



Inert Gaseous Suppression System
Fire Detection and Alarm Systems
Specification Document





Introduction

This guide has been created by FSL as an aid to be used by those who have the responsibility for specifying and designing active fire protection systems incorporating gaseous suppression systems including detection and alarm.

This intention is that this guide is used as a guide to good practice. This guide is not exhaustive to all design standards and codes.

For any queries concerning technical matters, please contact the FSL support team.

enquiry@firetec-systems.com

+44 (0) 118 989 7910

All information given in this guide is done so in good faith. FSL cannot be held responsible for any errors or omissions.



FSL (Firetec Systems Ltd.) was launched in April 2013 and is a member of the NITIN GROUP COMPANIES.

Our fledgling organisation, backed by a long-standing international specialist company, NITIN FIRE aims to set itself apart from competitors by providing a more - flexible, personal service and higher level of customer care.

FSL brings a fresh outlook to the market place and a wish to make life easier for customers; through the provision of a full range of suppression systems complemented by our detection and alarm products.

FSL is the independent option for trade organisations seeking gaseous suppression systems, detection and alarm.

The FSL team is backed by longstanding specialist organisation, Nitin Fire Protection Industries Ltd. (NFPIL). With over 25 years of experience in the Fire Protection Industry it is hardly surprising that NFPIL is one of the leading organisations in Fire Protection Systems in India with a presence in United Arab Emirates, South Asia & Europe.

FSL
The Business Centre
Unit 6, Molly Millars Lane
Wokingham, RG41 2QZ
UK

Tel: +44 (0)118 989 7910
Fax: +44 (0)118 989 2099
enquiry@firetec-systems.com
www.firetec-systems.com



INERTECH (IG01 IG55 IG100 IG541)
GASEOUS SUPPRESSION and DETECTION SYSTEM
ENGINEERING SPECIFICATIONS

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PART 1: GENERAL

1.01 Introduction

The system provides a Total Flooding fire suppression system in accordance with NFPA 2001 or BS EN 15004-5:2008

Inertech (Inert gas blends IG01, IG100, IG55 and IG541) may be used in the protection of the following types of facilities:

- Data processing
- Process control rooms
- Telecommunications facilities
- High value assets

Inertech (Inert gas blends IG01, IG100, IG55 and IG541) is **NOT** suitable for:

- Certain chemicals or mixtures of chemicals, such as cellulose nitrate and gunpowder, that are capable of rapid oxidation in the absence of air
- Reactive metals such as lithium, sodium, potassium, magnesium, titanium, zirconium, uranium, and plutonium
- Metal hydrides
- Chemicals capable of undergoing automatic thermal decomposition, such as certain organic peroxides or hydrazine.

These systems require fast detection and discharge to minimise the fire damage. Do not delay the extinguishant discharge longer than is necessary to evacuate the protected space.

The Inertech (Inert gas blends IG01, IG100, IG55 and IG541) clean agent total flooding gaseous fire suppression system is manufactured by Firetec Systems Limited (FSL), Unit 6, the Business Centre, Molly Millars Lane, Wokingham, RG41 2QZ, UK.

1.02 Applicable publications

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference there to (latest edition):

National Fire Protection Association (NFPA) Standards:
No. 2001 Clean Agent Fire Extinguishing Systems
BS EN 15004-5:2008

Loss Prevention Certification Board (LPCB)
LPCB red book live www.redbooklive.com

Industrial Risk Insurers Interpretive Guide (Detection & Controls)

U.S. Environmental Protection Agency, Protection of Stratospheric Ozone
59 FR 13044, March 18, 1994 (Final SNAP Ruling)

Requirements of the Authority Having Jurisdiction (AHJ)

1.03 Requirements

This installation shall be made in strict accordance with the drawings, specifications and applicable standards. All equipment and devices used shall be listed in the LPCB red Book.

1.04 General

Furnish all engineering design and materials for a complete fire detection / Inertech clean agent suppression system including charged storage cylinders, pipe network, nozzles, control panel, detectors, wiring, alarm and all other equipment necessary for a complete operational system.

Major system components shall be produced by FSL (no alternatives) and shall be installed by an authorized FSL distributor certified for the design and installation and service of Inertech clean agent suppression systems.

1.05 Submittal

1. The following shall be submitted for approval prior to delivery of materials:

Material and equipment information shall include manufacturer's technical data sheet for each component or device used in the system. This shall include, but not be limited to, the following:

- Detectors
- Manual discharge switches
- Control panel
- Release devices
- Alarm devices
- Agent storage cylinders
- Mounting brackets
- Discharge Nozzles
- Abort stations
- Piping isometrics
- Flow calculations

Provide information outlining the warranty of each component or device used in the system.

