



PAS 122:2009

Specification for the installation of
audiovisual equipment in classrooms
and general publicly accessible areas

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Foreword

This Publicly Available Specification (PAS) was sponsored by Becta and its development was facilitated by The British Standards Institution (BSI).

Acknowledgment is given to the following organizations that were instrumental in the development of this PAS:

- Becta
- Extron
- HSE (Health and Safety)
- Infocomm
- Intenect Ltd
- Sky
- Unicol

Wider comments from other interested parties were invited by BSI. The expert contributions made by the organizations and individuals consulted in the development of this PAS are gratefully acknowledged.

This Publicly Available Specification has been developed and published by BSI, which retains its ownership and copyright. BSI reserves the right to withdraw or amend this PAS on receipt of authoritative advice that it is appropriate to do so.

This PAS will be reviewed at intervals not exceeding two years and any amendments arising from the review will be published in an amended PAS and publicized in *Update Standards*. Feedback on this PAS will be gratefully received.

This document is not to be regarded as a British Standard. It will be withdrawn upon publication of its contents in, or as, a British Standard.

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

Compliance with this PAS does not in itself confer immunity from legal obligations.



Introduction

This Publicly Available Specification provides requirements for the installation of Audio Visual equipment in a wide variety of settings. It is intended as a reference point for AV and electrical installers to ensure that the quality and standards of installations are raised to a sustainable level where any customer can be aware that specific criteria are being met.

In particular it has been noted over the past number of years that resellers of Interactive Whiteboards and AV equipment use third party sub-contractors to install their equipment. It has become apparent following completion of a number of audits that there are no strict guidelines relating to how the installations are carried out and that the processes employed by suppliers and subcontract staff differed greatly. This adds to the risk as, in a few isolated cases, installs have been carried out without adhering to the appropriate processes.

As such, the primary aim of this specification is to provide a framework that helps to ensure increased safety and analysis / management of risks, whilst also demonstrating due diligence in these areas.

Ultimately, an objective of this specification is to provide a means of assessment and certification in order to assure the users and wider industry of compliance with best practice. Wherever possible and where appropriate the equipment and installation processes should have measureable performance figures that can be validated by appropriate assessors and auditors.

This PAS is not a training document and therefore a suitably trained and or competent engineer is required to be able to carry out work to these guidelines. Assumptions are made for knowledge and market place understanding to suit the installation that is being undertaken.

Annex A provides further information on the technology referred to in this document.

Annex B provides guidance on optical radiation safety.

Annex C provides a sample site survey document (pre-installation).

Annex D provides sample codes of conduct.

Annex E provides a sample static load test.

Annex F provides general guidance for using whiteboards and projectors.

Annex G provides a sample post installation document.

Although most of the above documents are samples for whiteboard and projector implementations this PAS is not restricted to this type of technology. It is intended to cover the many differing existing and emerging technologies used in the audio visual world.

All the information contained in the Annexes is for illustrative purposes only.



1 Scope

This PAS specifies requirements for the correct and safe implementation of Audio Visual installations.

It does not specify requirements for the training of installation engineers.

It is for use by Audio Visual installation companies in the UK who provide installations comprising of a significant AV component such as, but not limited to, computers, projectors, whiteboards, plasma screens, LCD screens, loud speakers (both wall and ceiling mounted) and light arrays to the public and private sectors and their end users.

This PAS has been created to give end users / customers a level of confidence and assurance when purchasing Audio Visual Installation services.



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.

