UCL Fire Technical Note - TN055

**FIRE ALARM SYSTEMS - UCL GENERAL INSTALLATION DESIGN GUIDANCE & EMPLOYERS REQUIREMENTS**

(Student Halls of Residences & Sleeping Accommodation)

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**UCL Fire Alarm Standards & Specific Employers Requirements (ERs) for Projects - what you need to know:**

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<td><strong>Mandatory</strong></td>
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<td><strong>Standard</strong></td>
<td>All fire alarm systems in UCL premises shall be designed, installed and maintained to comply with the latest edition of BS 5839-1 &amp; BS5839 series.</td>
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<tr>
<td><strong>Protocol</strong></td>
<td>UCL fire alarm systems and devices shall use ‘OPEN APOLLO’ protocol only, (unless the existing system is not compatible) with standard equipment to ensure communality of systems, efficiency of maintenance and control of software access. No other fire alarm panels or systems will be acceptable unless written permission.</td>
</tr>
<tr>
<td><strong>The Client</strong></td>
<td>UCL as the Client strives to improve its standards and requires only fire alarm system designers, installers and maintenance companies that can demonstrate BAFE SP203 or LPC1014 with ISO9001 Quality Management System compliance or equivalent to undertake works on UCL fire alarm systems.</td>
</tr>
<tr>
<td><strong>Unwanted Fire Alarms</strong></td>
<td>Designers of fire alarm systems shall take considerable care to ensure that their fire alarm design reduces unwanted fire alarms through thoughtful understanding of room/space function, where the detection is provided, to avoid unwanted activation as far as reasonably practicable.</td>
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<tr>
<td><strong>Prohibited</strong></td>
<td>The introduction by design or use of ‘closed or managed’ fire alarm systems in premises under the control of UCL.</td>
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<td><strong>Loop Capacity</strong></td>
<td>As a general rule designers shall ensure the numbers of devices provided on loops gives approx. 20% spare capacity (e.g. 126 devices - 20% = 105 devices) allowing for future changes or alterations to the system.</td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td>The raising of the alarm and warning to occupants in case of fire is a legal requirement. The addition of Automatic Fire Detection (AFD) is a requirement of higher risk sleeping accommodation to ensure a quick response of sleeping occupants in the event of fire and to protect others in the event of fire. Increased AFD provision also increases the number of unwanted alarms from not only cooking but also hair and other products. UCL have introduced design measures to minimise unwanted alarms in its residential accommodation.</td>
</tr>
<tr>
<td><strong>Life Category L2 Coverage</strong></td>
<td>AFD to Life Category L2 standard shall be provided for Sleeping Accommodation, as a minimum in all cases.</td>
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<td><strong>Contingency Funds</strong></td>
<td>Project Managers / Consultants / Principal Contractors must ensure that contingency funds from the project are available at pre-contract, to provide &amp; install addition sounders at commissioning, should the sound pressure coverage fall below acceptable levels any particular area.</td>
</tr>
<tr>
<td><strong>UCL Fire Safety Manager</strong></td>
<td>Should be consulted with any design query in the first instance who will consult further, as required.</td>
</tr>
</tbody>
</table>
1.0. Fire Alarm Panels

1.1. UCL fire alarm panels must be capable and compatible of using and switching between all modes of Apollo Discovery multi-sensing detectors, using alarm confirmation facilities to meet UCL student residence fire alarm strategy.

1.2. In addition, have peer-to-peer networking and IP gateway facilities.

1.3. **UCL Fire Alarm Panel Provision** - the following manufacturer’s fire alarm panels shall be used in UCL Student Residences:

   1. Advanced Electronic Ltd (see: www.advancedco.com);

2.0. Smoke Detection - General Requirements

2.1. Other Related Technical Notes for Student Halls of Residence fire alarms:

   (a). UCL Student Halls of Residence fire safety design and refurbishment strategy can be found at **TN050**;

   (b). UCL student halls of residence fire detection and alarm system commission of software Cause & Effect (C&E) can be found at **TN055a**;

   (c). Specification for smoke alarms in UCL owned domestic flats, apartments, dwellings and similar accommodation can be found at **TN055b**;
2.2. **Fire Detection** - residential and sleeping accommodation shall be designed to meet BS5839-1 with Life Risk 2 (L2) provision of Automatic Fire Detection.