Provide information outlining the operation and maintenance procedures that will be required of the owner. This information shall explain any special knowledge or tools the owner will be required to employ and all spare parts that should be readily available.

Drawings shall indicate locations, installation details and operation details of all equipment associated with the Inertech clean agent system. Floor plans shall be provided showing equipment locations, piping, point-to-point wiring and other details as required. Isometric piping layouts shall be provided with the drawings. In addition, point-to-point electrical layout drawings shall be provided.

Sequence of operation, electrical schematics and connection diagrams shall be provided to completely describe the operation of the Inertech clean agent system controls.

PART 2: PRODUCTS

2.01 System Description and Operation

Systems shall be designed, installed and maintained in accordance internationally recognised standards:

NFPA 2001, Standard on clean agent fire extinguishing systems

ISO 14520, Gaseous fire-extinguishing systems.

BS EN 15004-5:2008, Fixed fire fighting system – Gas extinguishing systems

Inertech systems must be designed, installed, commissioned and maintained by qualified and competent personnel who have the relevant training and experience.

Cross-Zone Smoke Detection (double knock): The Inertech clean agent total flooding system shall be automatically actuated by cross-zoned detection circuits. Smoke detectors shall be ionization detectors and photoelectric with compatibility listings for use with the control unit. Smoke detectors shall be installed at no more than 250 square feet (37 m²) of coverage per detector. The detectors shall be alternated throughout the protected area with the system requiring two (2) detectors in alarm prior to automatic agent release.

2.02 Sequence of Operation

Activation of any single detector in any detection zone shall:

Cause a first-stage alarm (Horn/Strobe slow cadence).

Operate relay contacts for building alarm annunciation. Relay contacts are provided by two on-board relays, one for each protected zone. Wiring and termination to owner's equipment shall be provided by others.

Energize a corresponding lamp on the activated detector and control panel.

Activation of a detector on the second zone shall:

Cause a second-stage (pre-discharge) alarm to operate, horn/Strobe and Strobe. The horn shall sound at "March Time" cadence and a strobe at the protected area entrance shall illuminate.

Initiate a programmable time delay (Inertech clean agent total flooding agent release).

Operate auxiliary relay contacts to operate interconnected equipment such as HVAC shutdown and/or power off. Wiring and termination to owner's equipment shall be provided by others.

Upon completion of the time delay the Inertech clean agent total flooding system shall:

Cause a discharge alarm to be activated, Horn/Strobe and Strobe, horn shall sound a steady tone

Energize release actuator for Inertech cylinders releasing gaseous agent into the protected area.

2.03 Auxiliary Components

Double action manual releasing stations shall be provided at each exit of the protected area and shall, when activated, immediately release for Inertech clean agent total flooding agent and cause all audible/visual alarms to activate. In addition, activation of the manual releasing stations shall cause immediate shutdown of interconnected electrical circuits.

Abort stations shall be provided at each exit of the protected area and shall, when operated, interrupt the discharge of for Inertech clean agent total flooding agent and emergency power-off functions. The abort stations shall be momentary devices (dead-man) requiring constant pressure to maintain contact closure. Note: Manual Releasing Station activation shall override any abort station. Abort station operation shall be per IRI guidelines.

PART 3: MATERIAL AND EQUIPMENT (ELECTRICAL)

3.01 General Requirements

Materials and equipment shall be of a single manufacturer (FSL). Alternates will not be accepted. The name of the manufacturer and the serial numbers shall appear on all major components.

3.02 General Materials - Electrical

All electrical enclosures, raceways and conduits shall be employed in accordance with applicable codes and intended use and contain only those electrical circuits associated with the fire detection and control system and shall not contain any circuit that is unrelated to the system.

3.03 Control Systems - General

All control systems shall be LPCB approved and be utilized with listed or approved compatible operating devices and shall be capable of the following features:

- Ground fault indication
- Supervised detection circuit(s)
- Supervised alarm circuit(s)
- Supervised release circuit(s)
- Supervised manual pull circuit
- Supervised primary power circuit
- Alarm overrides trouble logic
- Battery standby
- Front panel indicating lamps (LEDs)
- Key lock steel enclosure
- Programmable time delay
- Programmable detection logic
- Prioritized trouble logic
- Microprocessor based logic
- History buffer

3.04 Control Panel – FSL Control System

The control panel shall communicate with and control the following types of equipment used to make up the system: smoke detectors, manual release/abort stations, alarm notification appliances, releasing components and other system controlled devices.