BS 1129, *Specification for portable timber ladders, steps, trestles and lightweight stagings*

BS 2037, *Specification for portable aluminium ladders, steps, trestles and lightweight stagings*

BS 5499-10:2006, *Safety signs, including fire safety signs. Code of practice for the use of safety signs, including fire safety signs*

BS 6399, *Loading for Buildings*

BS 7671, *Requirements for electrical installations. IEE Wiring Regulations*

BS 8437, *Code of practice for selection, use and maintenance of personal fall protection systems and equipment for use in the workplace*

BS 8454, *Code of practice for the delivery of training and education for work at height and rescue*

BS EN 131-1, *Ladders*

BS EN 795:1997, *Protection against falls from a height. Anchor devices. Requirements and testing*

BS EN ISO 8765: 2001, *Hexagon head bolts with metric fine pitch thread. Product grades A and B*

ISO/IEC 11801:2002, *Information Technology – Generic cabling for customer premises*

IEC 61156-5, *Multicore and symmetrical Multicore and symmetrical pair/quad cables for digital communications – Symmetrical pair/quad cables with transmission characteristics up to 600 MHz – Horizontal floor wiring – Sectional specification*

IEC 61156-6, *Multicore and symmetrical Multicore and symmetrical pair/quad cables for digital communications – Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Work area wiring – Sectional specification*

DIN 962:2001, *Designation system for fasteners*

ANSI/TIA/EIA-568-B, *Commercial Building Telecommunications Cabling Standard*

3 Terms and definitions

For the purposes of this PAS the following terms and definitions apply.

3.1 audio

anything pertaining to equipment or conduction of sound

3.2 ceiling mounted

equipment mounted to the ceiling structure using an adapter bracket, or to beams or other load bearing structures using appropriate bracketry

***NOTE** In high ceiling installations a suspension column is normally employed to suspend the equipment at the correct height*

3.3 competent person

person who can demonstrate that they have sufficient professional knowledge or technical training, knowledge, actual experience and authority to enable them to:

- a) carry out their assigned duties at the level of responsibility allocated to them;
- b) understand any potential hazards to the work (or equipment) under consideration;
- c) detect any technical defects or omissions in that work (or equipment), recognize any implications for health and safety, where appropriate, caused by those defects or omissions, and be able to specify a remedial action to mitigate those implications.

3.4 customer/client

corporate body/individual that is responsible for procuring the work

3.5 employer

person, persons or legally defined business entity that either uses, erects or installs audio-visual equipment

3.6 equipment

3.6.1 personal protective equipment

equipment which is intended to be worn or held by a person at work and which protects him/her against one or more risks to his/her health and safety

3.6.2 use of work equipment

any activity involving work equipment, including

starting and stopping, erecting, installing, dismantling, programming, setting, using, transporting, repairing, modifying, maintaining, servicing and cleaning

3.7 floor / surface mounted

equipment mounted on a wheeled trolley (cart) or static stand, which may be fixed to the floor structure

***NOTE** There are circumstances where floor and ceiling is used in combination i.e. fixed to floor and fixed to ceiling as a continuous mounting assembly. AV equipment can also be mounted on desks or tables.*

3.8 management

body of people who, collectively, manage or direct an organization

3.9 method statement

document prepared by an organization that describes in a logical sequence exactly how a work activity is to be carried out in a manner which is safe and without risks to health

3.10 organization

administrative and functional structure

3.11 risk assessment

process of hazard identification and evaluation that enables appropriate steps to be taken in the control of injury risks to people, damage risks to property and pollution risks to the environment that might otherwise arise from such hazards

3.12 site owner

landlord, organization or persons responsible for the operational management of the building in which the subject premises is located

3.13 visual

any device that either converts light into an electrical signal or an electrical signal into light

3.14 wall mounted

equipment mounted directly to the wall or via an adapter bracket or a bracket designed to stand the equipment off the wall for any specific purpose

4 Abbreviations

4.1 AV

Audio Visual

4.2 BS

British Standard

4.3 HSE

Health and Safety Executive

5 Health and safety

5.1 General

5.1.1 Management shall continue to work in close co-operation with employees, contractors, customers/clients, site owners and visitors to achieve continuous health and safety performance improvements.

***NOTE** This should be indicated by the knowledge held by management and employees of the relevant laws and regulations applicable to the areas of work.*

5.1.2 Management shall ensure that employees participate in the development of programmes to improve health and safety and are responsible and accountable for ensuring that they work within current health and safety standards.

5.1.3 Management shall ensure that hazards are eliminated where reasonably practicable and residual risks are controlled to the lowest possible level.

