PAS 191:2023

Multifunctional columns – Design – Specification

Department for Science, Innovation & Technology

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Foreword

This PAS was sponsored by the Department for Science, Innovation & Technology (DSIT). Its development was facilitated by BSI Standards Limited and it was published under licence from The British Standards Institution. It came into effect on 30 April 2023.

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Acknowledgement is also given to the members of a wider review panel who were consulted in the development of this PAS.

Relationship with other publications

This PAS provides a design specification for new multifunctional columns. PAS 191 is related to PAS 190 which provides an assessment method for existing lighting and CCTV columns for the same use.

PAS 191 also relates to BS EN 40 (all parts) and to PD 6547. BS EN 40 provides an appropriate product standard on which to certify column design and production while PD 6547 provides additional guidance.

PAS 185 supplies a framework for establishing and implementing city-wide, strategic-level, security-minded approaches as part of both the development and operation of smart cities and might be useful in establishing and implementing a security-minded approach to multifunctional columns.

The Institution of Lighting Professionals (ILP) *Guidance Note 12 The Smart Lighting Column* [1] is also relevant to the aims of this publication.

Information about this document

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The provisions of this document are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Requirements in this document are drafted in accordance with the *Rules for the structure and drafting of UK standards*:2021 subclause **G.1.1**, which states, "Requirements should be expressed using wording such as: 'When tested as described in Annex A, the product shall ...'". This means that only those products that are capable of passing the specified test will be deemed to conform to this document.

Where words have alternative spellings, the preferred spelling of the *Shorter Oxford English Dictionary* is used (e.g. "organization" rather than "organisation").

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In particular, attention is drawn to the following specific Acts and Regulations (as amended):

- Construction (Design and Management) Regulations 2015 [2];
- Construction Products Regulations 2013 [3];
- Electronic Communications Code (Conditions and Restrictions) Regulations 2003 [4];
- Low Voltage Electrical Equipment (Safety Regulations) 1989 [5];
- Provision and Use of Work Equipment Regulations 1998 [6];
- Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 [7];
- Control of Electromagnetic Fields at Work Regulations 2016 [8];
- Control of Artificial Optical Radiation at Work Regulations 2010 [9];
- Communications Act 2005 [10], Schedule 3 ("the Electronic Communications Code").

0 Introduction

0.1 Existing functions

Multifunctional columns are specified and designed based on the general design rules provided in BS EN 40 Lighting columns for circulation areas. The core function of lighting columns is to support one or more luminaires for providing lighting. Luminaires are the only equipment that is currently recognized as an attachment within BS EN 40.

Despite their omission from BS EN 40, a common but secondary function of lighting columns is to provide support for other types of equipment that require mounting brackets and, in some cases, provision for an electrical supply. These attachments might include for example:

a) traffic and information signs;
b) flower baskets or flora installations;
c) festive or seasonal decorations;
d) banners or flags; and
e) litter bins, etc.

Similarly, columns supporting closed circuit television (CCTV) equipment are often designed to BS EN 40 along with guidance in CD 354 (published by National Highways, Transport Scotland, Welsh Government, and Northern Ireland Department For Infrastructure). ILP PLG 07 [11] is often used for larger mast structures and these structures provide similar benefits to lighting columns in terms of offering opportunities to mount smart equipment.

Like lighting and CCTV columns, multifunctional columns can have these types of equipment installed, provided that these attachments are included in the original design load calculations for the structure.

0.2 Smart equipment hosting

With the advent of smart cities, smart streets and smart spaces, columns and mast-type structures are being used as supporting structures for a range of Internet of Things (IoT) and smart equipment. For the purposes of this PAS, smart equipment can be defined as equipment that has the ability to communicate through wired or wireless means to a proprietary network or cloud. For example:

a) CCTV cameras and safety devices;
b) IoT sensors;
c) electric vehicle (EV) charging points;
d) digital advertising;
e) variable message signs;
f) electronic telecommunications; and
g) local energy generation and storage including small wind turbines, solar panels and batteries.