2.3. **Multi-Sensing (Apollo Discovery) Heads** - detectors are to be programmed on installation for operations at **MODE 4** (‘student setting’):

(a). for all bedrooms (except Studio Flats);

(b). cluster flat **corridors** outside kitchens shower rooms that may be effected by cooking products from kitchens or steam from showers etc.

(c). multi-sensing heads have five settings (guidance only check the latest specification by Apollo for accuracy before instructing):

- **Mode 1** - multi-sensing using both heat & smoke monitoring and reacting at around 1% obscuration of the optical head and any temperature changes of more than 15°C;

- **Mode 2** - optical sensing setting only (no heat sensing), reacting at around 2% obscuration of the optical head;

- **Mode 3** - multi-sensing using both heat & smoke monitoring and reacting at around 2% obscuration of the optical head and any changes of temperature of more than 21°C;

- **Mode 4** - least sensitive setting using both heat & smoke monitoring and reacting at around 4% obscuration of the optical head and any changes of more than 15°C - use this setting in all **BEDROOMS** and peripheral i.e. outside kitchens & Shower areas;

- **Mode 5** - heat sensing setting only;

3.0. **Halls of Residence Fire Alarm Design Principle**

3.1. **Commentary** - given the prominence of unwanted fire alarms in halls of residence and in view of London Fire Brigade’s policy of charging for attendance, the configuration of each fire alarm in halls of residence will be subject to initial detection will warn local occupants in bedrooms with general safeguards. Local warning just within a bedroom or within every room in the surrounding corridor shall be decided on a case-by-case basis. Control and indicating equipment that supports such flexible configurations shall be procured, as set out below.

3.2. **Unwanted Alarm & Design Principles** - the general design principle shall be:

(a). smoke detector activation in a bedroom will trigger the sounder in the **room only** (or each room within that particular corridor - subject to risk assessment based on building construction) to act as a local room waming (similar to Domestic BS 5839-6: Smoke Alarms);
(b). Room AFD activation will initially generate a pre-fire alarm signal and warning at the master panel, but not a global fire alarm activation or occupant evacuation, **unless**:

1. the room sensor detects increasing heat gain &/or smoke obscuration;

2. a second or heat detector activates;

3. a Manual Call Point (MCP) is activated.

(c). Fire alarm panel is to self-cancel fire pre-alarm in room or rooms off that corridor (subject to site-specific configuration), if the condition **does not progress into full fire activation mode** automatically, after suitable time out delay of approximately five (5) minutes.

(d). **Cause & Effect of AFD** shall employ the following principals:

1. Heat detector (either RofR or fixed type) on activation - **then immediate full evacuation of occupants initiated**;

2. Smoke detectors located in corridors or stair enclosures forming part of the Means of Escape on activation - **then immediate full evacuation of occupants initiated**;

3. Apollo Discovery multi-sensing smoke detectors installed in **student bedrooms** on activation, will be programmed in **local alarm mode** as follows:
   
   (i). on activation within a bedroom shall:
      - initiate pre-alarm signal on master panel;
      - initiate warning sounder;
      - if **no change in ambient conditions** after approximately five (5) minutes, the fire alarm system shall reset automatically and silence room sounder;

   (ii). **any change of room conditions** such as increasing levels of obscuration or heat being detected - **then immediate full fire evacuation of occupants initiated**;

   (iii). a second detector or Manual Call Point (MCP) is activated - **then immediate full fire evacuation of occupants initiated**;

