Pearl Addressable Fire Detection and Alarm System Specification

Contents

Scope of Work

To design, supply and install a Digital Addressable Fire Alarm Detection and Alarm System in accordance with the details specified herein and in accordance with supplied drawings.

The EN54 Part 2 & 4 Fire System

The system shall include all materials, equipment and wiring required to install the complete Fire Detection and Alarm System. The system shall include but not be limited to one or more control panels, repeater panels, and detectors, call points, audible and visual alarm indicating devices and relays.

The installation shall include the laying of all cables required for connection of the detection, alarm indicating and other devices along with connections to the power supply as appropriate to the design.

All cabling shall conform to the requirements and recommendations of the Fire Alarm Control Panel manufacturer. Any openings /chasings in walls, ceilings or floors shall be fire-stopped as appropriate and made good.

The system shall be designed such that no more than 80% of the available signalling / detection loop capacity is employed to allow for future requirements.

Standards

The fire detection system shall be designed, installed and commissioned in accordance with, and all elements shall meet the requirements of:

- BS5839-1: 2013 Code of Practice for automatic fire detection and alarm systems
- EN54-Part 2: Control and indicating equipment
- EN54-Part 3: Audible fire alarm devices
- EN54-Part 4: Power supply equipment
- EN54-Part 5: Heat Detectors – point type
- EN54-Part 7: Smoke Detectors – point type using scattered light
- EN54-Part 8: High temperature heat detectors
- EN54-Part 10: Flame detection
- EN54-Part 11: Manual call points
- EN54-Part 12: Beam smoke detectors
- EN54-Part 15: Multi-detector fire detectors
- EN54-Part 17: Isolators
- EN54-Part 18: Input / Output modules
- EN54-Part 20: Aspirating smoke detection
- EN54-Part 23: Visual alarm devices
- EN54-Part 25: Radio linked devices
- EN54-Part 26: Point detectors using CO elements
- EN54-Part 27: Duct smoke detectors
- BS7671 - IEE Wiring Regulations
- BS7273 Code of practice for the operation of fire protection measures Part 4: Actuation of release mechanisms for doors

The responsible company should be able to demonstrate their competence to design, install and commission the system, e.g. by certification to BAFE SP203, LPS1014 or other relevant standard.
The equipment manufacturer shall operate a quality management system in accordance with ISO 9001:2000. In addition, the equipment shall be manufactured and Third Party Certificated under a recognised factory control procedure.

All detection devices shall be independently certified as complying with the relevant EN54 standard.

The Fire Alarm Control Panel shall be independently certified as complying with requirements of EN54 Part 2 and EN54 Part 4.
The Control and Indicating Equipment (C.I.E) shall be independently certified as complying with requirements of EN54 Part 2 and EN54 Part 4, including any Network devices to connect multiple C.I.E together.

In addition to the basic requirements of EN54, the C.I.E shall offer the following EN54 optional features with requirements:

Optional Functions:		EN54-2 Clause
Indication	Fault signals from fire protection equipment	7.10.4
	Alarm counter	7.13
	Fault Signals from points	8.3
Outputs	Fire alarm devices	7.8
	Fire alarm routing equipment	7.9.1
	Fire alarm routing equipment with confirmation	7.9.2
	Fault warning routing equipment	8.9
Controls	Investigation delays to outputs	7.11.1
	Manual or automatic switching of delays to outputs	7.11.2
	Dependency on more than one alarm signal. Type B	7.12.2
	Dependency on more than one alarm signal. Type C	7.12.3
	Disablement of points	9.5
	Test condition	10

Power Supply Equipment Functions:	EN54-4 Clause
Operation from a main power supply	5.1
Operation from a standby battery	5.2
Monitor and charge the standby battery	5.3
Recognise and notify supply faults	5.4

The Fire Alarm Control Panel shall also support a number of additional functions that are not covered by EN54. These additional functions shall include:

- Programmable Cause / Effect on Outputs (E.g. Phased Evacuation)
- Auxiliary Power Supply Output
- Auxiliary Relay Outputs

Control and Indicating Equipment (C.I.E)

Functional Description

The C.I.E shall be the central controller of the complete system. It shall receive and process analogue and digital information from the detection devices, provide audible and visual indication of alarm and other conditions to the user, automatically initiate alarm response sequences and provide the user interface for interrogation and user programming of the system.

Updates to the C.I.E operating software shall be simple to undertake and shall not require the use of replaceable components. The operating program and configuration memory shall be stored in non-volatile memory and shall not rely on batteries for retention.

The C.I.E shall incorporate separate microprocessors for signalling loop control and central operation, C.I.E networking shall be controlled from a separate microprocessor.

The C.I.E shall provide a user interface from which; controls can be operated, manual operations can be carried out, indications are audible and/or visible and system information can be obtained. It shall also be capable of unambiguously indicating the following functional conditions: Quiescent condition, fire alarm condition, fault warning condition, test condition and disablement condition. Furthermore, the fire alarm condition shall always be capable of clearly being indicated without any prior manual intervention at the C.I.E.

The C.I.E shall be easy to configure all basic operating characteristics and variables through the user interface on the C.I.E to satisfy the detection zone and output mapping of the premises. A PC Tool operating under the Windows™ operating system shall also be available to fully program the panel.

The C.I.E shall support up to 318 devices on the signalling loop. The C.I.E shall fully support the sub-addressing capabilities of the relevant input and output devices.

The C.I.E shall contain of one or two signalling loop drivers depending on the system design requirements. Each signalling loop shall be capable of supplying at least 750mA of power for loop-based sounders or other output devices.

The signalling loop should be capable of supporting field based devices on fire rated cabling of not less than 3500m in length.

The C.I.E shall provide 2 outputs to fire alarm devices, each rated at 0.5 ampere. An auxiliary supply output shall also be available to provide power for internal option modules.

The C.I.E shall incorporate a real-time clock for time stamping of in excess of 1000 events in the event history log and for scheduling of time related functions, the real-time clock shall have battery back-up and shall adjust to daylight savings time automatically. The event history log shall be stored in non-volatile memory and shall be able to be recovered even in case of total power failure to the control panel.

It shall be possible to install a network communications card to allow connection of up to 125 network nodes to include C.I.E, remote terminals, mimic displays or other peripheral devices.

The network shall offer peer-to-peer operation and be fault tolerant. The time to propagate a fire alarm condition across the network shall not exceed 2 seconds even in the event of a single network fault. The network shall have a message priority system to ensure that fire messages are transmitted to all network nodes within 2 seconds even in case of multiple faults being simultaneously generated.

A single C.I.E shall have the capability for displaying 64 fire alarm zones. In a network system, the overall system shall have the capability for up to 8,192 fire alarm zones.

It shall be possible to adjust sensitivity settings for all detection devices based on a time clock. It shall be possible to select device modes for both active and inactive time periods for multi-detector detectors.

It shall be possible to configure the panel for Stage 1/ Stage 2 Investigation operation based on a time clock. It shall be possible to configure the devices used for investigation on an individual basis. This shall also include call point type devices.

It shall be possible to configure up to 8 independent time clocks. Each time clock shall be capable of up to two active time periods for each day of the week.

All fault conditions shall be latching.

A pre-alarm condition shall be able to be recognised from detectors approaching their alarm threshold. The pre-alarm condition shall be able to be used as an input to the cause and effect programming such that an appropriate warning may be given to staff monitoring the system.

All input devices shall have the capability of being latching or non-latching except when configured for Fire Alarm input.

It shall be possible to configure complex cause and effect operation for phased evacuation and output control operations at the panel. The cause and effect must be able to define at least 500 separate relationships between cause and effect. These relationships must be capable of controlling separate sounder tones, intermittent or constant tones, disablement of other devices, and links to PA/VA system for output. The inputs must be able to be operated singly or using coincidence between devices or zones, they must be able to be time-related and include not only the ability to switch on alarm but also on fault, pre-alarm.

The individual rules must be able to combined using logical relationships to define operational priority, including definition of a “first-come-first-served” strategy to prevent clashes of priority in case of multiple alarms.

It shall be possible to connect optional equipment in accordance with the requirements of EN54-2 Standardised I/O such as mimic panels and remote control terminals.