System Capacity - The control panel shall include two Style Y/Z (Class A/B) notification circuits, two releasing circuits, two Form-C alarm and one trouble contacts, four Style B/D (Class A/B) initiating circuits, two Style B/D (Class A/B) manual release circuits, and two Style B/D (Class A/B) abort circuits. For two zone applications, manual release & abort circuits are combined on one special purpose monitor circuits, and are controlled via an abort supervision module. (Current limiter). For class A wiring, on-board class A adapter modules are available.

System Display - The system display shall indicate the status of the following system parameters:

- AC POWER: Green LED
- SYSTEM ALARM: Red LED
- RELEASE: Red LED
- SUPERVISORY: Yellow LED
- SYSTEM TROUBLE: Yellow LED
- ALARM SILENCED: Yellow LED

System Control Switch Operation –

Acknowledge Switch: Activation of the control panel acknowledge switch acknowledges system status during normal operation.

Alarm Silence Switch: Activation of the alarm signal silence switch shall cause all alarm notification appliances to return to the normal condition after an alarm condition except after discharge time delay.

System Reset Switch: Activation of the system reset switch shall cause all electronically-latched initiating devices, appliances as well as all associated output devices and circuits, to return to their normal condition. Holding system reset down shall perform a LAMP TEST function and will activate the sounder.

System Operation –

Zone Status LEDs: The alarm, supervisory or trouble LED(s) shall flash until event(s) has been acknowledged. Any subsequent new alarm, supervisory or trouble condition will resound all indications and flash new events.

Supervisory: A short circuit on this zone shall cause the supervisory LED to flash. The tone silence switch shall silence the sounder causing the supervisory LED to illuminate steady. An open circuit shall report as a zone trouble.

Optional modules shall include:

Relay module includes four relays, form C 7A @ 120VAC, 5A @30VDC, unsupervised contacts.

The control panel shall also include the following functions:

Output circuits shall be protected against false activation by using a 2-step electronic activation circuit.

Battery/earth fault supervision shall be provided.

Adjustable delay timer shall be available, zero to thirty seconds.

Cross-zone option shall be selectable (two zones in alarm before release).

Three abort functions options shall be selectable:

(1) Standard LPCB method; (2) IRI method; and (3) local AHJ method.

A second release zone and circuit are available and fully programmable.

A supervised manual release circuit shall be provided which, when activated, shall override the Abort.

7 AH to 12 AH battery options shall be available providing up to 90 hours standby.

A watchdog timer to supervise microprocessor shall be provided.

Slide-in zone identification labels shall be provided.

Power Supply –

The power supply shall be integral to the control panel and provide all control panel and peripheral device power needs.

Input power shall be 120 VAC, 60 Hz. The power supply shall provide an integral battery charger for use with batteries up to 12 AH.

The power supply shall also provide 2 amperes of regulated 24VDC power for each release circuit and alarm notification circuits, (3A max. per panel). Aux power output for four-wire smoke detectors or other is rated at 24 VDC up to 750 mA, resettable or non-resettable.

The power supply shall be designed to meet NFPA requirements for power-limited operation on all notification and initiating circuits.

Positive-temperature-coefficient thermistors, circuit breakers, fuses, or other over-current protection shall be provided on all power outputs.

Mechanical Design –

The control panel shall be housed in a cabinet designed for mounting directly to a wall or vertical surface. The back box and door shall be constructed of .060 steel with provisions for electrical conduit connections into the sides and top. The door shall provide a key lock and include a glass or other transparent opening for viewing of all indicators. The cabinet shall be approximately 4.25 inches (127 mm) deep, and 14.5 inches (368 mm) wide, and 16 inches (406 mm) high. An optional trim ring shall be used for flush mounting of the cabinet. Space shall be provided in the cabinet for 7 AH or 12 AH batteries.

Batteries –

Batteries shall be 2 - 12 volt, Gel-Cell type providing 24 VDC.

Batteries shall have sufficient capacity to power the fire alarm system for not less than 24 hours in standby plus 10 minutes of alarm upon a normal AC power failure.

The batteries are to be completely maintenance free. No liquids are required. Fluid level checks, refilling, spills and leakage shall not be accepted.

3.05 Manual Pull Station

A manual pull station shall, when operated, will cause an immediate release of the G² clean agent total flooding agent suppression agent. They shall use a key operated test-reset lock and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

All operated stations shall have a positive, visual indication of operation.

Manual stations shall be metal with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front and both sides of the stations.

