ISS New Audio & Visual installations

Design and Physical install guidelines v1.7

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Background

This document is intended to aid contractors and design teams to plan audio visual installations in new and refurbished buildings at Lancaster University.

This document is not an audio visual equipment specification. ISS provide AV specifications for University defined room types.

Guidance in this document is to be used alongside the ISS Cabling Specifications document. The most recent version of which can always be found at – http://www.lancs.ac.uk/iss/network/physinfstandards/

Overview of Considerations

The following aspects must be given consideration when designing a new Teaching and Learning space. Further details are outlined later in the document:

Lighting – Avoid impacting projected images or display screens. Lighting control available to the lecturer.

Acoustics – Comfortable to learn and work in the space for 3 hours.

Cable routes – Dedicated to Audio Visual equipment. Accessible for future maintenance and installation. Appropriate containment and fixings.

Equipment Positions – Allocated positions for Lecturers and a podium must be designed into rooms.

Installation standards

Installations should adhere to BS 8590:2014 Code of practice for the installation of audio visual equipment.

Equipment should be installed to manufacturers recommended installation guidelines.

Installation companies should refer to ANSI/Infocomm 2M-2010 Standard Guide for Audio Visual Systems Design and Coordination Processes.

Display screen and projector positioning

Fixed frame and electric drop projection screens – excluding Interactive Whiteboards

For flat floor venues with an unobstructed view of the screen the projection screen shall be positioned so that the bottom edge of the viewable area is no less than 1.2m above the floor.

Positioning of Display Screens and Projection Screens underneath light sources should be avoided. All projected images should adhere to the ANSI/Infocomm 3M-2011 Projected Image System Contrast Ratio guidelines.

Where projection screens are to be installed in rooms with Lab benches or student PC workstations then sightlines to the projected images will be impaired. Details must be given to show what considerations have been made to allow sight lines for all positions, typically this would involve fixing the screen higher or installing multiple screens.

Displays or screens with interactivity

- Interactive Whiteboards – 1000mm from floor to bottom of board

- Interactive Display Screens – 1000mm from floor to bottom of screen bezel
- Non-Interactive Display Screens – 1300mm from floor to bottom of bezel

Note: Average seated head height is 1300mm, Average seated eye height is 1200mm

- Digital Signage Screens – 1400mm - 1800mm from floor to bottom of screen bezel

Note: Screen Size and Ceiling height will dictate final Digital Signage Screen position

All screens should be fixed using appropriate manufacturer recommended brackets and mounting points. Where a Display screen is to be mounted into a recess or alcove the bracket must allow the screen to pull out from the wall to allow cable access using a suitable articulated arm. Dimensions of any alcoves or recesses must be detailed so a screen of appropriate size can be specified.

All wall and ceiling mounting must satisfy the safety requirements of 'BS EN62368-1:2014. Audio/Video, information and communication technology equipment. Safety requirements'.

Cabling and containment

All new cabling must be CCA Rated or higher CPR class.

All cabling must be run in suitable containment, e.g. Circular Polypropylene Flexible Conduit.

It is not acceptable to share a cable conduit with Power or Data cabling.

Where three compartment shared trunking is used Power cabling, data cabling and AV cabling must run in separate compartments.

Where individual conduits are installed for AV cabling 40mm conduit is preferred. Two 25mm conduits for AV cabling are also acceptable. This is the minimum requirement, additional conduits maybe requested depending on the number of cables required for the installation.

Cables running in ceiling voids must be installed within suitable containment used for AV cabling only sufficient to meet all current Fire, Electrical and Health and Safety regulations.

For Example:

- Cables should be contained in 32mm Kopex, e.g. https://uk.rs-online.com/web/p/conduit/0623710/
- Fixed to the soffit/slab with Metal Tie wraps, plastic ties must not be used, e.g. Metal Tie Wraps https://uk.rs-online.com/web/p/cable-ties/1235035/
- The metal tie wraps must be looped through Flat hanger screws fixed with a nylon wall plug to the soffit/slab at no more than 1m intervals, e.g. https://www.gexpro.com/usg/Root-Category/Fasteners/Fixture-Hardware/Hangers%2C-Bolts/Screws---Flat-Hanger/Multiple-631-Flat-Hanger-Screw/p/523430

The containment must not be fixed to any existing Data cabling baskets or trays as this contravenes the ISS Networking Installation specifications.

This is in addition to cable basket required for Power and Data cabling.