C.I.E Construction

The C.I.E shall be of ABS UL94-HB40 construction. It shall be capable of surface or semi-flush mounting. 20 x 20mm top mounted and 2 x 20mm bottom mounted cable entry holes shall be provided to accommodate all likely wiring requirements. The top cable entry shall be provided via a separate bracket to allow first fix without putting the control equipment at risk. The entry points shall be open, being provided with plugs to close unused holes so that “knocking out” discs, thereby risking damage to the equipment.

The housing shall meet IP30 (EN60529) minimum ingress protection classification. It shall not be possible to open the enclosure without a special tool.

C.I.E Indications

The C.I.E shall be equipped with a Monochrome QVGA (Quarter Video Graphics Array) display, 320x240 pixels as the primary indicator displaying a mixture of graphical and textual information. The display shall be capable of displaying 15 lines x 40 characters.

The display shall incorporate a backlight that will illuminate upon any event or button press.

The primary display shall be simultaneously capable of indicating the presence of Fire Alarms, Faults, Disablements and Tests in accordance with the requirements of EN54-2.

In addition, the following minimum LED indicators shall be provided in accordance with the requirements of EN54-2:

- Power On — Green
- Fire Alarm — Red
- Fault — Yellow
- Disable — Yellow
- Test — Yellow
- Pre-Alarm — Yellow
- System Fault — Yellow
- Delay Active — Yellow
- Alarm Fault/Disablement — Yellow
- Fire Protection Active — Red
- Fire Protection Fault/Disablement — Yellow
- Fire Output Active — Red

- Fire Output Fault/Disablement Yellow
- Technical Alarm Yellow

Panel Controls

The C.I.E shall be provided with the following minimum manual controls:

- Mute Buzzer
- Sound Alarms
- Resound Alarms
- Silence Alarms
- Reset System
- Extend Delay
- End Delay
- Disable Fire Output
- Disable Fire Protection Devices
- Disable Alarm Devices

In addition, the following controls shall be provided for menu operation and programming:

Navigation keys, ←→↑↓
An Asterisk *, used to initiate context-sensitive shortcuts
A confirmation key, ✓
A numeric keypad, 0-9,
also providing the function for letter / character programming
A Cancel key, **x**
A Help key, ***i***
A Clear key, C
A Shift key, ↑
4 x Soft keys, shall be able to be programmed to provide site specific function
e.g. Day mode switch

The C.I.E shall be provided with control keys that can illuminate as an aid to guide the user through basic operation procedures.

Access to the controls above shall be able to be accomplished via either a user-specific access code or by a control enable access key. All control panels on a network shall be supplied with common pattern control enable keys.

Panel Features

The Fire Alarm Control Panel shall be provided with the following minimum features

- Control-By-Event-By-Time.
- Day/Night Sensitivity settings.
- Device Blink Control.
- Log/Display Reports.
- Alarm Delays.
- Non-Alarm Module Reporting.
- Periodic Detector Test.
- Non-addressed device detection (address 0).
- Duplicate address detection.
- Walk Test.
- Upload/Download to PC Computer.
- “Autolearn “facility
- Class change
- Real Time Display of Analogue or Digital Data.
- Degraded mode of operation

Networking

The Fire Alarm Control Panel shall be capable of networking up to 125 Nodes on a secure network complying to EN54-2 as a distributed C.I.E.

A zoning facility to allow the networked system to share up-to 8,192 zones giving non-confusing indication and allowing true peer-to-peer cross panel report, control and site-wide cause and effect functionality.

Functionality

The network shall use a multi token-passing, non-collision-based protocol. A single token shall be used between two stations only and be un-reliant on any other token in the system.

Two communication links shall be provided on each network node capable of communicating independently of each other. Each communication links shall be electrically isolated.

When the network node receives a message, the message shall be regenerated and error checked before it is re-transmitted to the next network node.

A priority message system must be provided so that fire response is prioritised above other network messages. In case of one or more fire messages “over-taking” a lower priority message the lower priority message shall be stored on the network for continued transmission once the high priority messages have all been sent.

Each network node shall have an independent microprocessor dedicated to control of the network. The use of the C.I.E microprocessor for network control is not acceptable.

Network distance boosters shall be available if required.

Network Capacity and General Operation

It shall be possible to connect up to 125 nodes on the entire network.

The network shall be capable of accepting up to 16 C.I.E’s.

The propagation delay though any network node shall not exceed 50mS for any message not including low priority messages at the time when they may be overtaken at the node by a higher priority message.

A single network fault, either open or short circuit between nodes, shall have no effect on network transmission.

The network shall be true peer-to-peer performance and not be reliant on any single node in the system to control the network information.

The control of the entire network is possible from any C.I.E. in terms of system control functions, Disablements, testing or the display of device statuses including analogue or digital real time value.

Supervision of open & short circuit shall be provided between all nodes.

Optional earth fault monitoring shall be provided.

The network shall be connected in a closed ring. Networks using sub network/stubs or Master/slave architecture are not acceptable.

Messages shall be transmitted simultaneously in both directions around the network so that messages are received as fast as possible at all points. The second time a message is received at each node it shall not be ignored but registered and passed on to the next point so that full confirmation of receipt is available to the sending node.

The network system shall provide the capability to synchronise addressable loop sounders across the network.

Network Cabling

The network cable shall be two core copper cables suitable for the purpose. This shall include capability of using standard fire retardant cables of the types used for addressable loops for the network. The maximum distance between adjacent network nodes (using standard 1.5mm fire retardant cable) shall be at least 1.6km.

Optical Fibre shall be used if specified. Optical Fibre shall be 50/125 or 62.5/125 mm duplex fibre only.

Use of fibre shall not impose any delay on message.

It shall be possible to mix fibre optic and copper cables in each C.I.E. or booster such that any node may convert from one media to another.

Software

A PC Configuration Tool shall be available for configuration of the C.I.E and for retention of configuration data.

The PC Configuration Tool shall be graphically based and operate under Windows ™ operating systems XP pro and Windows 7.

All system information including loop device configuration and cause and effect programming shall be stored on a removable SD memory card.

It shall be possible to configure ALL basic configuration parameters and settings from either the C.I.E front panel or from the PC Configuration Tool.

A PC Configuration Tool shall be available to allow the site to re-configure device text labels without affecting the C.I.E cause and effect programming. The text labels shall be able to be exported to Microsoft Excel for typing independently of the system configuration.

It shall be permitted to configure enhanced/ extended features and functions from the PC Configuration Tool only.

Loop Design

A tool shall be provided to demonstrate that the loop as designed provides critical signal path redundancy, e.g. all loop powered alarm devices will function in case of a single loop fault if so required by the system designer

Repeater / Mimic Panels

It shall be possible to provide remote access to monitor or control the operation of the installation.

The repeaters and mimic controllers shall communicate with the fire alarm control panel via an RS485 (multi-drop) communications link. Up to 16 Repeaters/Mimic Controllers may be connected to the RS485 communications cabling. If critical signal path redundancy to repeaters is required they shall be capable of being connected directly to the panel network.

The repeaters/mimics shall require only four wires to provide power and data.

Each repeater shall provide full text location detail as indicated at the main C.I.E.

The repeater shall provide switches to control the following functions:

- MUTE BUZZER
- END DELAY/EVACUATE
- SILENCE/RESOUND ALARM DEVICES
- CHANGE TABS
- ZONES IN ALARM
- RESET

Power Supplies

All power supplies (integral to the fire alarm control panel or remote) shall be certified to EN54-4: 1998 and shall be capable of supporting:

2x12 volt 12Ah, Sealed Lead Acid type batteries in standard enclosure or 2x12 volt 38Ah, Sealed Lead Acid type batteries in extended housing.

Batteries shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 30 minutes of alarm upon a normal AC power failure.

A manufacturer's supplied Windows™ software tool shall be used to provide the calculations required to determine the minimum battery capacity required for the associated system loading over the expected standby time.

All power supplies shall be capable of operating from a main supply of 230VAC 50/60Hz.

Addressable Photoelectric Smoke Detector Specification

Compliance with standards

The addressable Photoelectric Smoke Detector shall be third party approved to EN54 part 7.

Functionality

The Detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the C.I.E, send data to the panel digitally representing the analogue level of smoke density.

Photoelectric Smoke Detectors shall be intelligent and addressable devices and shall connect with two wires to one of the C.I.E. Signalling Line Circuit loops.

The detector shall operate on a digital protocol to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

The detectors shall be fitted with a loop isolation device in-built into the device.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The Detectors shall be ceiling-mount and shall include a twist-lock base.