(4). activation of multi-sensing smoke detector in Cluster Flat corridor - **then immediate full fire evacuation of occupants initiated**;
3.3. **Studio Flats - Design Principals:**

(a). **Studio Flats** - due to unwanted alarm issues will be provided with smoke detection and control unit to comply BS5839-6 (see UCL Fire Safety Technical Note TN055b);

(b). provide ‘rate of rise’ heat detector complete with sounder in all studio flats positioned at approximately 500mm in from the entrance door;

4.0. **Manual Call Points (MCP)**

4.1. **Cluster Flats** - manual call points to be provided so no occupant travels more than 15m to activate a call point in an emergency, locate as follows:

(a). **Cluster Flats** (grouped along a secondary corridor) containing six rooms with kitchen unit with access onto a main corridor - provide a MCP on the flat exit to main corridor.

(b). **Cluster Flats** (grouped along a main corridor) containing six rooms with kitchen unit - provide a MCP where cluster flat groups stop and a new cluster group starts, at no more than 15m distance between units.

4.2. **Studio Flats** - position additional MCPs so that studio flat occupants travel no more than 15m in any direction to operate a unit.

4.3. **Elsewhere** - at final exits and landings as per BS5839-1.

4.4. **Anti-Tamper security covers** - in student halls circulation spaces, common rooms, bars of UCL Student’s Union occupancy and vulnerable places, ‘Anti-Tamper’ security covers are to be fitted to each call points:

• I.e. Apollo - transparent hinged Cover (Apollo Ref: 26729-152);

5.0. **Sound Pressure Requirements & Visual Alarms Devices**

5.1. **Sleeping Accommodation** - loop driven ‘Intelligent’ sounders compatible with Apollo protocol and detectors are to be used to ensure devices can be programmed as per UCL Residences unwanted fire alarm strategy.

5.2. **General Note on Sound Levels (Sleeping Accommodation)** - UCL require an average sound pressure level in all areas of **85 dB(A)** (not 75 dB(A) as specified in the BS 5839-1), particularly at the bed head. Where sound pressure levels fall below this standard, additional sounders **MUST** be installed or other means used, to raise the sound pressure levels.

**Note** - Design teams and Principal Contractors to ensure that contingency funds from the project are available for additional sounders to be installed at commissioning, should the sound pressure coverage fall below acceptable levels any particular area. Where sound levels fall below this standard, additional sounders **MUST** be installed to raise the sound levels.
5.3. **Visual Alarms Devices (VADs)** - meeting BSEN 54-23 to be provided in the following locations:

(a). **Disabled Refuges** - where disabled or hearing impaired persons may use facilities such as WC's and in Disabled Refuges to allow communications with others by users;

(b). **Find the Panel** - to identify and locate the main fire alarm panel particularly in property with identical frontage, or where the panel location is not obvious or in the normal location of the main entrance area.

(c). UCL will not accept blanket coverage of a building with supplementary visual alarms (LED) as per guidance in BS 5839-1.

6.0. **Disabled Refuges / Alarms & Hearing Impaired People Facilities**

6.1. UCL has a specific policy and procedures for accommodating people with disabilities - please discuss with **UCL Fire Safety Manager** prior to design.

6.2. **Disabled Refuge Communications** - disabled refuges require a means of communicating so ensure that person using the disabled can communicate their presence and location in an emergency. Generally, there are two methods of providing this communication:

(a) **Telephone** (preferred option) - provide a standard UCL data telephone connection (configured for internal use only) within the disabled refuge, and install a **BT Big Button 1100** (for wall mounting) handset. UCL Fire Safety will free issue information in a clip frame adjacent to the handset with relevant internal 24/7 with full (for mobile use) contact numbers and exact location to assist user / helpers.