Lighting columns designed for hosting smart equipment can be divided into three general types:

1) Standard functional columns designed to accept specific attachments such as luminaires and CCTV: These columns might be able to host additional attachments or equipment but have not been explicitly designed to do this.
2) Standard functional columns that have been designed to accept other attachments which are either mechanically attached to the outside of the structure or mounted inside the column: These columns can be referred to as "specials". The attachments planned for can include signs, banners, hanging baskets, festive decorations and, in more recently manufactured columns, some digital devices.
3) Other special (often proprietary) columns designed and manufactured with structural details that are significantly different to the standard functional lighting columns: These columns can be developed in a modular way to allow different combinations of smart attachments and equipment and/or designed with particular consideration of aesthetics.

The selection of structure to be specified depends on factors that include the functionality offered, the structural suitability for the location and the available budget.

0.3 Aesthetic function

Asset owners might have specific aesthetic requirements for structures within their control, for example, using specific colour schemes to complement the local street scene or to reflect corporate branding.

Aesthetic requirements vary from location to location but might include the need to blend into a heritage street scene or to provide a modern architectural feature or decorative interest.

Heritage columns are often used in historic towns and city boroughs where original cast iron lighting columns were provided during Victorian or Georgian periods. New and replacement lighting columns follow this same style but can be manufactured from modern materials, most often a galvanized steel lighting column with decorative kits to replicate the style of the original cast iron designs.

While the appearance of heritage, architectural or decorative columns are quite different, the construction of the lighting columns are in general very similar to the construction of functional columns, being either tapered tubular or straight-sided tubular sections with a reduction in diameter of the tube at the swage (the joint between the base and the shaft of the column).

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1 Scope

This PAS specifies design, installation and relevant maintenance requirements for multifunctional columns based on one or more the following core functions:

a) lighting columns;
b) CCTV columns;
c) sign poles;
d) cantilever masts;
e) traffic signal poles; and
f) mast type structures.

This PAS is also applicable to other column-type minor structures as defined by the Design Manual for Roads and Bridges document CD 354 *Design of Minor Structures*.

The PAS covers the following design and performance attributes of multifunctional columns:

1) core function;
2) smart equipment hosting;
3) attachments, e.g. for monitoring, telecommunications services and renewable energy generation;
4) service configurations;
5) aesthetic function;
6) physical security;
7) design of ultimate limit state conditions, including permitted changes to the structure for future-proofing;
8) design of serviceability limit state conditions;
9) connections for utility services;
10) durability;
11) installation;
12) maintenance; and
13) hazards.

The PAS is intended to apply to any current or future telecommunications technology.

The PAS gathers product specific requirements of multifunctional columns from a range of relevant standards and guidance.

This PAS does not cover how to procure multifunctional columns, sub-components, new equipment or services to be hosted on multifunctional columns.

It also does not cover requirements for the operational use or maintenance of the attachments or equipment including cybersecurity, data protection, data privacy, and grid security.

This PAS does not include commercial aspects of the supply from either the asset manufacturers, or the attachment equipment suppliers' warranties or guarantees.

This PAS is of use to specifiers, designers, manufacturers, suppliers and installers of multifunctional columns and to installers of attachments and/or equipment on multifunctional columns.

This PAS is of interest to infrastructure owners and infrastructure managers (e.g. local authorities, highways authorities, assets owners and equipment owners, and mobile network and neutral host operators) when considering procuring assets for new locations and where existing assets have been assessed as being unsuitable for additional multifunctional use.

It might also be of interest to suppliers of attachments and equipment including, but not limited, to luminaires, small cells, EV charging, CCTV, IoT sensors, banners, hanging baskets, festive decorations and street signage, plus maintenance and operational providers including power and communications via coaxial cables, fibre optic cables and wireless services.