

Category 2 Standard

S2103

Fire Engineering- Fire Detection and Alarm Systems

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1 Purpose

- 1.1 The purpose of this Standard is to give project managers, designers and contractors details on the level of testing, applicable standards and assurance documentation required by LU to demonstrate compliance with relevant Regulations and Engineering Standards for fire detection systems. This includes the relevant sections of BS 5839 and Category 1 standards 1-081 – Design and installation of fire protection systems and compartmentation measures and 1-082 – Active fire protection systems and portable fire equipment

2 Scope

- 2.1 This engineering standard applies to new installations and shall also be applied to modifications, maintenance repairs and extensions to existing premises
- 2.2 It covers the design, test and assurance requirements for fire protection systems installed on LU premise, stations, depots and in tunnels. The objective is to demonstrate compliance with the requirements of the Regulatory Reform (Fire Safety) Order 2005, Fire Precautions (Sub-surface railway stations) Regulations 2009 (retained under Article 24 of the RRO), and Building Regulations as appropriate.
- 2.3 There are significant interfaces with the following:
- a) Fire Safety Strategy/ Operational Procedures
 - b) Public Address/ Voice Alarm System
 - c) Automatic Ticketing System Gates
 - d) Lifts and Escalators
 - e) Magnetic Door Retainers – Locking Systems
 - f) Ventilation/ Smoke Control Systems
 - g) Fire Suppression Systems
 - h) Emergency Do Not Enter Signs
 - i) Compartmentation
 - j) Fire Smoke Dampers
 - k) Electrical Supplies

3 Requirements

3.1 General

- 3.1.1 The provision, extent and location of fire detection systems and fire alarm equipment in any particular premises, station, or railway facility, shall be determined by a review of the fire risk to the premises and shall also satisfy the requirements of relevant LU Category 1 Standards (e.g. Fire, Communications, Signals, Electrical, Lifts and Escalators, etc).
- 3.1.2 Design of fire detection systems shall be performed by competent designers in accordance with BS 5839 – Part 1 and working within a quality system certificated by a recognized European independent certification body.
- 3.1.3 Design verification, installation and commissioning shall be undertaken by suppliers that are approved under a European accreditation scheme for fire system installers (Loss Prevention Council 1014, British Approvals for Fire Equipment SP201 or 203,

or similar third party certification scheme accredited by UKAS their equivalent European nationally recognised body) and shall certify the completed works in accordance with BS 5839 - Part 1.

- 3.1.4 When selecting the fire protection systems, care must be exercised to ensure that a suitable range & quantity of spares are available to facilitate repairs and maintenance. The systems must be supported by the manufacturer.
- 3.1.5 All proposals to provide new or to modify existing Fire Detection and Alarm system provisions for changes in layout and use of Station premises shall be approved via LU Category 1 Standard - Bb224 Fire Safety Precautions - Compliance with fire precautions and process for change.
- 3.1.6 All proposals to provide new equipment or to modify existing Fire Detection and Alarm system provisions on other premises where Bb224 does not apply shall be approved by a competent accredited LU Fire Engineer. In some cases the Local Fire Brigade Fire Safety Officer may need to be informed either through local Building Control application route or through correspondence from the project
- 3.1.7 All changes to system configuration or messages, including cause and effect shall follow (PR0632 Management of Drawings and Message Changes)
- 3.1.8 Intrusive works to fire alarm and detection systems (works that involve the re-configuration of the system set up) shall only be performed by licensed (Grade 1) fire engineers in compliance with (PR0631 Licensing of Fire Engineers)
- 3.1.9 The Fire system / Equipment or any sub-system must comply with the requirements of the European EMC Directive (2004/108/EC) and the additional requirements of LU Cat 1 standard 1-222 – Electromagnetic Compatibility. Note there are special requirements for equipment within 3 and 10 metres of the track.

3.2 Main fire control and Indicating panel (MFCP)

- 3.2.1 Shall be as approved by LU and shall comply with the requirements of LU standard 1-081. The system shall be open protocol.
- 3.2.2 The requirements for the main fire control panels shall include:
 - a. A minimum of four programmable sounder circuits (where required to work in conjunction with a PAVA system).
 - b. An Integral printer.
 - c. A key switch to enable the controls.
 - d. A lockable protective door (where sited in public areas).
 - e. Communications and network compatibility.
 - f. The ability to expand system for future works.
- 3.2.3 For premises other than stations, the panel shall be sited in accordance with the recommendations given in BS5839 Part 1.
- 3.2.4 For stations, a MFCP shall be located at the designated Station Control Facility. Where there is no protected route leading directly from the station to open air, a repeater panel (see 4.3) shall be provided in an agreed location, with other agreed secondary control provisions, at or near the station entrance nearest to the RVP.