Group Polling

The detector shall be capable of group polling with improved performance a result.

There shall be no limit to the number of devices that can be grouped together on the same loop.

Implementation of group polling feature shall decrease response time for an alarm to be detected to less than 2.5 seconds, the use of complex cause and effect programming shall not increase the operation of all output devices to more than 10 seconds.

Test functions

The Detectors shall provide a means of test whereby they will simulate an alarm condition and report that condition to the C.I.E.

Such a test may be initiated at the Detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

Address setting

The Detectors shall provide address setting on the Detector head using decimal switches.

Addressable Detectors that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The Detectors shall also feature an internal identifying code that the C.I.E. shall use to identify the type of Detector.

Visual indication

The Detectors shall provide dual bi-colour LED's. Both LED's enable red, amber and green local status indication also indicating that the Detector is operational and in regular communication with the C.I.E.

The LED's shall be configurable from the C.I.E to give visual indication of:

- Device Healthy
- Fire
- Fault – Isolation in use
- Detector Dirty
- Test Mode
- Chamber Fault

If required, the flashing mode operation of the Detector LED's shall be controlled through the system field program.

An output connection shall also be provided in the base to connect an external remote alarm LED.

Sensitivity settings

The Detector sensitivity shall be set through the C.I.E, and shall be adjustable in the field through the field programming of the system.

Sensitivity may be automatically adjusted by the panel on a time-of-day basis.

Theses sensitivity levels shall not contravene EN54 part 7 unless placed in to thermal (heat) only mode in which case the unit shall comply with EN54 part 5.

Drift compensation

The Detector shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.

The use of this function shall not contravene EN54 part 7.

Additional requirements

Optional relay base and isolator base variants shall be available.
Up to 159, intelligent Detectors may connect to one SLC loop.
The C.I.E software, not the detector, shall make the alarm decision.
The sensitivity of each detector shall be set in the C.I.E.
The system operator shall be able to view the current analogue or digital value of each detector at the C.I.E.

Addressable Thermal Heat Detector Specification

Compliance with standards

The Heat Detector shall be third party approved to EN54 part 5.
Types A1R, A1, and BS shall be available.

Functionality

The Detectors shall use an electronic detector to measure thermal conditions caused by a fire and shall, on command from the C.I.E, send data to the panel representing the analogue or digital level (the temperature) at the detector.

Heat Detectors shall be intelligent and addressable devices, and shall connect with two wires to one of the C.I.E. Signalling Line Circuits.

The detector shall operate on a digital protocol to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

The detectors shall be fitted with a loop isolation device in-built into the device.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The Detectors shall be ceiling-mount and shall include a twist-lock base.

Group Polling

The detector shall be capable of group polling with improved performance a result.

There shall be no limit to the number of devices that can be grouped together on the same loop.

Implementation of group polling feature shall decrease response time for an alarm to be detected to less than 2.5 seconds, the use of complex cause and effect programming shall not increase the operation of all output devices to more than 10 seconds.

Test functions

The Detectors shall provide a means of test whereby they will simulate an alarm condition and report that condition to the C.I.E. Such a test may be initiated at the Detectors itself (by activating a magnetic switch) or initiated remotely on command from the C.I.E.

Address setting

The Detectors shall provide address setting on the Detector head using decimal switches.

Addressable Detectors that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The Detectors shall also store an internal identifying code that the control panel shall use to identify the type of Detector.

Visual indication

The Detectors shall provide dual bi-colour LED's. Both LED's enable red, amber and green local status indication also indicating that the Detector is operational and in regular communication with the C.I.E.

The LED's shall be configurable from the C.I.E to give visual indication of:

- Device Healthy
- Fire
- Fault – Isolation in use

- Detector Dirty
- Test Mode
- Chamber Fault

If required, the flashing mode operation of the Detector LED's shall be controlled through the system field program.

An output connection shall also be provided in the base to connect an external remote alarm LED.

Sensitivity settings

The Detector sensitivity shall be set through the C.I.E, and shall be adjustable in the field through the field programming of the system.

Sensitivity may be automatically adjusted to the panel on a time-of-day basis.

These sensitivity levels shall not contravene EN54 part 5.

Additional requirements

Optional relay base and isolator base variants shall be available.
Up to 159, intelligent Detectors may connect to one SLC loop.
The C.I.E software, not the detector, shall make the alarm decision.
The sensitivity of each detector shall be set in the C.I.E.
The system operator shall be able to view the current analogue or digital value of each detector at the C.I.E.

Addressable Multi-Criteria SMART2 Detector Specification

Compliance with standards

The Multi-Criteria Detector shall be third party approved to EN54 part 7 & 5, CEA 4021 Type C multi detector.

Functionality

The Detector shall use the photoelectric (light-scattering) principal to measure smoke density in conjunction with dual thermistors to measure heat and shall, on command from the C.I.E, send data to the panel representing the fire risk.

The Detector shall incorporate a micro processor that combines the signals from the photoelectric smoke chamber, and the thermistor heat detector elements using algorithms that include a time element to provide an increased immunity to false alarm whilst maintaining the earliest warning of real fire condition.

Multi-Criteria Detectors shall be intelligent and addressable devices and shall connect with two wires to one of the C.I.E. Signalling Line Circuit loops.

The detector shall operate on a digital protocol to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

The detectors shall be fitted with a loop isolation device in-built into the device.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The Detectors shall be ceiling-mount and shall include a twist-lock base.

Group Polling

The detector shall be capable of group polling with improved performance a result.

There shall be no limit to the number of devices that can be grouped together on the same loop.

Implementation of group polling feature shall decrease response time for an alarm to be detected to less than 2.5 seconds, the use of complex cause and effect programming shall not increase the operation of all output devices to more than 10 seconds.

Test functions

The Detectors shall provide a means of test whereby they will simulate an alarm condition and report that condition to the C.I.E.

Such a test may be initiated at the Detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

Address settings

The Detectors shall provide address setting on the Detector head using decimal switches.

Addressable Detectors that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The Detectors shall also feature an internal identifying code that the C.I.E. shall use to identify the type of Detector.

Visual indication

The Detectors shall provide dual bi-colour LED's. Both LED's enable red, amber and green local status indication also indicating that the Detector is operational and in regular communication with the C.I.E.

The LED's shall be configurable from the C.I.E to give visual indication of:

- Device Healthy
- Fire
- Fault – Isolation in use
- Detector Dirty
- Test Mode
- Chamber Fault

If required, the flashing mode operation of the Detector LED's shall be controlled through the system field program.

An output connection shall also be provided in the base to connect an external remote alarm LED.

Sensitivity settings

The Detector sensitivity shall be set through the C.I.E, and shall be adjustable in the field through the field programming of the system.

Sensitivity may be automatically adjusted by the panel on a time-of-day basis.

The detector shall be capable of 6 sensitivity settings.

Alarm Level 1 - 1%/ft Smoke
Alarm Level 2 - 2%/ft Smoke
Alarm Level 3 - 3%/ft Smoke
Alarm Level 4 - 3%/ft Smoke
Alarm Level 5 - 3%/ft Smoke
Alarm Level 6 - Class A1R. Heat only alarm.

These sensitivity levels shall not contravene EN54 part 7 unless placed in to thermal (heat) only mode in which case the unit shall comply with EN54 part 5.

The Detector shall be able to be placed in to a thermal (heat) only mode of operation from command from the C.I.E. This shall be automatic on a time-of-day basis or by means of a manual operation at the C.I.E.

The Detector shall include two self optimising sensitivity levels that will adjust to the optimum sensitivity based on the long term environmental conditions of the unit's surroundings.

Drift compensation

The Detector shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The use of this function shall not contravene EN54 part 7.

Additional requirements

Optional relay base and isolator base variants shall be available.
Up to 159, intelligent Detectors may connect to one SLC loop.
The C.I.E software, not the detector, shall make the alarm decision.
The sensitivity of each detector shall be set in the C.I.E.
The system operator shall be able to view the current analogue or digital value of each detector at the C.I.E.

Addressable Multi-Criteria SMART3 Detector Specification

Compliance with standards

The Multi-Criteria Detector shall be third party approved to EN54 part 7 & 5, CEA 4021, LPS1279.

Functionality

The Detector shall use the photoelectric (light-scattering) principal to measure smoke density in conjunction with dual thermistors to measure heat and Infra Red detector to detect flame and shall, on command from the C.I.E, send data to the panel representing the fire risk.

