ES06 Fire Alarm

UNIVERSITY OF LEICESTER

Document Control

Rev	Date	By	Comments
G	Mar 20	J Thrupp	Update
H	Feb 21	UoL	Interface Updates
I	Sept 21	UoL	Void Clarification update
J	Sept 21	UoL	Life Cycle analysis Added
K	Oct 22	UoL	VADS and mounting locations information updated
L	Oct 24	UoL	Minor Alterations
M	April 24	UoL	Void detection clarification and other minors
N	May 24	UoL	Further void detection clarification

Design Guidance

1. The central alarm receiving centre (ARC) for all projects whether new development, full or part refurbishment shall be the University central campus security where all fire and fault activations shall report in the first instance. Signalling shall be via a dedicated network outlet for signalling only. The fully addressable fire alarm panel shall operate over the Drax network.
2. The fire alarm classification for all Academic buildings shall be to a minimum L2 classification and L1 for all Residential buildings.
    - The additional areas for L2 definition should include, as a minimum, the following areas such as kitchens, electrical distribution rooms, store areas if not fire resistant or where escape of smoke can occur, plantrooms, boiler rooms and similar high-risk areas.
3. Minimisation of nuisance alarms shall form an integral part of the design stage of any fire alarm system. Where specific areas present the risk of nuisance alarms, consideration shall be given to the use of specialist automatic detection methods. The specification of any such system shall be agreed with the University fire officer and maintenance team prior to specification.
4. It is the university's preference to operate a 1 out all out policy. No phased evacuation philosophy shall be adopted without consultation of the University fire officer during design stage.
5. Cause & Effect - Detailed design cause and effect schedules shall be provided by the designers (in accordance with the Building Safety Act) for University agreement, at the latest, at the end of RIBA stage 3 in order to assess the final fire strategy of the building including room and device reference addressing. Discussions regarding this schedule shall be initiated during RIBS Stage 2 to facilitate expectations with University relevant parties.
    - The designers shall be responsible for the coordination of the schedule between all parties including input from the fire alarm system installers (where the latter is not available pre-tender then the schedule shall be updated by the designers as soon as the fire alarm specialists are appointed).
    - The cause and effect shall include for all necessary interfaces and consider shutdowns and/or operation philosophy changes of the following as a minimum
    - The Cause-and-Effect schedule shall include the following items as a minimum and the necessary interfaces with the fire alarm system shall consider (a) interfaces on fire alarm test, (b) interfaces on fire alarm activation and (c) interfaces on reception fire mains panel overrides. All such below items will require an addressable interface with the fire alarm system to energise/de-energise as required by the Cause-and-Effect schedule matrix.
        i. Roof vents, smoke vents and window automatic openers where installed.
        ii. CHP engines
        iii. Boilers
        iv. Gas systems, Gas valves, Oil valves and Medem units
        v. Air handling systems (supply and extract) considering also fresh/recirculation operation. Required as British Standard 7273.
        vi. Small heat recovery AHUs (but not fully recirculatory devices such as fan coils, fan convectors, DX cassette units and similar

University of Leicester, University Road, Leicester, LE1 7RH
T. 0116 252 2522 **W**. http://www.le.ac.uk

vii. Small fresh air and exhaust air standalone systems
viii. Certain maglock and door interfaces. See access control design guide for further information
ix. AV systems in lecture theatres and large teaching spaces. The fire interface units shall disable all audio and visual presentations in these spaces such that any fire alarm audio or visual signals are correctly heard and seen by the occupants. Note that this must not impede any hard of hearing systems from repeating any of the fire alarm warnings.
x. Smoke dampers
xi. Safety Circuits
xii. BMS operations