(b). **Disabled Refuge Communication System** - unless specifically agreed with UCL Fire Safety Manager do not use systems complying with BS5839-9, as UCL has found systems to be problematical, because:

1. ongoing maintenance costs and reliability;

2. Often no person at the communication master panel / reception point to communicate with refuge occupants - causing stress to users;

3. Often abused and interfered causing alarms and faults on system.

(c). **Other Considerations** - do not provide sounders close to or within refuge so that occupants can communicate with reduced background alarm.
6.3. **Deaf Messaging Service (DMS)** - UCL uses a DMS system connected to the fire alarm for hearing-impaired persons with further details through [www.alarmscom.co.uk](http://www.alarmscom.co.uk) - please see [www.ucl.ac.uk/fire UCL Fire Safety Technical Note TN007](http://www.ucl.ac.uk/fire UCL Fire Safety Technical Note TN007).

6.4. **Disabled WC Alarms** - disabled toilet alarms should be **Timeguard Emergency Assist Alarms** with a connection through the Gallagher Security system to signal back 24/7 to the UCL Security Control Room. See further detail from UCL Access Systems Manager:


### 7.0. Electrical Supplies & Batteries

7.1. **Main Electrical SUPPLY to Fire Alarm Panels** - require a dedicated 240v supply using fire resistant cable and terminated into a double pole, isolating spur with key switch as defined in BS 5839-1.

7.2. **Main Electrical ISOLATION to Fire Alarm Panels** - means should be provided for double pole isolation of the mains supply to all parts of the system.

7.3. UCL requires a ‘**Fire Safety Isolator Switch**’ (available from [www.firesafe.co.uk](http://www.firesafe.co.uk)) to be provided which is a secure method for safely isolating the mains voltage supply to fire systems in accordance with BS 5839-1.

- To be suitably sited, near the equipment served without the need for access to remote parts of the building;
- The 'Fire Safety Isolation' switch can only be isolated by an authorised person, by means of a keylock switch - the key is removable in both ON/OFF positions;
- The fuse cannot be removed without taking the cover off & when in the off position the FUSE is disconnected from the supply;
- A neon indicator is provided to indicate mains present at the switched output;

- **Technical Specification:**
  - **Working Voltage**: 240AV
  - **Switch Contact Rating**: Double Pole - 240V AC 4Amp
  - **FUSE Rating**: Max - 6A Fast (20mm) supplied
  - **Switch Surge Rating**: 80Amp
  - **Key Number**: 901
7.4. **24 Volt Equipment** - UCL requires all auxiliary equipment interfaced with the fire alarm system such as door hold open magnets, Fire Alarm Do Not Enter (FADE) Signs etc. to be 24v volt.

8.0. **Fire Resistant Cabling**

8.1. All cables shall be coloured **red**, unless there is overriding aesthetic reasons for White to be used.

8.2. Special attention is to be paid to the terminating of cables to ensure that earth faults are eliminated.

8.3. The following cables should be used in all instances:

(a). **FP 200 Gold**, equal or approved;

(b). **MICC cabling** is required where routes provide mission critical signals or pass through a high risk or vulnerable areas (as per BS 5839-1);

8.4. **Fixing** - all fire alarm cabling is to be fixed to the structure, cable trays or cable management system using metal ties. **No other fixing is acceptable.**

9.0. **Marking and Indicating of Fire Alarm Devices**

9.1. **Labelling** - all fire alarm devices are to be permanently marked or by using suitable adhesive labels, to indicate the device Zone and Address number.

9.2. **Identification** - where remote or hidden detectors / devices are placed in voids, ducts or above ceilings then a suitable **LED repeater indicator** is to be provided in a logical and adjacent location.

- All **LED indicators** are to be clearly marked specifying type of device, address number and remote device location.

10.0. **Door Hold Open, Fire Dampers & Other Automatically Released Equipment**

10.1. These items should adhere to the terms of latest edition of BS 5839-3. It should be noted that:

- 'door holders' are generally not acceptable on any fire door that leads directly onto a stair enclosure;

- sleeping accommodation doors hold open devices, are to be programmed to release and close at night;
10.2. **Door Release Switches** - electromagnetic door release switches are to be positioned in a clear and accessible location, to prevent damage to fixings by doors being pulled close against the magnetic holders.