The Detector shall incorporate a micro processor that combines the signals from the photoelectric smoke chamber, the thermistor heat detector and Infra Red elements using algorithms that include a time element to provide an increased immunity to false alarm whilst maintaining the earliest warning of real fire condition.

The Infra Red detector shall be capable of measuring Irradiance on the IR detector of between 0 – 450 µW/cm².

Multi-Criteria Detectors shall be intelligent and addressable devices and shall connect with two wires to one of the C.I.E. Signalling Line Circuit loops.

The detector shall operate on a digital protocol to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

The detectors shall be fitted with a loop isolation device in-built into the device.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The Detectors shall be ceiling-mount and shall include a twist-lock base.

Test functions

The Detectors shall provide a means of test whereby they will simulate an alarm condition and report that condition to the C.I.E.

Such a test may be initiated at the Detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

Address setting

The Detectors shall provide address setting on the Detector head using decimal switches.

Addressable Detectors that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The Detectors shall also feature an internal identifying code that the C.I.E. shall use to identify the type of Detector.

Visual indication

The Detectors shall provide dual bi-colour LED's. Both LED's enable red, amber and green local status indication also indicating that the Detector is operational and in regular communication with the C.I.E.

The LED's shall be configurable from the C.I.E to give visual indication of:

- Device Healthy
- Fire
- Fault – Isolation in use
- Detector Dirty
- Test Mode
- Chamber Fault

If required, the flashing mode operation of the Detector LED's shall be controlled through the system field program.

An output connection shall also be provided in the base to connect an external remote alarm LED.

Sensitivity settings

The Detector sensitivity shall be set through the C.I.E, and shall be adjustable in the field through the field programming of the system.

Sensitivity may be automatically adjusted by the panel on a time-of-day basis.

The detector shall be capable of 6 sensitivity settings.

Alarm Level 1 - Low false alarm resistance, high photoelectric only sensitivity
Alarm Level 2 - Medium false alarm resistance, medium photoelectric only sensitivity
Alarm Level 3 - Standard false alarm resistance, low photoelectric only sensitivity
Alarm Level 4 - High false alarm resistance, low photoelectric only sensitivity
Alarm Level 5 - Very high false alarm resistance, low photoelectric only sensitivity
Alarm Level 6 - Class A1R. Heat only alarm.

Theses sensitivity levels shall not contravene EN54 part 7 unless placed in to thermal (heat) only mode in which case the unit shall comply with EN54 part 5.

The panel threshold should be chosen according to the specific environment:

- "ULTRA-CLEAN" environments can use Level 1 ALERT
- "CLEAN" environments can use Levels 2-3 ALARM
- "MODERATE" environments can use Level 4 ALARM
- "HARSH" environments can use Level 5-6 ALARM

The Detector shall be able to be placed in to a thermal (heat) only mode of operation from command from the C.I.E. This shall be automatic on a time-of-day basis or by means of a manual operation at the C.I.E.

Drift compensation

The Detector shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The use of this function shall not contravene EN54 part 7.

Additional requirements

Optional relay base and isolator base variants shall be available.
Up to 159, intelligent Detectors may connect to one SLC loop.
The C.I.E software, not the detector, shall make the alarm decision.
The sensitivity of each detector shall be set in the C.I.E.
The system operator shall be able to view the current analogue or digital value of each detector at the C.I.E.

Addressable Multi-Criteria SMART4 Detector Specification

Compliance with standards

The Multi-Criteria Detector shall be third party approved to EN54 part 7 & 5 CEA 4021, LPS1279.

Functionality

The Detector shall use the photoelectric (light-scattering) principal to measure smoke density in conjunction with dual thermistors to measure heat, Carbon Monoxide detector, and Infra Red detector to detect flame and shall, on command from the C.I.E, send data to the panel representing the fire risk.

The Infra Red detector shall be capable of measuring Irradiance on the IR detector of between 0 – 450 µW/cm².

The Carbon Monoxide detector shall be capable of measuring CO levels of between 0 – 500 ppm.

The Detector shall incorporate a micro processor that combines the signals from the photoelectric smoke chamber, the thermistor heat detector, Carbon Monoxide detector and Infra Red elements using algorithms that include a time element to provide an increased immunity to false alarm whilst maintaining the earliest warning of real fire condition.

Multi-Criteria Detectors shall be intelligent and addressable devices and shall connect with two wires to one of the C.I.E. Signalling Line Circuit loops.

The detector shall operate on a digital protocol loop to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The Detectors shall be ceiling-mount and shall include a twist-lock base.

Group Polling

The detector shall be capable of group polling with improved performance a result.

There shall be no limit to the number of devices that can be grouped together on the same loop.

Implementation of group polling feature shall decrease response time for an alarm to be detected to less than 2.5 seconds, the use of complex cause and effect programming shall not increase the operation of all output devices to more than 10 seconds.

Test functions

The Detectors shall provide a means of test whereby they will simulate an alarm condition and report that condition to the C.I.E.

Such a test may be initiated at the Detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

Address setting

The Detectors shall provide address setting on the Detector head using decimal switches.

Addressable Detectors that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The Detectors shall also feature an internal identifying code that the C.I.E. shall use to identify the type of Detector.

Visual indication

The Detectors shall provide dual LED's. Both LED's shall flash red under normal conditions, indicating that the Detector is operational and in regular communication with the C.I.E. Both LED's may be placed into steady red illumination by the C.I.E, indicating that an alarm condition has been detected.

If required, the flashing mode operation of the Detector LED's shall be controlled through the system field program.

An output connection shall also be provided in the base to connect an external remote alarm LED.

Sensitivity settings

The Detector sensitivity shall be set through the C.I.E, and shall be adjustable in the field through the field programming of the system.

Sensitivity may be automatically adjusted by the panel on a time-of-day basis.

The detector will be capable of 6 sensitivity settings

Level 1 – 1%/ft of smoke or greater than 45 ppm of CO. No delays from processed photo output.
Level 2 – 2%/ft of smoke. No delays from processed photo output.
Level 3 – 3%/ft of smoke. No delays from processed photo output.
Level 4 – 3%/ft of smoke. Maximum of 10 minutes delay from processed photo output.
Level 5 – 4%/ft of smoke. Maximum of 10 minutes delay from processed photo output.
Level 6 – Heat only alarm. If the heat level on either thermistor exceeds 60°C or rate of rise limits.

Theses sensitivity levels shall not contravene EN54 part 7 unless placed in to thermal (heat) only mode in which case the unit shall comply with EN54 part 5.

The detector shall be capable of being configured from the control panel to accept various application dependant alarm threshold levels to reduce nuisance alarms

The panel threshold should be chosen according to the specific environment:

- “ULTRA-CLEAN” environments can use Level 1 ALERT
- “CLEAN” environments can use Levels 2-3 ALARM
- “MODERATE” environments can use Level 4 ALARM
- “HARSH” environments can use Level 5-6 ALARM

The Detector shall be able to be placed in to a thermal (heat) only mode of operation from command from the C.I.E. This shall be automatic on a time-of-day basis or by means of a manual operation at the C.I.E.

Drift compensation

The Detector shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The use of this function shall not contravene EN54 part 7.

Additional requirements

Optional relay base and isolator base variants shall be available.
Up to 159, intelligent Detectors may connect to one SLC loop.
The C.I.E software, not the detector, shall make the alarm decision.
The sensitivity of each detector shall be set in the C.I.E.
The system operator shall be able to view the current analogue or digital value of each detector at the C.I.E.

Addressable View Laser High Sensitivity Smoke Detector Specification

Compliance with standards

The View Laser detector shall be third party approved to EN54 part 7, ANSI/UL 268, CAN/ULC –S529, FM3230-3250

Functionality

The View Laser detector shall use the Laser Diode and patented smoke sensing chamber, designed to amplify signals from smoke and shall, on command from the C.I.E, send data to the panel representing the analogue or digital level of smoke density.

The View Laser detector shall incorporate a micro processor that analyses the signals from the Laser smoke chamber and using algorithms that include a time element to provide an increased immunity to false alarm whilst maintaining the earliest warning of real fire condition.

View Laser smoke detectors shall be intelligent and addressable devices and shall connect with two wires to one of the C.I.E. Signalling Line Circuit loops.

The detector shall operate on a digital protocol loop to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The Detectors shall be ceiling-mount and shall include a twist-lock base.