The following cable installation practices are **not acceptable**:

- Sharing a basket with network cabling.
- Making joints with taping or other makeshift fastenings.
- Right angle junctions, where a junction box is not provided at the right angle.

Cable conduits will be required between but not limited to the following possible locations:

- Floor boxes and wall mounted equipment.

- Floor boxes and ceiling mounted equipment.
- Wall plates and wall mounted equipment.
- Wall plates and ceiling mounted equipment.
- Equipment racks and wall mounted equipment.
- Equipment racks and ceiling mounted equipment.

Wall mounted equipment examples include:

- Large format display screens.
- Ultrashort throw projectors/Interactive Whiteboards.
- Speakers.

Ceiling Mounted equipment examples include:

- Projectors.
- Ceiling mounted speakers.
- Ceiling mounted microphones.

RGBHV cabling is not permitted, any video signalling running over 10 metres should be achieved via Cat6 and convertors.

All audio signal cables over 3 metres must either be balanced cables or converted to CAT6.

Wall plates and pattresses

The instructions below may be subject to specific change to meet architectural design considerations.

Wall mounted inputs plates for presentation equipment, control pads and touch panels should be mounted 1100mm from floor to bottom of plate/bezel.

At any point where a cable exits the wall a suitable single or double gang pattress back box must be used to finish the exit hole properly.

If cables are terminating on an input plate the plate must be brushed metal, not white plastic.

If the cables are passing through then a white plastic face plate is acceptable. Wherever possible this should be hidden behind the equipment where the cable terminates.

There should be sufficient space in the back-box to prevent crushing or over-bending of cables.

Where a cable passes through a faceplate directly into a piece of equipment then white nylon woven mesh fabric, sized appropriately for the number and size of cables inside should be fitted, with the end tied off behind the faceplate. The exit from the faceplate must be rounded off or brushed to prevent cable damage.

It is not acceptable to have an empty faceplate panel, all pattress boxes must be correctly finished.

Floor boxes

Three compartment floor boxes must be used to allow Power, Data and AV cabling to be kept separate.

Floor boxes must be correctly installed so they sit flush with the flooring and the lid is able to close completely.

A minimum 85mm depth floor box should be used.

All cables entering the floor box must do so via the correctly punched out entry points marked on the box. The punch-outs must then be correctly finished with a grommet or other suitable finish to protect the cable from wearing on the metal edge.

The AV cable compartment should be finished with either a brushed entry plate for cables passing out of the floor box or a double gang faceplate with cable terminations.

When cables exit a floor box or wall plate at low level the cables must be braided with black nylon woven mesh fabric, sized appropriately for the number and size of cables inside.

There must also be a restraining wire of shorter length than the AV cabling attached to the wall, or floor and the AV cabinet to prevent damage to cables.

Power and data

Typical Power and Data requirements for AV equipment locations are listed below. These are subject to specific design requirement changes when stated.

Equipment Type	Power and Data socket requirements
All display screens	1 double power socket, 2 data sockets
All digital signage screens	1 double power socket, 1 data socket
All projector locations	1 double power socket, 1 data socket
Wall mounted speaker locations	1 single power socket
Electric raise/fall projection screen	1 single power socket
AV cabinet location (floor box or wall plate)	2 double power sockets, 6 data sockets
Wall mounted input plate location	1 double power socket, 2 data sockets
Wall mounted PoE clock	1 single data socket

Lighting

Room lighting should be designed so that no lights are positioned in the following locations:

- Directly above a projection screen or Display screen
- To obscure the projected light from the projector
- In front of a speaker

Attention must be given to sources of direct or reflected sunlight that will affect displays and projection screens. Where possible direct sunlight should not be able to fall onto projection screens and displays.

In rooms following the ISS Large Lecture Theatre specification it is desirable to have lighting control on the AV control system as well as from wall switches. Typically, the AV control system will recall a

preset from the lighting control system, therefore a connection from the AV rack or cabinet location is required to the lighting controller.

Acoustics

Consideration of the acoustic performance of the space must be detailed to ensure even sound distribution to all seating areas. This should include eliminating areas of poor coverage and the reduction of long reverberation times. Methods to control reverberation include acoustic panelling and soft furnishings.

The ambient noise level should be no more than 50db and the RT60 (reverberation time) should be less than 1 second. The minimum expected standard is BS8233.

Audio

Careful consideration should be given to speech intelligibility utlising the speech transmission index (STI) aiming for a 'good' rating of 0.6 where possible.

Amplified audio signals should be commissioned appropriately giving thought to gain structure, EQ and delays dependent on the space, to ensure a consistent audio experience without introducing feedback.

