properties under cyclic loading conditions.*

The calculation used in Annex A of BS EN 40-3-3:2003 was taken from the Highways Agency Standard BD 26/94 [1], which has now been superseded by BD 94/07 [2]. Until Annex A of BS EN 40-3-3 is updated, reference should be made to the guidelines in BD 94/07 [2] although, as an alternative, the Eurocode relevant to steel structures subject to fatigue loading may also be considered:

BS EN 1993-1-9:2005, *Eurocode 3: Design of steel structures – Part 1-9: Fatigue.* ⟨A1]

Annex A (informative)
Rationalized wind factor and maximum altitude

A1 Table A.1 – Rationalized wind loading factor, R_{wf}, and maximum altitude

Administrative Area	BS EN 1991-1-4 10 min Mean Wind Velocity m/sec	Rationalized Wind Loading Region	Maximum Altitude m	Rationalized Wind Factor R_{WF} N/m²
Aberdeen	26.0	Extra Heavy	229	576
Aberdeenshire	27.0	Extra Heavy	184	576
Angus	26.0	Extra Heavy	229	576
Antrim	26.0	Extra Heavy	229	576
Argyll & Bute	28.0	Extra Heavy	141	576
Armagh	26.0	Extra Heavy	229	576
Bath & North East Somerset	22.5	Medium	226	429
Bedfordshire	22.0	Extra Light	132	350
Blackburn with Darwen	23.5	Medium	174	429
Blackpool	24.0	Extra Light	38	350
Blaenau Gwent	23.0	Heavy	250	466
Bournemouth	22.0	Extra Light	132	350
Bracknell Forest	21.5	Extra Light	159	350
Bridgend	23.5	Heavy	223	466
Brighton & Hove	22.0	Extra Light	132	350
Bristol	22.5	Light	178	396
Buckinghamshire	21.5	Extra Light	159	350
Caerphilly	23.0	Heavy	250	466
Carmarthenshire	24.5	Extra Heavy	250	576
Cambridgeshire	22.0	Extra Light	132	350
Cardiff	23.0	Heavy	250	466
Ceredigion	24.5	Medium	126	429
Channel Islands	24.0	Light	104	396
Cheshire	23.5	Medium	174	429
Clackmannanshire	25.5	Extra Heavy	250	576
Conwy	24.5	Extra Heavy	250	576
Cornwall	25.0	Medium	103	429
Cumbria	24.5	Extra Heavy	250	576
Darlington	23.5	Extra Light	60	350
Denbighshire	24.0	Extra Heavy	250	576
Derby	22.0	Extra Light	132	350
Derbyshire	22.5	Light	178	396
Devon	24.0	Medium	149	429
Dorset	23.0	Medium	199	429
Down	26.0	Extra Heavy	229	576

Table A.1 – Rationalized wind loading factor, R_{wf}, and maximum altitude (*continued*)

Administrative Area	BS EN 1991-1-4 10 min Mean Wind Velocity m/sec	Rationalized Wind Loading Region	Maximum Altitude m	Rationalized Wind Factor R_{WF} N/m²
Dumfries & Galloway	26.0	Heavy	106	466
Dundee	25.0	Extra Heavy	250	576
Durham	24.0	Extra Heavy	250	576
East Dunbartonshire	25.5	Extra Heavy	250	576
East Lothian	24.5	Medium	126	429
East Renfrewshire	25.5	Extra Heavy	250	576
East Riding of Yorkshire	23.0	Medium	199	429
East Sussex	22.0	Extra Light	132	350
Edinburgh	24.5	Heavy	173	466
Essex	22.5	Light	178	396
Falkirk	25.5	Extra Heavy	250	576
Fermanagh	26.0	Extra Heavy	229	576
Fife	25.0	Heavy	150	466
Flintshire	24.0	Heavy	198	466
Glasgow	25.5	Extra Heavy	250	576
Gloucestershire	22.5	Light	178	396
Greater London	22.0	Extra Light	132	350
Greater Manchester	23.5	Medium	174	429
Gwynedd	25.0	Extra Heavy	250	576
Halton	23.0	Extra Light	83	350
Hampshire	22.0	Extra Light	132	350
Hartlepool	23.5	Extra Light	60	350
Herefordshire	23.0	Light	152	396
Hertfordshire	22.0	Extra Light	132	350
Highland	29.5	Extra Heavy	83	576
Inverclyde	26.0	Extra Heavy	229	576
Isle of Anglesey	25.5	Medium	82	429
Isle of Man	26.0	Heavy	106	466
Isle of Wight	22.0	Extra Light	132	350
Isles of Scilly	25.0	Light	60	396
Kent	22.5	Light	178	396
Kingston upon Hull	22.5	Extra Light	107	350
Lancashire	24.0	Medium	149	429
Leeds City	23.0	Heavy	250	466
Leicester	22.0	Extra Light	132	350
Leicestershire	22.0	Light	204	396
Lincolnshire	22.5	Extra Light	107	350

Table A.1 – Rationalized wind loading factor, R_{wf}, and maximum altitude (*continued*)