11.0. **Access Control Devices Connected To Fire Alarm Systems**

11.1. Where security Access Control Systems are to be installed in a building, it will be necessary to interface with the fire alarm system to meet UCL, local fire and District surveyor requirements. See UCL Fire Safety Technical Note TN001 & TN005 for specific requirements.

12.0. ** Provision of Audible & Visual Warning at Internal Building Boundaries Connected to the Fire Alarm System**

12.1. Where the Means of Escape (MoE) routes access and egress passes through a building boundary, it is necessary to provide Visual and Audible Warning signs connected to the fire alarm systems and it will be necessary to interface with the fire alarm system to meet UCL, local fire, and District Surveyor Authority requirements. See UCL fire safety technical note TN058.

13.0. **Mechanical & Electrical, Air Handling & Smoke Control Equipment Interfaces**

13.1. Where mechanical & electrical systems and smoke control measures are provided and connected to the fire alarm system, please see UCL Fire Safety Technical Notes TN 038 & TN039 for general requirements.

14.0. **Cause & Effect Matrix Fire Alarm System**

14.1. Designers are to provide a cause and effect chart for all new systems - see UCL Fire Safety Technical Note TN063.

15.0. **Fire Brigade Communications**

15.1. UCL fire alarm panels shall alert the fire brigade via the UCL Security Control Room (24/7) using the Gallagher Security System via UCL Data system network wherever possible, by providing:

   (a). a ‘Fire Signal’ generated at the fire panel;
   (b). a Fault signal generated at the fire panel;

15.2. **Monitoring Centre** - the signals are to terminate at the UCL Security Control Room on the Gower Street Campus, which acts as a 24-hour monitoring service for the UCL estate.
(a). The UCL Security Control Room Manager can be contacted on 020 7679 3333 and should be consulted on all signals required to be monitored by the Security Control Room, including Disabled WC alarms / security / lift / plant as well as fire alarm signals.

(b). Data connections can be arranged through the UCL Information Systems Division (ISD) Network Group.

15.3. **Alarm Receiving Company (ARC)** - in some locations, a specialist ARC may be required, which should be arranged through our fire alarm maintenance provider and **Southern Monitoring Services Ltd**.

- A BT Redcare line and Digital Communications (Digicom) device will also be required. Requirements and procedures will need to be discussed with the UCL Fire Safety Manager at the outset of the project.

### 16.0. System Commissioning Requirements

16.1. **Fire Alarm System Commissioning Engineers** - in all cases the UCL Fire Alarm Maintenance provider (**Fisk Fire Protection Ltd**) shall be employed to commission / test all UCL fire alarm system changes whether new, alterations or modification projects.

#### Design, Installation Commissioning and UCL Acceptance Certificates:

16.2. The provision of the appropriate design, installation and commissioning certificates containing information based on the ‘Model Certificates’ provided in BS 5839-1: Annex H, is to be provided by the appropriate parties. Copies of the certificates are to be issued as following:

(a). All original certificate(s) to be placed in the Operational & Maintenance (O&M) Manuals;

(b). a copy of each certificate to be issued to the Fire Alarm Maintenance Contract Manager (UCL EM&I);

(c). a copy of each certificate to be issued the UCL Fire Safety Manager for building’s fire certificate and fire strategy documents;

(d). any additional copies required by an authorised person;

16.3. **Design Certificate** - is to be provided in all cases by the **Design Consultant** on completion of the design stage of the fire alarm.

16.4. **Installation Certificate** - is to be provided in all cases by the **Contractor** installing the fire alarm system, on completion of the installation stage.