Co-operative Multi-Sensing

The View Laser detector shall be capable of co-operative multi-sensing using AWACS^{Tm} (Advanced Warning Addressable Combustion Sensing) software with improved performance a result.

There shall be no limit to the number of devices that can be grouped together on the same loop.

Implementation of co-operative multi-sensing feature shall decrease response time for an alarm to be detected by combining signals from adjacent detectors then statistically combining to reach a common signal.

The use of co-operation multi-sensing shall allow an alarm condition to be indicated before the signal from any one detector is itself is above the alarm threshold.

The View Laser detector shall use co-operative multi-sensing to reject certain false alarm phenomena, this function shall work on the basis that if a detector sees a relatively sudden and large change in scattered light, it raises the suspicion of a false signal. Such a large 'step' function is not normally given by true smoke, and could be caused by a lint or hair particle, or even by an insect.

The View Laser detector must be capable of rather than immediately accepting this signal as a fire, the Laser detector first checks a physically adjacent Laser detector, and observe this second Laser detector for several seconds (if a third Laser detector is also adjacent, AWACS^{Tm} will observe the third detector). If no significant analogue signal, even a very low signal, is received from the adjacent Laser detector, AWACS^{Tm} will report a fault condition for the first detector.

The View Laser detector shall be capable of, if the situation changes, because of any oscillation in the first Laser detector, or any small reading in the second or third Laser detector, AWACS^{Tm} will still report an alarm.

Test functions

The View Laser detectors shall provide a means of test whereby they will simulate an alarm condition and report that condition to the C.I.E.

Such a test may be initiated at the Laser detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

Address setting

The View Laser detectors shall provide address setting on the Detector head using decimal switches.

Addressable Detectors that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The View Laser detectors shall also feature an internal identifying code that the C.I.E. shall use to identify the type of Detector.

Visual indication

The View Laser detectors shall provide dual LED's. Both LED's shall flash red under normal conditions, indicating that the Detector is operational and in regular communication with the C.I.E. Both LED's may be placed into steady red illumination by the C.I.E, indicating that an alarm condition has been detected.

If required, the flashing mode operation of the Detector LED's shall be controlled through the system field program.

An output connection shall also be provided in the base to connect an external remote alarm LED.

Sensitivity settings

The View Laser detector sensitivity shall be set through the C.I.E, and shall be adjustable in the field through the field programming of the system.

Sensitivity may be automatically adjusted by the panel on a time-of-day basis; this will force the detector to a minimum sensitivity setting for the time period, then return to normal sensitivity operation.

The View Laser detector will be capable of 9 sensitivity settings for both Pre-alarm and Alarm, sensitivity settings from 0.02 %/ft upto 2 %/ft obscuration shall be achievable.

Theses sensitivity levels shall not contravene EN54 part 7.

Drift compensation

The View Laser detector shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The use of this function shall not contravene EN54 part 7.

Additional requirements

Optional relay base and isolator base variants shall be available.
Up to 159, intelligent Detectors may connect to one SLC loop.
The C.I.E software, not the detector, shall make the alarm decision.
The sensitivity of each detector shall be set in the C.I.E.
The system operator shall be able to view the current analogue or digital value of each detector at the C.I.E.

Addressable Loop Powered Beam Detector Specification

Compliance with standards

The Beam Smoke Detector shall be third party approved to EN54 part 12.

Functionality

The Beam Smoke Detector shall consist of a transmitter and receiver unit in the same housing which projects an IR signal, which is reflected by use of a suitable reflector.

The Beam Smoke Detector shall be intelligent and addressable, and shall connect with two wires to one of the C.I.E. Signalling Line Circuits. Additional connections for power are not acceptable.

Mounting brackets capable of ceiling or wall mounting shall be available.

The unit shall have automatic drift compensation to adjust for signal deterioration from dust and dirt.

Test functions

A servo test function shall be available whereby activation of a low level test switch shall operate a servo motor that moves a calibrated test filter in to the path of the beam. A temporary 24 Vdc source is acceptable for this purpose.

The Beam Smoke Detector shall provide a means of test whereby they will simulate an alarm condition and report that condition to the C.I.E.

Such a test may be initiated at the Detector itself (by activating a low level test switch) or may be activated remotely on command from the C.I.E.

Address setting

The Beam Smoke Detector shall provide address setting on the Detector head using decimal switches.

Addressable Beam Smoke Detectors that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The Beam Smoke Detectors shall also feature an internal identifying code that the control panel shall use to identify the type of Detector.

Visual indication

The Detector shall provide fire, fault and normal LED's.

The normal LED shall flash green under normal conditions, indicating that the Detector is operational and in regular communication with the C.I.E.

The flashing mode operation of the Detector LED shall be controlled through the system field program

The fire LED may be placed into steady illumination by the C.I.E, indicating that an alarm condition has been detected.

An output connection shall also be provided to connect an external remote alarm LED.

The fault LED shall be used to indicate all fault conditions detected by the unit including alignment or drift compensation faults.

Sensitivity settings

The Detector sensitivity shall be adjustable in the field with four fixed settings of 25%, 30%, 40% and 50% obscuration.

In addition the detector shall also be capable of being set to one of two self-optimising sensitivity settings being 30-50% or 40-50% obscuration.

Drift compensation

The Detector may automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.

The use of this function shall not contravene EN54 part 12.

Additional requirements

In order to aid alignment, a side ‘gun sight’ shall be provided allowing direct visibility of the reflector form the transmitter / receiver unit.
Optional in built loop isolation shall be included in each unit.
Up to 159, intelligent Detectors may connect to one SLC loop.
The C.I.E software, not the detector, shall make the alarm decision.
The system operator shall be able to view the current analogue or digital value of each detector at the C.I.E.

Addressable In-Duct Smoke Detector Housing Specification

Compliance with standards

The smoke detector used in the In-Duct housing shall be third party approved to EN54 part 7.

Functionality

The In-Duct Housing shall use the Duct-tube principle, whereby air is drawn in through a sampling tube and released back to the ducting by an exhaust tube.

Sample filters shall be provided to minimise the accumulating of dust and dirt.

The air velocity shall have a rating from 2.5m/s to 20 m/s.

A clear Polycarbonate cover shall be used on the In-Duct housing, to provide easy visual inspection of sampling tube filters.

When sufficient smoke is sensed, an alarm signal is initiated at the C.I.E, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

Test functions

The unit shall have the facility to initiate a remote test from a conveniently located key switch such that the detector housed within the unit shall operate it's test whereby they will simulate an alarm condition and report that condition to the C.I.E.

Smoke detectors.

In-Duct Smoke Detector Housing shall accommodate an intelligent Photoelectric Detector, to provide continuous analogue or digital monitoring and alarm verification from the panel.

Visual indication

The In-Duct Smoke Detector Housing shall provide remote LED output suitable for connection to a conveniently located LED position.

The LED output shall pulse under normal conditions, indicating that the detector is operational and in regular communication with the C.I.E.

The LED output may be placed into steady condition by the C.I.E, indicating that an alarm condition has been detected.

If required, the flashing mode operation of the LED output shall be controlled through the system field program.

Additional requirements

The In-Duct Housing shall when required provide 1 relay output and 24Vdc input.

High Sensitivity Aspirating Smoke Detection Systems

Under this section the contractor shall supply, install and commission a very high sensitivity Aspirating Smoke Detector (ASD) system in the designated areas identified in the tender document, the ASD will provide detector sensitivity class selection of A, B, or C as set out in EN54-20 and the FIA Design, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems C.O.P Feb 2012 and or local C.O.P for fire detection and alarm systems.

The ASD shall incorporate optical laser point detection technologies comprising laser light scattering principles and inbuilt algorithms to provide immunity to false alarms.

The ASD shall have the capacity to cover an area of 2000m^2 in class C application.

The ASD shall encompass the options of single or dual channel capabilities as follows

1 CHANNEL with 1 SENSOR		(2 pipes per channel)
1 CHANNEL with 2 SENSORS	(common chamber)	(2 pipes per channel)
2 CHANNEL with 2 SENSORS	(seperate chamber)	(2 pipes per channel)

In the 1 Channel with 2 sensors (common chamber) version, this ASD will provide the configurable options of raising alarm when only 1 or both sensors reach alarm conditions.