AV furniture

Design teams must follow the standard ISS room specifications for all teaching spaces in the project unless specified.

A 19U AV equipment rack is required for seminar rooms, lecture theatres and teaching labs equipment as well as bespoke spaces with AV equipment. An appropriate location must be assigned in the room to house the AV rack.

AV Racks must be housed inside a suitable cabinet or a teaching lectern. Standalone 19U racks are not permitted in teaching rooms.

The rack must be sized appropriately for the equipment to be installed as per manufacturers guidelines, taking particular attention of cooling requirements.

In racks where there will be user accessible equipment, such as PCs or Blu-ray players, care should be taken that only that equipment is visible to the user. All other equipment must be kept behind a locked cabinet door.

Cabinets and lecterns will be specified at the same time as the rest of the furniture to ensure consistency of colours and styles. Suitable examples of teaching space furniture can be found in the ISS teaching space specifications.

Racks and cabinets/lecterns must allow sufficient cooling of equipment via venting. Ventilation slots at the bottom and exhaust vents at the top.

Equipment security

All AV cabinets and lecterns must have a lockable front panel door. These must be keyed alike to existing installations on which ISS will advise.

Side and rear access panels must also be secured with suited keys.

Hex screws and other security bits are not permitted for access panels.

Display screens should be secured to the wall mounting bracket with a padlock if the bracket itself does not have a security feature or lock.

Projectors should be fitted with a sonic shock alarm or utilise a Security plate as part of its mounting option.

Flooring and hearing loops

All teaching spaces require a hearing loop, this may be a perimeter loop for a standalone room or more commonly a phased array loop system to prevent overspill into nearby rooms. The loop is a copper tape installed below the floor covering but above any metal raised flooring grid or concrete screed.

Where a hearing loop is required the tape must be laid prior to:

- Carpet tiles been laid.
- Any sealed floor covering been laid.

Rooms which require a hearing loop are outlined in the ISS Teaching Space specifications.

AV rooms

Where an AV room is specified as an equipment location then sufficient ventilation must be provided for the cooling of the equipment, especially projectors. This means extraction of hot air and supply of fresh/cold air into the room. This can be achieved either through natural convection and vents or mechanically with an air conditioning unit.

As specific projector models are determined after the design process projectors should not be assumed to be installed in an enclosed space that does not allow for sufficient cooling to the sides and rear of the projector. A minimum clearance of up to 50cm on all sides of a projector is required, see figure 1.
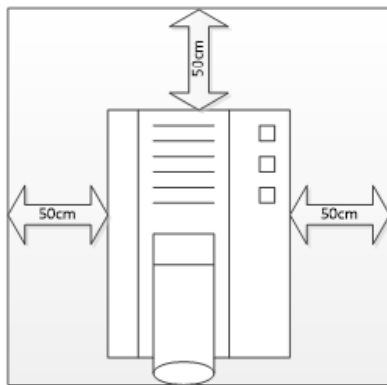
Figure 1. Top down view of projector in enclosed space with acceptable clearance on all sides.

Full Power and data requirements will be advised once the equipment has been specified.

Any equipment racks in AV rooms must be accessible at the rear and both sides to allow for maintenance and servicing. This can be achieved by allowing sufficient space around all sides of the equipment enclosure or allowing the rack to be pulled out from its enclosure.

Note that network comms rooms are not allowed to contain AV equipment and should not be considered for co-location.

Warranty and handover

Please ensure all electrical equipment is covered by a 5 year guarantee. You must provide details on whom the guarantee is provided by, either the OEM or installation contractor.

Once installation is completed the room must pass the sign-off procedure detailed in Appendix D. This ensures that LU staff have had the relevant training on using the system as well as having inspected all aspects of the installation including but not limited to:

- Control system
- Device connectivity and inputs
- Physical installation aspects such as cable labelling
- Supply of O&M documentation

As part of the sign-off procedure Lancaster University requires full as built schematics for audio, video and control cabling. The AMX Control code must also be handed over as well as a copy been left on the AMX Controller

Reference material

AETM Audio Visual Design Guidelines 2nd Edition.

BS 8590:2014 Code of practice for the installation of audio visual equipment.

BS EN62368-1:2014 Audio/Video, information and communication technology equipment. Safety requirements.

Avixa Certified Technology Specialist exam guide.

ANSI/Infocomm 2M-2010 Standard Guide for Audio Visual Systems Design and Coordination Processes.

ANSI/Infocomm 3M-2011 Projected Image System Contrast Ratio guidelines.