16.5. **Commissioning Certificate** - is to be provided in all cases by **Commissioning Engineers** (generally UCL Fire Alarm Maintenance provider) on completion of the testing & commissioning stage of the fire alarm.
16.6. **Acceptance Certificate (UCL)** - this is to be completed and issued by Project / Design Consultant; and witnessed by a **Nominated UCL Person** on behalf of the Director of UCL Estates.

16.7. Only on completion of the ‘Acceptance Certificate’ witnessed by a UCL Nominated Person may:

   (a). a new system, become the primary ‘Warning in Case of Fire’ for the building.

   (b). where the fire alarm system has been replaced / upgraded etc may the old system be switched off and decommissioned. The new system may then become the primary ‘Warning in Case of Fire’ for the building.

16.8. **Addressing of Fire Device Locations** - the programming of the device address must be carefully considered to ensure that its location matches the local, generic or room numbers to prevent confusion by staff, contractors or the Fire Brigade in locating the device.

16.9. **Drawing and Zone Chart** - zone chart information is to be supplied as part of the commissioning of the fire alarm system as follows:

   (a). Clear fire alarm zone information in ‘A4 Word’ format, is to be provided in a suitable ‘clip frame’ position adjacent to the fire alarm panel. This is to provide quick reference to incident location.

   (b). ‘As Installed’ Drawings are to be provided on hard copy A1 sheets and in electronic AutoCAD 2007+ Version format scale of 1:50, 1:100 or 1:200 as appropriate.
### 17.0. Quick Overview

17.1. General equipment overview required by UCL for new and existing fire alarm systems on upgrading refurbishment etc (where practical):

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<th>Items / Devices</th>
<th>Details</th>
<th>Protocols &amp; Remarks</th>
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<td>Fire Panels</td>
<td>Advance Only</td>
<td>Open Protocol / Apollo / Addressable</td>
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<td>Manual Call Points</td>
<td>Apollo</td>
<td>Open Protocol / Apollo / Addressable</td>
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<tr>
<td>Smoke Detectors</td>
<td>Apollo Range - Type to Suite</td>
<td>Open Protocol / Apollo / Addressable</td>
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<tr>
<td>Heat Detectors</td>
<td>Apollo Range - Type to Suite</td>
<td>Open Protocol / Apollo / Addressable</td>
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<tr>
<td>Multi-Sensing Detectors</td>
<td>Apollo Discovery Range</td>
<td>Open Protocol / Apollo / Addressable</td>
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<tr>
<td>Sounders</td>
<td>Apollo - Type to Suite</td>
<td>Open Protocol / Addressable</td>
</tr>
<tr>
<td>Voice Sounders</td>
<td>Vimpex ‘Firecryer’</td>
<td>Open Protocol / Addressable</td>
</tr>
<tr>
<td>Beam Detectors</td>
<td>Open Area Smoke Imaging Detection (OSID) by xtralis</td>
<td>Open Protocol / Addressable (<a href="http://www.xtralis.com">www.xtralis.com</a>)</td>
</tr>
<tr>
<td>Building Interface</td>
<td>Philip Payne 2784 Range</td>
<td>‘Fire Alarm Activated Do not Enter’ illuminated signs</td>
</tr>
<tr>
<td>Cables</td>
<td>FP 200 Gold (or equivalent) MIC</td>
<td>Red unless aesthetic consideration required</td>
</tr>
<tr>
<td>Visual Alarm Devices (VAD)</td>
<td>Do not blanket cover for DDA - separate arrangements at UCL</td>
<td>Red LED indicators fitted to sounder units</td>
</tr>
<tr>
<td>Deaf &amp; Hearing Impaired Warning Systems</td>
<td>Deaf Message Service (DMS) or Hearing Fire Alert System (HFAS) (See Fire Safety TN007)</td>
<td>Alarmscom Ltd <a href="http://www.alarmscom.co.uk">www.alarmscom.co.uk</a> Discuss with UCL Fire Safety Manager</td>
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<td></td>
<td></td>
<td>Discuss with UCL Access Systems Manager</td>
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</tbody>
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