5.1.4 Where it is not reasonably practical to eliminate hazardous situations, safe working practices and procedures (including method statements and permits to work) shall be developed for all remaining potentially hazardous situations and compliance shall be rigorously enforced.

***NOTE** Attention is drawn to Regulation 3 of the Management of Health and Safety at Work Regulations 1999 [1].*

5.2 Working at height

5.2.1 When working at height all installation engineers shall operate following the recommendations given in **BS 8437**, *Code of practice for selection, use and maintenance of personal fall protection systems and equipment for use in the workplace* and **BS 8454**, *Code of practice for the delivery of training and education for work at height and rescue*.

***NOTE** Attention is drawn to the Work at Height Regulations 2005 as amended [2].*

5.2.2 Where ladders are being used, the ladders shall comply with:

BS 2037 *Specification for portable aluminium ladders, steps, trestles and lightweight stagings;*

BS 1129, *Specification for portable timber ladders, steps, trestles and lightweight stagings;*

BS EN 131-1 *Ladders.*

5.2.3 Where platforms are being used, the installation engineer shall have completed an accredited working at height safety course.

5.3 Asbestos

The room in which the work is to be carried out shall have been checked for asbestos prior to any works being carried out.

NOTE Attention is drawn to the *Control of Asbestos at Work Regulations 2006 [3]*.

5.4 Electrical Safety

All electrical installations shall comply with **BS 7671**, *Requirements for electrical installations. IEE Wiring Regulations*.

5.5 Hazards

Where a hazardous area has been created during the job being carried out, this area shall be sectioned off and identified with signage following the recommendations in **BS 5499-10**, *Safety signs, including fire safety signs. Code of practice for the use of safety signs, including fire safety signs*.

5.6 Optical Radiation Safety

Guidance on optical radiation safety is given in Annex B.



6 Pre install

6.1 Site survey

Pre-installation site surveys shall be carried out by a person or persons who are experienced in the siting and installation of audio visual devices. During the survey, a review of the product selection shall be carried out in relation to the environment where the equipment is to be installed. Detailed measurements, dimensions and angles shall be recorded and any existing electrical cabling (where applicable) shall be noted and any recommendations for alteration to aid the installation of the AV equipment made.

NOTE A sample site survey is given in Annex C.

6.2 Risk assessment of works to be carried out

A risk assessment shall be performed prior to any work being carried out. All risk assessments shall be completed in accordance with HSE Risk Assessment guidelines.

NOTE 1 Reference should be made to the HSE Five Steps to Risk Assessment publication which includes:

- Identify the hazards;
- Decide who might be harmed and how;
- Evaluate the risks and decide on precaution;
- Record your findings and implement them;
- Review your assessment and update if necessary.

During the risk assessment, observations shall be made to calculate the PPE that will be required in accordance with Personal Protective Equipment at Work Regulations 1992 (as amended) [4].

NOTE 2 The risk assessment should enable the installation work to be completed safely by installation personnel and without risk of injury to other persons who may be at the installation premises. It should also enable the customer or end-user to subsequently use the installation safely and without risk to the health of any of the users, staff, students, pupils, members of the public or others as the case may be. This includes the need to pay particular attention towards the risk of staring directly into a projector beam if this is included as part of the installation.

Audio visual equipment installation shall be safe in any reasonably foreseeable circumstance of use which, for all installations, shall include the possibility of miscreant behaviour by anyone that would result in a pull-out force being generated.

Consideration shall be given to the possibility that someone may attempt to swing from any AV equipment that is accessible. The excess forces applied to any equipment will be substantial. The intended location for the AV equipment shall be checked during the survey for its suitability to deal with any peak loading that could occur. Particular attention shall be paid to the wall brackets and fixings used (see 7.2).

NOTE Attention is drawn to the Health and Safety at Work etc. Act 1974 [5].

6.3 Customer actions

Customers shall be informed of any actions that need to be carried out by them prior to installation taking place.

6.4 Installer conduct

Installers shall act in a polite and professional manner at all times, and treat all people and property with due respect.

NOTE An example code of conduct is given in Annex D.