In two channel (separate chamber) version, the channels shall be separate and independent of each other, they shall have independent inlets, filters, aspirating fans, ultrasonic sensors, smoke detectors, sounder circuits and exhausted air outlet.

The ASD shall incorporate an integral 24vdc sounder circuit, 1 per channel for remote alarm application.

The ASD shall have sealing ingress rating of IP65, in addition to the IP65 sealing, to provide further ingress protection the ASD electronics will be mounted in a separate internal chamber that does not require access during installation and commissioning or routine maintenance of the ASD system.

The sampling pipe network design shall be by the manufacturer or the manufacturer's approved and trained ESD and shall be produced via the ASD manufactures EN54-20 single software design, configure, monitoring tool. (e.g. Pipe IQ LT)

The EN54-20 single software design, configure, monitoring tool shall have Multilanguage selection inclusive of: English, Italian, Spanish, German, French, Dutch, Portuguese, Russian, Swedish, Norwegian, Finish, Hungarian.

The EN54-20 single software design, configure, monitoring tool shall produce 3D sampling pipe network designs.

The EN54-20 single software design, configure, monitoring tool shall allow for ASD configuration, sampling pipe network design and ASD monitoring.

The EN54-20 single software design, configure, monitoring tool shall generate the 7 required design documents that verify the design compliancy with EN54-20 and the local Code of Practice for ASD system application inclusive of : System design Class, Transport time, Hole sensitivity, Sample air flow rate, Sample point location, Sample air pressure and sample pipe network configuration.

A single ASD shall not cover more than 2000m^2 or more than 1 fire zone.

The ASD shall be secured via the manufactures mounting bracket.

The installation of the ASD system shall comply with EN54-20 approved equipment inclusive of pipe and pipe fittings and accessories along with the FIA Design, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems C.O.P Feb 2012 and or local C.O.P for fire detection and alarm systems.

The following parts of the ASD system shall be clearly labeled;

- Sample pipe
- Sample points
- ASD Unit
- Power Supplies and Battery enclosures.

The labelling shall clearly identify the purpose and where appropriate the zone location of the equipment.

Where access is restricted i.e.: lift shaft, atrium a test point shall be installed in an accessible location to facilitate testing without having to gain access to the protected area.

The commissioning of the installed ASD system must comply with and include performance testing as defined in the FIA Design, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems C.O.P Feb 2012 and or local C.O.P for fire detection and alarm systems.

Specification ASD Design Description and Requirements

The ASD shall incorporate optical laser point detection technologies comprising laser light scattering principles combined with built in advance algorithms to provide immunity to false alarms.

The ASD shall provide 9 selectable sensitivity range settings that will detect smoke particles between 0.06%/m – 6.0%/m.

The ASD shall incorporate inbuilt day and night selection options.

The ASD shall incorporate the programming option of up to 20 holiday days per annum that can be selected to operate the ASD in the night time settings only.

The ASD shall incorporate an integral separate replaceable inbuilt filter that has a 4 year life span as a second filtration process to provide immunity to false alarms.

The ASD shall incorporate dual air flow detection consisting of ultrasonic and electronic detection technology monitoring air flow through the pipe network and the detection chamber.

The ASD shall incorporate an independent 10 segment air flow pendulum graph indicating low or high air flow alarms at 20% segment intervals as required by EN54-20.

The ASD shall have an integral programmable 10 speed aspirating fan with automatic or manual options.

The ASD shall incorporate 2 alarm levels and 10 pre-alarm levels via a 10 segment bar graph, the 2 alarm levels shall provide the following: Pre-Alarm, Fire.

The ASD shall have integral 3 x form C 2amp programmable relays with latching options that shall provide the following alarm signals for external equipment: Fire, Pre-Alarm, Fault.

The ASD shall have an integral built in event log with the capacity to store up to 2,244 events.

The ASD shall incorporate integral facility to create and monitor live or historical trend graphs.

The ASD shall have an integral USB interface port that facilitates for the download / uploading of the system configuration, pipe network design and monitoring of the ASD via a standard USB cable for type B USB connections.

The ASD shall incorporate password access levels as defined in EN54-20.

The EN54-20 software design, configure, monitoring tool shall have the capacity to import drawings in dxf format.

Design and Application Codes of Practice

The fire detection system shall be designed, installed and commissioned in accordance with, and all elements shall meet the requirements of:

- FIA Design, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems C.O.P Feb 2012.
- FIA Design, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems C.O.P Feb 2012.
- FIA C.O.P Cold store and freezer application and design.
- FIA C.O.P Clean room application design.
- FIA C.O.P Heritage building application and design.
- FIA C.O.P In- Cabinet detection application and design.
- FIA C.O.P Dusty environment areas application and design.
- FIA C.O.P Primary sampling for AHU return grills application and design.
- BS 5839-1: (2002) + A2:2008 C.O.P Fire detection and fire alarms for buildings.
- BS 6266 (2011) C.O.P for fire protection for electronic equipment installations.
- EN54-20: 2006 Fire detection and fire alarm systems-Part 20 Aspirating smoke detectors.
- CEA 4022 12/1999 Specifications for fire detection and alarm systems-requirements and test methods for aspirating smoke detectors.
- Regulatory Reform (Fire Safety) Order 2006.
- VdS 2095: 2010-05 VdS-Richtlinien für automatische Brandmeldeanlagen – Planung und Eunbau
- ADPAD R7 (Jul06) Règle d'installation. Détection automatique d'incendie
- EN 54-2:1997 / A1: 2006 Fire detection and fire alarm systems - Part 2. Control and indicating equipment
- EN 54-4:2001/ A2: 2006 Fire detection and fire alarm systems - Part 4. Power supply equipment
- EN 54-7:2001/ A2: 2006 Fire detection and fire alarm systems - Part 7. Smoke detectors – Point detectors using scattered light, transmitted light or ionization
- PrEN 54-27 Fire detection and fire alarm systems - Part 27. Duct smoke detectors (Draft)
- The FIA CoP DSD The FIA Code of Practice for Design, Installation, Commissioning & Maintenance of Duct Smoke Detector (DSD) Systems

Specification ASD Design Approvals

CE (Construction Product Directive) to EN 54-20 for class A, B and C
LPCB (Loss Prevention Certification Board)
VdS (Verband der Sachversicherer e. V) Germany. Applied for

Submittals

Site drawings defining areas covered by the aspirating including the pipe network layout device location and wiring schematic.

The ASD system design shall be produced and submitted via the ASD manufactures EN54-20 software design, configure, monitoring tool with documentation verifying the design calculations conformity parameters inclusive of System design Class, Transport time, Hole sensitivity, Sample air flow rate, Sample point location, Sample air pressure and Pipe network configuration.

Submit the manufacturer's product data inclusive of installation and testing instructions and procedures.

Submit manufacturer's operation and maintenance instruction manuals inclusive of installation, commissioning and maintenance procedures.

Submit manufacturer's equipment warranty.

Communication with C.I.E.

The ASD shall be provided with embedded loop protocol in order to communicate with the CIE directly via the loop.

The C.I.E software, not the detector, shall make the alarm decision.

The system operator shall be able to view the current analogue or digital value of each detector at the C.I.E.

Addressable Manual Call Point Specification

Compliance with standards

The Manual Call Points shall be third party approved to EN54 part 11.

Only Manual Call Points of Type A shall be used.

The uses of Type B Manual Call Points are not acceptable.

Functionality

Manual Call Points shall be addressable, and shall connect with two wires to one of the C.I.E. Signalling Line Circuits.

The Manual Call Points shall, on command from the Control Panel, send data to the panel representing the state of the manual switch.

All operated Manual Call Points shall have a positive, visual indication of operation by means of an LED indicator.

The Manual Call Points shall operate on a digital protocol to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

The Manual Call Points shall be fitted with a loop isolation device in-built into the device.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

Manual Call Points shall be suitable for surface mounting, or semi-flush mounting as shown on the plans.

Manual Call Points shall be constructed of flame retardant plastic with clearly visible operating instructions provided on the glass. The 'house burning' symbol shall appear on the front of the Call Points.

Test functions

Manual Call Points shall use a key operated test without the need to break the glass, and shall be designed so that after Emergency operation, they cannot be restored to normal use except by the replacement of the glass element.

Address setting

The Manual Call Points shall provide address-setting means using decimal switches.

Addressable Manual Call Points that use binary address setting methods, such as a dip switch code cards or soft addressing are not acceptable.