Administrative Area	BS EN 1991-1-4 10 min Mean Wind Velocity m/sec	Rationalized Wind Loading Region	Maximum Altitude m	Rationalized Wind Factor R_{WF} N/m²
Londonderry	26.5	Extra Heavy	206	576
Luton	21.5	Extra Light	159	350
Medway	22.0	Extra Light	132	350
Merseyside	23.5	Light	128	396
Merthyr Tydfil	23.5	Extra Heavy	250	576
Mid Lothian	24.5	Heavy	173	466
Middlesbrough	23.5	Light	128	396
Milton Keynes	22.0	Extra Light	132	350
Monmouthshire & Newport	23.0	Light	152	396
Moray	27.0	Extra Heavy	184	576
Neath Port Talbot	23.5	Medium	174	429
Norfolk	23.0	Light	152	396
North Ayrshire	26.5	Extra Heavy	206	576
North East Lincolnshire	22.5	Extra Light	107	350
North Lanarkshire	25.5	Extra Heavy	250	576
North Lincolnshire	22.5	Extra Light	107	350
North West Somerset	22.5	Light	178	396
North Yorkshire	23.5	Light	128	396
Northamptonshire	22.0	Extra Light	132	350
Northumberland	24.5	Light	82	396
Nottingham	22.0	Extra Light	132	350
Nottinghamshire	22.5	Light	178	396
Orkney	29.5	Extra Heavy	83	576
Oxfordshire	21.5	Light	232	396
Pembrokeshire	25.0	Heavy	150	466
Perth & Kinross	26.5	Extra Heavy	206	576
Peterborough	22.0	Extra Light	132	350
Plymouth	24.0	Medium	149	429
Poole	22.0	Extra Light	132	350
Portsmouth	22.0	Extra Light	132	350
Powys	23.5	Medium	174	429
Reading	21.5	Extra Light	159	350
Redcar & Cleveland	23.5	Extra Light	60	350
Renfrewshire	26.0	Extra Heavy	229	576
Rhondda Cynon Taff	23.5	Extra Heavy	250	576
Rutland	22.0	Extra Light	132	350
Scottish Borders	24.5	Light	82	396

Table A.1 – Rationalized wind loading factor, R_{wf}, and maximum altitude (*continued*)

Administrative Area	BS EN 1991-1-4 10 min Mean Wind Velocity m/sec	Rationalized Wind Loading Region	Maximum Altitude m	Rationalized Wind Factor R_{WF} N/m²
Shropshire	23.0	Heavy	250	466
Slough	21.5	Extra Light	159	350
Somerset	23.5	Medium	174	429
South & East Ayrshire	26.0	Heavy	106	466
South Gloucester	22.5	Light	178	396
South Lanarkshire	25.5	Extra Heavy	250	576
South Yorkshire	22.5	Light	178	396
Southampton	22.0	Extra Light	132	350
Southend	22.0	Extra Light	132	350
Staffordshire	22.5	Medium	226	429
Stirling	26.5	Extra Heavy	206	576
Stockton-on-Tees	23.5	Light	128	396
Stoke-on-Trent	22.5	Medium	226	429
Suffolk	23.0	Extra Light	83	350
Surrey	21.5	Light	232	396
Swansea	24.0	Medium	149	429
Swindon	21.5	Extra Light	159	350
Telford & Wrekin	22.5	Medium	226	429
Thurrock	22.0	Extra Light	132	350
Torbay	23.5	Light	128	396
Torfaen	23.0	Heavy	250	466
Tyne & Wear	24.0	Extra Heavy	250	576
Tyrone	26.5	Extra Heavy	206	576
Vale of Glamorgan	23.5	Heavy	223	466
Warrington	23.0	Extra Light	83	350
Warwickshire & Coventry	22.0	Medium	250	429
West Berkshire & Newbury	21.5	Light	232	396
West Dunbartonshire	26.0	Heavy	106	466
West Lothian	25.0	Heavy	150	466
West Midlands	22.0	Extra Light	132	350
West Sussex	22.0	Extra Light	132	350
West Yorkshire	23.0	Heavy	250	466
Western Isles	31.0	Extra Heavy	31	576
Wiltshire	22.0	Extra Light	132	350
Windsor & Maidenhead	21.5	Extra Light	159	350
Wokingham	21.5	Extra Light	159	350
Worcestershire	22.5	Extra Light	107	350

Table A.1 – Rationalized wind loading factor, R_{wf}, and maximum altitude (*continued*)

Administrative Area	BS EN 1991-1-4 10 min Mean Wind Velocity m/sec	Rationalized Wind Loading Region	Maximum Altitude m	Rationalized Wind Factor R_{WF} N/m²
Wrexham	23.5	Heavy	223	466
York	23.0	Extra Light	83	350
Shetland	Special Case	Seek Specialist advice		
The rationalized wind loading factors R_{wf} are all stated at 10 m above ground and for a mean return period of 25 years.				

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NOTE

Tyne and Wear includes:

Gateshead, Newcastle, North and South Tyneside and Sunderland.

West Yorkshire includes:

Calderdale, Bradford, Kirklees and Wakefield.

South Yorkshire includes:

Barnsley, Doncaster, Rotherham and Sheffield.

Greater Manchester includes:

Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford and Wigan.

West Midlands includes:

Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall and Wolverhampton.

Greater London includes:

All London Boroughs.

Table A.2 — Checklist

Item to be specified	**Recommendation**	**Requirement**
Mean hourly wind speed – V_{ref}	Use Table A.1	n/a
Site altitude above 250 m	Seek expert advice	n/a
Site altitude	Use Table A.1	n/a
Topography factor	1	n/a
Terrain Category where installation is unknown	II for Group A columns III for Group B columns	n/a
Rationalized wind loading region [Specify category]	Extra Heavy/Heavy/Medium/ Light [A1]/Extra Light [/A1]	n/a
Partial safety factors on loads *f*	Class B	n/a
Deflection class	Class 3	n/a
Foundation data – if applicable – Soil type	Good/Average or Poor	n/a
Road signs – only if required	Class A/B or C	n/a
Fatigue requirements – only if applicable	Use Highways Agency BD [A1] 94/07 [/A1] [2]	n/a

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Standards publications

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⟨A1⟩ BS ⟨/A1⟩ EN 1991-1-4: ⟨A1⟩ 2005 ⟨/A1⟩, *Eurocode 1: Actions on structures — Part 1-4: General actions Wind actions.*

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