6. Smoke detectors shall be provided in all supply AHU systems, including small heat recovery AHUs in the supply ductwork after the final AHU component.
7. Void Detection - The treatment of fire detection in ceiling voids shall be given careful consideration as detailed in the following clauses and as follows.
   - The University do not wish to un-necessarily install void detection where risk is shown to be low and this is explained in the following main paragraph.
   - If void detection is required it can be expensive to maintain and expensive to undertake compliance checks. The University therefore require void detection to be analysed on a whole life cost basis taking into consideration the capital installation cost and the life cycle maintenance and compliance costs.
   - The fire alarm designers will therefore be required to analyse the requirements of void detection and in all instances, where this is extensive requiring several detectors, look at the possible cost benefits of an alternative Aspirating solution(s). This analysis work shall be undertaken at RIBA stage 3 latest and the options presented to the University who will then give guidance as to which type of system to include for tender issue.
   - Wherever possible detectors shall be of the self-test type (also to be used in other locations where maintenance access is difficult or restricted).
8. The treatment of ceiling voids above 800mm deep should be in accordance with BS5839:1 and the following. The University would normally expect to see void detection determined to this British Standard and as follows:-
   - All voids over 800mm should normally have void detection, however in a limited number of cases detection may omitted based on a risk assessment of the space, for instance - sterile space, containing only pipework and/or cables/containment/lighting, fire-resisting construction. (BS5839-1 sec 22.2 note 4)
   - If the system category is such that automatic fire detection should be provided in any area that contains a horizontal void of 800 mm or more in height, automatic fire detection should also be provided in the void.
   - Void detection shall be included within all voids over 800mm above escape routes.
   - Void detection shall be included within all voids over 800mm above rooms adjacent to escape routes where such rooms do not have a fire resisting construction to the escape route and the voids.
   - Void detection shall be included within all voids above 800mm containing fan coils, heat recovery units, motors, other sources of combustion (consideration should be given to max clear space requirements when selecting detection system).
   - Combustion risks generally will not include
     i. lighting fittings and their integral controls
     ii. interface units
     iii. power supplies including batteries
     iv. controls, controls detectors and actuators
     v. Wi-Fi access points
     vi. pipework, ductwork, containment and cabling
     vii. Solenoid valves
   - In voids above 800mm detection shall not be installed un-necessarily where the risk is identified as being low.

University of Leicester, University Road, Leicester, LE1 7RH
T. 0116 252 2522 **W**. http://www.le.ac.uk

- In voids above 800mm where a large number of detectors would be required due to beams and other obstructions then other detection systems should be considered such as Self-Test detection or Aspirating (FAAST/VESDA) units.

9. The treatment of ceiling voids below 800mm deep should be in accordance with BS5839:1 and the following. The University would normally expect to see void detection determined to this British Standard and as follows. Detection in voids less than 800mm shall be risk assessed and discussed with the UoL Asset Manager, UoL Project Engineer, Fire System designer and the UoL Fire Officer.

    - Some voids below 800mm should have void detection, however in limited cases detection may omitted based on a risk assessment of the space, for instance - sterile space, containing only pipework and/or cables/containment/lighting, fire-resisting construction. (BS5839-1 sec 22.2 note 4).

    - Detection in voids below 800mm will be required where the void is such that extensive spread of fire or smoke, particularly between rooms and compartments, can take place before detection; or on the basis of a fire risk assessment, the fire risk in the void is such as to warrant protection of the void.
    - Void detection shall be included within all voids below 800mm above escape routes unless these are sterile spaces such that no ignition sources are present and they only contain pipework, cables. containment and lighting.
    - Void detection shall be included within all voids below 800mm above rooms adjacent to escape routes where such rooms do not have a fire resisting construction to the escape route unless the voids are sterile spaces such that no ignition sources are present and they only contain pipework, cables, containment and lighting.
    - Void detection shall be included within all voids below 800mm containing fan coils, heat recovery units, motors, other sources of combustion (consideration should be given to max clear space requirements when selecting detection system). Where this is the case local detection shall be included within the void adjacent to the fire risk source only.
    - Combustion risks generally will not include
        i. lighting fittings and their integral controls
        ii. interface units
        iii. power supplies including batteries
        iv. controls, controls detectors and actuators
        v. WIFI access points
        vi. pipework, ductwork, containment and cabling
        vii. Solenoid valves
    - Detection is not needed in all other voids below 800mm above other rooms, not included in the above, where the voids are without any significant sources of combustion, i.e. containing only pipework and/or cables/containment/lighting.
    - Void detection shall not be installed in voids below 800mm un-necessarily where the risk is identified as being low.
    - In voids below 800mm where a large number of detectors would be required due to beams and other obstructions then other detection systems should be considered such as Self-Test detection or Aspirating (FAAST/VESDA) units.
10. Fire alarm audibility shall be achieved using a voice enunciated system for all new developments. PA/VA shall not be implemented for this purpose and refurbishment projects shall be discussed with the university estates fire officer to decide whether the extent of refurbishment warrants a full replacement of voice annunciation or whether traditional sounders shall be utilised. Buildings shall not be left with a mix of system audibility types.
11. Electromagnetic door hold open devices shall be installed to all circulation routes where doors do not open directly into a protected stairwell or refuge area. Door sensor alarms shall be installed to all residential kitchen doors to prevent from being left open.
12. Multifunctional devices shall be used in all cases where sound/ speech & strobe functions are required in lieu of separate devices.