Visual indication

The Manual Call Points shall provide bi-colour LED's. The LED's enable red, amber and green local status indication also indicating that the Manual Call Point is operational and in regular communication with the C.I.E.

The LED's shall be configurable from the C.I.E to give visual indication of:

- Device Healthy
- Fire
- Fault – Isolation in use
- Test Mode

If required, the flashing mode operation of the Call Point LED shall be controlled through the system field program.

Additional requirements

Optional waterproof (IP76) Manual Call Points shall be available.
Up to 159, addressable Manual Call Points may connect to one SLC loop.

Addressable Control Module Specification

Compliance with standards

The Control Modules shall be third party certified to CEA GEI 1-082 and CEA GEI 1-084.

General

Addressable Control Modules shall be provided to supervise and control the operation of one conventional indicating circuit of compatible, 24 Vdc powered, polarised audio/visual indicating appliances.

For fan shutdown and other auxiliary control functions, the control module may be set to operate as a Volt Free relay contact and shall connect to one of the C.I.E. Signalling Line Circuit Loops.

Addressable Control Modules shall operate on a digital protocol to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The Control Modules shall mount in a purpose made surface mount box, panel mount clip for mounting in to other equipment housings or on a DIN rail mounting clip.

The Control Modules shall include loop isolation in each unit, which shall be installer selectable as required.

Functionality

The indicating circuit shall be capable of powering a maximum of 1.5 Amps of Resistive audio visual signalling equipment, or as a Volt Free Contact (Form C) Relay shall be capable of switching 2 Amps @ 30Vdc.

The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay or indicating circuits may be energised at the same time on the same Signalling Line Circuit Loop.

Audio visual power shall be provided by a separate supervised power connection from the main C.I.E. or from a supervised remote power supply approved to EN54 Pt2.

Control Modules shall be loop powered and addressable devices, and shall connect with two wires to one of the C.I.E. Signalling Line Circuits.

Address setting

The Control Modules shall provide address setting on the module using decimal switches.

Addressable Modules that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The modules shall also feature an internal identifying code that the C.I.E. shall use to identify the type of module.

Address switches shall be viewed in two plains such that the address is visible when mounted in a surface mount box or DIN / panel mounted.

Visual indication

The Control Module shall provide bi-colour LED's. The LED's enable red, amber and green local status indication also indicating that the module is operational and in regular communication with the C.I.E.

The LED's shall be configurable from the C.I.E to give visual indication of:

- Device Healthy
- Fire
- Fault – Isolation in use
- Test Mode

If required, the flashing mode operation of the Control Module LED shall be controlled through the system field program.

Additional requirements

Up to 159, addressable Control Modules may connect to one Signalling Line Circuit Loop.

Addressable Radio Interface Translator Module Specification

Compliance with standards

Radio Interface Modules shall be designed to meet the requirements of EN54 Part 25 & BS5839 Part 1.

General

Radio Interface Modules shall be provided to connect one zone of radio detectors to one of the C.I.E. Signalling Line Circuit (SLC) Loops.

The Radio Interface Modules shall mount in a purpose made surface mount box with antenna positions in two planes.

Functionality

The Radio Interface Modules shall use 868MHz to communicate with up to 32 radio devices.

The Radio Interface Modules shall be loop powered and addressable devices, and shall connect with two wires to one of the C.I.E. Signalling Line Circuits.

The radio devices shall pass all analogue or digital device data via the Radio Interface Modules to the C.I.E.

Address setting

The Radio Interface Modules shall provide address setting on the Module using the on board LCD.

Addressable Modules that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The modules shall also feature an internal identifying code that the control panel shall use to identify the type of Module.

Visual indication

The Radio Interface Modules shall provide 3 visible LED indicators.

The LED's shall give visual indication of:

- Device Healthy
- Module Fault
- Low Power Source

The Radio Interface Modules shall provide an LCD for programming and additional information for the connected radio devices.

Test functions

The Radio Interface Modules shall pass test requests invisibly to the radio devices which, in turn, will respond in the same way as other loop powered devices.

Additional requirements

Up to 6, addressable Radio Interface Modules may connect to one SLC loop.
The C.I.E software, not the Radio Interface Modules, shall make the alarm/normal decision, thereby allowing the system operator to view the status of each radio device.

Addressable Monitor Module Specification

Compliance with standards

The Monitor modules shall be third party certified to CEA GEI 1-082 and CEA GEI 1-084.

General

Addressable Monitor Modules shall be provided to connect one supervised area of conventional Alarm Initiating Devices (any N.O. volt free contact device) to one of the C.I.E. Signalling Line Circuit Loops.

Addressable Monitor Modules shall operate on a digital protocol to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The Monitor Modules shall mount in a purpose made surface mount box, panel mount clip for mounting in to other equipment housings or on a DIN rail mounting clip.

The Control Modules shall include loop isolation in each unit, which shall be installer selectable as required.

Functionality

The Monitor Module shall use an electronic supervised input to monitor the conditions of flow switches, sprinkler valves, fire dampers etc.

Monitor Modules shall be loop powered and addressable devices, and shall connect with two wires to one of the C.I.E. Signalling Line Circuits.

Address setting

The Monitor Modules shall provide address setting on the Module using decimal switches.

Addressable Modules that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The modules shall also feature an internal identifying code that the C.I.E. shall use to identify the type of Module.

Address switches shall be viewed in two plains such that the address is visible when mounted in a surface mount box or DIN / panel mounted.

Visual indication

The Monitor Module shall provide bi-colour LED's. The LED's enable red, amber and green local status indication also indicating that the module is operational and in regular communication with the C.I.E.

The LED's shall be configurable from the C.I.E to give visual indication of:

- Device Healthy
- Fire
- Fault – Isolation in use
- Test Mode

If required, the flashing mode operation of the Monitor Module LED shall be controlled through the system field program.

Additional requirements

Up to 159, addressable Monitor Modules may connect to one Signalling Line Circuit Loop.
The C.I.E software, not the Monitor Module, shall make the alarm/normal decision, thereby allowing the system operator to view the status of each Monitor Module.

Addressable Dual Monitor Module Specification

Compliance with standards

The Dual Monitor Modules shall be third party certified to CEA GEI 1-082 and CEA GEI 1-084.

General

Addressable Dual Monitor Modules shall be provided to connect two supervised areas of conventional Alarm Initiating Devices (any N.O. volt free contact device) to one of the C.I.E. Signalling Line Circuit Loops.

Addressable Monitor Modules shall operate on a digital protocol to give reduced power consumption, up to 159 detectors and 159 modules may be connected to a single loop.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify its location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The Dual Monitor Module shall mount in a purpose made surface mount box, panel mount clip for mounting in to other equipment housings or on a DIN rail mounting clip.

The Dual Monitor Module shall include loop isolation in each unit, which shall be installer selectable as required.

Functionality

The Dual Monitor Module shall use two electronic supervised inputs to monitor the conditions of flow switches, sprinkler valves, fire dampers etc.

Dual Monitor Modules shall be loop powered and addressable devices, and shall connect with two wires to one of the C.I.E. Signalling Line Circuits.

Address setting

The Dual Monitor Modules shall utilise two module addresses with the start address being set as above and the second address being automatically assigned at the start address plus one.

Addressable Modules that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The modules shall also feature an internal identifying code that the C.I.E. shall use to identify the type of Module.

Address switches shall be viewed in two plains such that the address is visible when mounted in a surface mount box or DIN / panel mounted.

Visual indication

The Dual Monitor Module shall provide two bi-colour LED’s to show the status of each module address. The LED’s enable red, amber and green local status indication also indicating that the module is operational and in regular communication with the C.I.E.

The LED’s shall be configurable from the C.I.E to give visual indication of:

- Device Healthy
- Fire
- Fault – Isolation in use
- Test Mode

If required, the flashing mode operation of the Dual Monitor Module LED shall be controlled through the system field program.

Additional requirements

Up to 159, addressable Modules (79 Dual Monitor Modules) may connect to one Signalling Line Circuit Loop.

The C.I.E software, not the Monitor Module, shall make the alarm/normal decision, thereby allowing the system operator to view the status of each Monitor Module.

Addressable Dual Monitor and Single Relay Output Module Specification

Compliance with standards

The Dual Monitor and Single Relay Output Modules shall be third party certified to CEA GEI 1-082 and CEA GEI 1-084.