3.2.5 The use of radio alarm systems may only be installed with the prior agreement of LU where the following apply.

- a. A wired system cannot practicably be installed and maintained; or,
- b. To satisfy aesthetic considerations or restrictions prevent the installation of cables
- c. The system is to be used to monitor temporary areas or constructions.
- d. And subject to a Radio signal risk assessment.

3.3 Repeater panel (RP)

3.3.1 Shall match and be compatible with the MFCP and all other connected equipment.

3.3.2 The requirements for repeater panels shall include:

- a. A full control facility
- b. An integral printer
- c. A key switch to enable the controls
- d. A lockable protective door (where sited in public areas)
- e. A fault tolerant, peer to peer network.

3.3.3 Where repeater panels are to be sited in aggressive locations (e.g. subject to the weather, dust, dampness etc.) a suitably IP rated enclosure shall be provided.

3.4 Damper control panels

3.4.1 Motorised fire smoke dampers shall be controlled by the MFCP loop via an auxiliary control and indicating panel (Damper Control Panel).

3.4.2 Auxiliary panels shall be built in accordance with the relevant requirements of BS EN 54: Part 2 and Part 4 and:

- a. Shall monitor and report the status of motorised fire smoke dampers (i.e. open and closed) to the MFCP,
- b. Shall have a delay timer facility to obviate reporting of a fault during transition (i.e. closed/open, open/closed),
- c. Shall ensure fail safe operation of dampers on loss of power supply or loss of the fire alarm loop.
- d. Shall have the provision for controlling 24V magnetic door retainers.

3.5 Escalator water suppression system control and indicating equipment

3.5.1 Escalator water suppression systems (EWSS) may be initiated by linear heat detection controlled by an auxiliary EWSS control and indicating panel. This shall be interfaced to the MFCP to report fire and fault. Auxiliary panels shall be manufactured in accordance with the relevant requirements of BS EN 54: Part 2 and part 4.

3.5.2 System design and manufacture shall be as approved by LU.

3.6 Remote monitoring equipment

- 3.6.1 Where remote monitoring and interrogation of the MFCP is required, the Modem or interface device providing this facility shall either be fitted within the MFCP or be provided in an auxiliary panel, sited adjacent to the MFCP.
- 3.6.2 Modems or interface devices shall be provided in accordance with the recommendations of BS 5839 Part 1
- 3.6.3 Remote connection may only be use for device isolation and de-isolation purposes as part of an agreed remote isolation process and to monitor the health status of fire systems and notify fault and fire to initiate response.
- 3.6.4 Remote monitoring or control may only be facilitated under the conditions described in Section 3.7.8 of 1-081.
- 3.6.5 Any remote control facility (including those capable of remotely controlling the fire system but where that capability is not used) shall comply with LU's requirements for ensuring adequate protection against unauthorised access.

3.7 Other control and indicating equipment

- 3.7.1 All additional or alternative control and indicating equipment that may be required, shall be approved by LU and be compliant with the relevant British Standard for the equipment. Where a relevant standard for specific item of controlling and indicating equipment does not exist, the equipment shall be in accordance with the appropriate requirements of BS EN 54.
- 3.7.2 Systems that may require control and indicating equipment include:
 - a. Linear heat detection;
 - b. Aspirating smoke detection;
 - c. Video smoke detection
 - d. Beam smoke detection;
 - e. Gaseous extinguishing systems;
 - f. Radio alarm systems;
 - g. Remote audio-visual driver units (RAVDU);
 - h. Trace heating;
 - i. 'Emergency Do Not Enter' signs (EDNE) /DNE functionality
- 3.7.3 Panels other than the MFCP and repeater panels shall be located in non-public locations, in or near the areas controlled by these panels. These panels shall be easily accessible and positioned such that controls and indication are visible whilst being protected from mechanical damage.

3.8 Power supplies for control and indicating equipment.

- 3.8.1 Power supplies for control and indicating equipment shall be in accordance with the requirements of BS EN 54: Part 4.
- 3.8.2 Mains power shall be taken from supplies as described in BS 5839: Part 1. In stations, the supply shall be taken from a point agreed by the LU Electrical Engineer, in accordance with the requirements of LU power supply and distribution