University of Leicester, University Road, Leicester, LE1 7RH
T. 0116 252 2522 **W**. http://www.le.ac.uk

13. All university fire alarm panels shall be linked via the Drax AMX network, preferably hard wired and at least dual path with signal redundancy, currently provided around campus. Allowance shall be made in all system designs to network the Fire alarm control panels via the SMaRT Watch and SMaRT Cube interfaces via RS232 port connections. Where required allowance shall be made to provide RS232 ports to existing panels to enable network management of the system being modified.
    - Any power supplies for the interlinks and signalling shall have a stand-alone UPS backup providing at least as much time standby as for the fire alarm system itself.
    - If the backup power supplies fail, they shall automatically provide an alarm.
14. Visual Alarm Devices (VAD's) shall be provided in all areas where it is deemed that a person may be alone within the building.
    - This shall include as a minimum all WC's, changing and shower facilities.
    - All rooms denoted as occupancy of three persons or below.
    - All lecture theatres, seminar rooms and teaching spaces.
    - In any rooms which are being provided with Audio Visual facilities.
    - Also, in line with the limited number of University of Leicester Generic Room Data Sheet if these are stated as being required.
    - VAD installed density, floor area per beacon, must be within manufacturers installation data specifications.
    - The VAD devices must be installed full in accordance with the manufacturer's requirements and recommendations. Wall devices must only be installed on walls and ceiling devices must only be installed on ceilings. They must be installed in accordance with the manufacturer's installation certification.
    - The VAD cabling must also be installed fully in accordance with the manufacturer's installation certification and recommendations. Wall mounted devices must be connected bottom entry only.
15. Fire alarm interface devices shall be provided to all systems as described earlier within this document.
    - Where provided a key isolation 'test facility' shall be provided adjacent to the panel capable of isolating some devices from the general fire alarm periodic testing to minimise disruption to the building and occupants.
    - All interface devices shall have an easily readable site label detailing what the device does and the system it interlinks to. Text in plain simple English wording.
    - Multi-channel interface devices shall have such plain wording for each such channel. Interfaces shall be suitable for mains switching and of the correct ratings.
    - The Cause-and-Effect schedule shall include the previously noted items as a minimum and the necessary interfaces with the fire alarm system shall consider (a) interfaces on fire alarm test, (b) interfaces on fire alarm activation and (c) interfaces on reception fire mains panel overrides. All such below items will require an addressable interface with the fire alarm system to energise/de-energise as required by the Cause-and-Effect schedule matrix.
16. Detectors shall normally be of the optical heat type unless in special circumstances heat detectors are required to reduce unwarranted alarms.
    - Wherever possible void detectors shall be of the self-test type.
17. Refuge alarm systems must not form part of the combined WC toilet alarm system. These systems shall remain independent and monitored from the secure lobby and building reception respectively.
    - See the details within the separate design guide for Refuge Systems.
18. Spare capacity for future extension or alterations
    - All containment for any loop wiring shall have a minimum 20% spare capacity for additional cables.
    - The loops themselves shall have spare capacity for an additional 20% devices on any individual loop.
    - The loops themselves shall have spare capacity for a 20% length extension
    - The lops themselves shall have 20% spare capacity for additional current draw
    - The panels and any cards shall have 20% spare capacity for 2 additional cards and/or loops
19. All general circuit wiring **must** be routed and contained within the floor area served by the respective circuit.
20. A document holder shall be provided for the fire brigade building documents. This to be a bright red "Leicestershire Fire brigade" A3 wall mounted, lockable holder. This to contain

University of Leicester, University Road, Leicester, LE1 7RH
T. 0116 252 2522 **W**. http://www.le.ac.uk

- Contact details of accountable persons.
- As built building plans showing all fire related equipment.
- Fire zones.
- Cause and effect schedule.

21. A wall mounted building zone chart shall be provided alongside the main fire alarm panel in a glazed fixed frame. It shall be a minimum A3 size. All to be clearly coloured and easily read.

Design Components

Item	Manufacturer	Comments

University of Leicester, University Road, Leicester, LE1 7RH
T. 0116 252 2522 **W**. http://www.le.ac.uk

Panels	Gent Vigilon	All main fire alarm indicator panels and system devices shall be truly 'open/managed protocol' and shall include the provision of unlimited future software access and manufacturer support updates for specific use on UOL campus. Panels shall be modular in construction and allow for future expansion. RS232 interface card to be provided for off-site DRAX network monitoring. Control and indicating equipment shall be microprocessor based and operate under a multi-tasking software program. Operating programs and configuration data must be contained in easily up-dateable non-volatile memory. (EEPROM) It shall be possible for the engineer to perform configuration upgrades on site using the control panel or a handheld programmer. Necessary programming equipment and connection leads shall be provided at handover for the specific system specified. No more than 200 addressable input or output points shall be controlled by a single loop card. Main fire alarm indicating equipment shall be capable of indicating the following as a minimum: • Networkable • 1-6 loops • 32 zone minimum • Where there are more than 32 zones or where zones form part of a network system a mimic panel must be fitted at the main fir panel. • Power AC healthy • Common fire/ fault • System/ CPU fault • Charger & Battery supply fault • 8 line 40-character alpha numeric display of Fire condition and location. • Minimum 30-character label per device • An interface unit for connection to a central receiving station with clean contact changeovers. A blue key switch should be utilised for isolation of Fire links to Security Control. This key switch control may also be used for local over-ride to key elements of plant within the respective building for testing purposes. Key to be captive with indicator to prevent inadvertently leaving in the isolated position and shall be clearly engraved. Repeat panels must be of a functional types.