General

Addressable Dual Monitor and Single Relay Output Modules shall be provided to connect two supervised areas of conventional Alarm Initiating Devices (any N.O. volt free contact device).

In addition the Dual Monitor and Single Relay Output Modules shall provide a single change over contact output and shall connect to one of the C.I.E. Signalling Line Circuit Loops.

Addressable Monitor Modules shall operate on a digital protocol to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The Dual Monitor and Single Relay Output Modules shall mount in a purpose made surface mount box, panel mount clip for mounting in to other equipment housings or on a DIN rail mounting clip.

The Dual Monitor and Single Relay Output Modules shall include loop isolation in each unit, which shall be installer selectable as required.

Functionality

The Dual Monitor and Single Relay Output Modules shall use two electronic supervised inputs to monitor the conditions of flow switches, sprinkler valves, fire dampers etc.

The Dual Monitor and Single Relay Output Modules shall provide a single addressable change over relay rated at 2A @ 30Vdc.

Dual Monitor and Single Relay Output Modules shall be loop powered and addressable devices, and shall connect with two wires to one of the C.I.E. Signalling Line Circuits.

Address setting

The Dual Monitor and Single Relay Output Modules shall utilise three module addresses with the start address being set as above and the second and third addresses being automatically assigned at the start address plus one and two respectively.

Addressable Modules that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The modules shall also feature an internal identifying code that the C.I.E. shall use to identify the type of Module.

Address switches shall be viewed in two plains such that the address is visible when mounted in a surface mount box or DIN / panel mounted.

Visual indication

The Dual Monitor Module shall provide three bi-colour LED's to show the status of each module address. The LED's enable red, amber and green local status indication also indicating that the module is operational and in regular communication with the C.I.E.

The LED's shall be configurable from the C.I.E to give visual indication of:

- Device Healthy
- Fire
- Fault – Isolation in use
- Test Mode

If required, the flashing mode operation of the Dual Monitor Module LED shall be controlled through the system field program.

Additional requirements

Up to 159, addressable Modules (53 Dual Monitor and Single Relay Output Modules) may connect to one Signalling Line Circuit Loop.

The C.I.E software, not the Monitor Module, shall make the alarm/normal decision, thereby allowing the system operator to view the status of each Monitor Module.

BS7273-4 Door Release System Specification

Compliance with standards

The BS7273 part 4 2007 is the code of practice governing door holders and door release mechanisms. The door release system shall offer a compliant solution to meet the requirements of section 5 of BS7273-4 Category A installations by ensuring the fail safe operation of actuation of release mechanisms in conjunction with the existing output module and wider fire system.

General

The system shall comprise loop addressable output module, failsafe measure and enclosure.
The door release system shall be compatible with 12-24VDC door hold systems and include a volt free contact.
The system shall be capable of driving a third party relay to switch mains giving the added benefit of separating the fire system from direct mains connection.
The system shall provide a reduced activation time test mode.

The system shall provide visual indication of loop power status, loop communication and activation status via a bi-colour LED.

The system shall mount in a purpose made surface mount box, panel mount clip for mounting in to other equipment housings or on a DIN rail mounting clip.

Loop communication failure and/or power failure shall be able to be simulated to demonstrate the functionality of the module via the removal of an integral jumper.

Functionality

The door release system shall offer a compliant solution to meet the requirements of section 5 of BS7273-4 Category A installations by ensuring the fail safe operation of actuation of release mechanisms in conjunction with the existing output module and wider fire system.

Address setting

The system shall utilise one module address.

Addressable Modules that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

Address switches shall be viewed in two plains such that the address is visible when mounted in a surface mount box or DIN / panel mounted.

Visual indication

The system shall provide three bi-colour LED’s to show the status of each module address. The LED’s enable red, amber and green local status indication also indicating that the module is operational and in regular communication with the C.I.E.

The LED’s shall be configurable from the C.I.E to give visual indication of:

- Device Healthy
- Fire
- Fault – Isolation in use
- Test Mode

Additional requirements

Up to 159, addressable Modules may connect to one Signalling Line Circuit Loop.

Addressable Loop Powered Audible Visual Devices Specification

Compliance with standards

Intelligent Addressable Sounders shall be third party approved to EN54 part 3 and shall be the primary means of evacuation.

Visual Alarm Devices (VADs) complying to EN54-23 are only required if they are considered to be the primary source of evacuation to building occupants as defined within the building's fire risk assessment.

Visual Indicating Devices (VIDs) can provide useful supplementary indication that may increase the awareness of people to an event.

Functionality

Six basic product groups shall be available consisting of:

- Wall mounting sounders;
- Wall mounting sounders & combined Visual Alarm Device;
- Wall or ceiling mounting Visual Alarm Devices;
- Base sounders for use beneath detectors;
- Base sounders & combined supplementary indicator for use beneath detectors;

Intelligent Addressable Audible Visual Devices shall operate on a digital protocol to give reduced power consumption, upto 159 detectors and 159 modules may be connected to a single loop.

Intelligent Addressable Audible Visual Devices shall be fitted with a loop isolation device in-built into the device.

Location of devices on the loop circuit shall with the aid of a Loop Mapping Tool be able to identify it's location and address on the loop, allowing for a schematic layout drawing to be produced and printed for use in the O&M manual.

The warning devices shall fit to a common mounting plate incorporating a twist-lock bayonet fitting.

Warning devices shall connect with two wires to one of the C.I.E. Signalling Line Circuit loops and derive the control and power from this single connection.

Address setting

The warning devices shall provide address setting on the device using decimal switches.

Addressable warning devices that use binary address setting methods, such as a dip switch, code cards or soft addressing are not acceptable.

The warning device shall also feature an internal identifying code that the C.I.E. shall use to identify the type of device.

Tone and volume settings

The audible warning devices shall have 32 different tone settings, which shall be site configurable.

The audible warning device shall have up to 8 distinguishable tone settings, which can be operated via C.I.E programming or remote input i.e. Class Change, Bomb Alert.

The audible warning devices shall have three volume settings, which shall be site configurable, from the C.I.E. or at the device.

Additional requirements

Up to 159, warning devices may connect to one SLC loop.
The wall-mounting units shall have a waterproof mounting option for external fitting.
Base sounder and combined base sounder / supplementary indicators shall not require an additional detector base.

Appendix 1 - Type B Dependency and Local Silence

Functionality
On receipt of an unconfirmed alarm from a zone, the evacuation devices only in that zone are activated. If the alarm is confirmed by a second signal (from another device sensor or call point) or a different sensor within a multi-criteria detector the system proceeds to the relevant evacuation strategy. If a confirmation signal is not given the system may reset automatically without any need for manual intervention.

It shall be possible to silence the local alarm condition for a period, configurable based on the risk assessment of the dwelling, to allow the resident to investigate the local alarm in that zone. If the detection device activated is still detecting a fire after the period of delay, the local alarm in the zone shall be re-activated and the relevant building evacuation strategy shall be activated. Additionally, during the silence period, a confirmed fire by a second signal (from another device sensor or call point) or a different sensing element (heat for example) within a multi-criteria detector, within in the same zone, the local alarm in the zone shall be re-activated and activate the systems full cause and effect.

Example:-
Utilising Type B Dependency
(Two stage alarm from a single multi-criteria device)
A particularly challenging example of the use of dependencies is to integrate the requirements of a building which contains both shared areas and individual sleeping accommodation such as warden assisted flats. Within this example the shared areas require a fire system compliant with BS5839 pt 1 whilst the individual flats require systems compliant with BS5839 pt 6.

Traditionally, these sorts of installation have been provided with individual systems for the flats linked to a landlord system for the shared area. Type B dependency allows a zone to be defined for each individual flat that acts as if it were a separate system. On receipt of an unconfirmed fire signal from a flat only the local alarm within the flat is given. If the alarm is confirmed by a second signal the system proceeds to the relevant evacuation stage (general alarm or part of staged evacuation). Alternatively, if the confirmation signal is not given the system may reset automatically without attendance by the warden.

In this case a confirmation signal may be given by; a second device in the same zone, a second signal from the same device (either after a certain time or from a different sensor within a multi-criteria detector), or a manual confirmation e.g. from a call point.

This scenario enables a single integrated system to be used whilst avoiding the possibility of unnecessary disruption to other residents due to nuisance alarm signals (such as burning toast). It also eliminates the need for the system to be manually reset once the nuisance smoke has cleared.