University of Leicester, University Road, Leicester, LE1 7RH
T. 0116 252 2522 **W**. http://www.le.ac.uk

Devices / Equipment	Gent Vigilon S-Quad	All devices must be truly 'open/ managed protocol'. Void detectors are to be self-test type S4T Series (also to be used where maintenance access is difficult or restricted) Solutions for High sensitivity areas shall include provision for an air aspiration system. Other detection types may be considered via approval. Particular care shall be taken to select appropriate devices for harsh environments – i.e. Cold Rooms. Carbon Monoxide detecting devices shall be utilised for all areas where CO may be present such as adjacent to domestic boilers or within bio solid fuel storage bins.

University of Leicester, University Road, Leicester, LE1 7RH
T. 0116 252 2522 **W**. http://www.le.ac.uk

Fire Alarm Interface Operations		Door access devices shall all fail open unless the security requirements of the building dictates otherwise through consultation with the estates/ security department. All fire door holders shall release. All plant to be auto resetting after a fire condition and lifts shall be supplied with multichannel interfaces for alternative destination control should the fire detection be at ground floor level. The cause and effect shall include for all necessary interfaces and consider shutdowns and/or operation philosophy of operation of the following as a minimum • Roof vents, smoke vents and window automatic openers where installed. • CHP engines • Boilers • Gas systems, Gas valves, Oil valves and Medem units • Air handling systems (supply and extract) considering also fresh/recirculation operation. Required as British Standard 7273. • Small heat recovery AHUs (but not fully recirculatory devices such as fan coils, fan convectors, DX cassette units and similar • Small fresh air and exhaust air standalone systems • Certain maglock and door interfaces. See access control design guide for further information • AV systems in lecture theatres and large teaching spaces. The fire interface units shall disable all audio and visual presentations in these spaces such that any fire alarm audio or visual signals are correctly heard and seen by the occupants. Note that this must not impede any hard of hearing systems from repeating any of the fire alarm warnings. • Smoke dampers • Safety Circuits • BMS operations The mechanical control panel shall receive a series of fire alarm condition notifications via volt free contacts to indicate the zone in which the fire condition has been activated. The mechanical control panel shall correlate the fire alarm zone activation to the AHU/ chilled water circuit and shutdown the respective mechanical services ONLY within the area of alarm. Incoming services such as gas shall be shut down upon full activation of a fire alarm condition.

University of Leicester, University Road, Leicester, LE1 7RH
T. 0116 252 2522 **W**. http://www.le.ac.uk

Sounder devices		The University of Leicester preference shall be to use loop powered sounders throughout the installation. Speech enunciated evacuation shall be implemented. Sounder devices shall be fully adjustable from 0-110dB. Where required to meet building regulations Pt M or to supplement sounder levels in areas with high ambient noise, VAD's shall be provided integral to the sounder device and shall be of the LED type.
Electromagnetic door hold open devices	Briton 996	Mounting application and finish to be discussed with the project team and agreed at design stage. Hold open devices shall not be used to doors directly onto the primary escape staircases.
Aspiration systems	Gent FAAST Vesda Compact	Air sampling fire sensing systems shall be employed in areas difficult to access, exceed recommended working height for conventional detectors and high-risk areas. Typical areas where air sampling systems shall be included are: • Atria spaces • Lift shafts • Primary Server rooms
Wiring System	Prysmian Cables (Formally Pirelli cables) i.e. FP 200 Gold or FP Plus	Red sheath (may require to be screened in mini trunking/ conduit in surface applications). Where rising or inverted cables are installed, these shall be secured by metallic fixings (no non metallic shall be used) tie wraps. Fire resisting cable to be tested to CWZ standards.

Framework Contractors

Service	Specialist	Address & Contact Details
Honeywell Gent	Gent 24 Approved Systems Integrator	https://www.gent.co.uk/gent24/locator/

University of Leicester, University Road, Leicester, LE1 7RH
T. 0116 252 2522 **W**. http://www.le.ac.uk