Stations shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches (1.06 m), nor more than 48 inches (1.22 m) above the finished floor.

Operation shall require two (2) actions.

3.06 Smoke Detectors

Smoke detectors shall be 24 VDC and shall be LPCB approved.

The sensitivity shall be factory set per UL 268.

The detector cover and screen shall be easily removable for field cleaning.

The head-to-base connection shall be made by use of bifurcated contacts. Terminal connections to the base shall be the screw type that are accessible with the base installed on the mounting box.

Photoelectric type smoke detector shall be the light reflective type and compatible with the FSL control system.

The design of the photoelectric detector compensating circuits shall provide stable operation with regard to minor changes in temperature, humidity and atmospheric conditions.

Photoelectric-type smoke detector with heat detector shall be the light reflective type and compatible with the FSL control system.

3.07 Indicating Appliances

Sounder/Strobe Combination –

The sounder/strobe combination shall operate on 24 VDC and shall be approved for use with the listed control system.

The sounder/strobe combination shall be polarized and powered from the control unit.

The device shall be UL listed or FM approved.

The strobe shall be listed to UL Standard 1971 for the Hearing-Impaired, approved for Fire Protective Service, and rated at either 15 cd or 75 cd.

The sounder shall have eight (8) tone options selected by means of programming clips.

Strobe –

The strobe shall operate at 24 VDC and shall be approved for use with the listed control system.

The strobe shall be polarized and powered from the control unit.

The strobe shall be LPCB approved.

The strobe shall be listed to UL Standard 1971 for the Hearing-Impaired, approved for Fire Protective Service, and rated at either 15 cd or 75 cd.

3.08 Abort Switch

The abort switch shall be used where an investigative delay is desired between detection and actuation of the fire suppression system.

This switch shall be a momentary contact "dead-man" type switch requiring constant pressure to transfer one set of contacts. Clear operating instructions shall be provided at the abort switch.

This switch shall be rated at 28 VDC @ 1.1 amp make break or 6 amp continuous carry.

The terminal connections shall be of the screw type.

3.09 Maintenance Lock-Out Switch

The maintenance lock-out switch shall be used where it is desired to disable the fire suppression system during routine maintenance.

This switch shall be key operated allowing removal of the key in either the "Normal" or "Lock-Out" position. A red indicator lamp shall be included on the switch assembly to be illuminated when in the "Lock-Out" position. The control unit is to indicate a trouble condition when in the "Lock-Out" position.

The switch shall include one (1) set of normally open and one (1) set of normally closed contacts rated at 28 VDC @ 1.1 amp make/break or 6 amp continuous carry.

The terminal connections shall be of the screw type

PART 4: SYSTEM ARRANGEMENT

4.01 Inertech (IG01 IG55 IG100 IG541) Physical Properties

Inert Gases Argon and Nitrogen are naturally occurring colourless, odourless and electrically non-conductive gases at normal temperatures and pressures. They leave no residue and have acceptable toxicity for use in occupied spaces.

Inert Gas suppresses a fire by reducing the oxygen content within a protected space to a concentration which does not sustain combustion. Concentrations can be chosen which allow people to see and breathe while permitting them to leave the fire area safely.

The system should be designed to discharge in accordance with the national standard depending on the authority having jurisdiction. Inert Gas is clean, efficient, environmentally acceptable, and leaves no residue, thus minimizing any downtime after a fire. Most materials contained in areas protected by Inert Gas, such as aluminium, brass, rubber, plastics, steel, and electronic components, are unaffected when exposed to Inert Gas.

Inert Gas is stored as a compressed gas in steel cylinders at a pressure of 150, 200 or 300 bar. When discharged, Inert Gas will expand at the discharge nozzles and effectively mix with the air throughout the protected area.

Various gases and mixtures are permitted under EN15004, NFPA 2001 and ISO 14520 Standards. They provide guidance on their use and concentrations including deep seated fires.

| Inert Gas Physical Properties | IG-01 | IG100 | IG55 | IG541 |
|--|-------|-------|-------|-------|
| Chemical formula | - | - | - | - |
| Gas : Argon - Ar | 100% | - | 50% | 42% |
| Gas : Nitrogen - N ₂ | - | 100% | 50% | 50% |
| Gas : Carbon Dioxide - CO ₂ | - | - | - | 8% |
| Density with respect to air at standard temperature/pressure | 1.38 | 0.97 | 1.17 | 1.18 |
| Saturated vapour density at 1 atm 20°C kg/m ³ | 1.661 | 1.166 | 1.412 | 1.434 |

The Inertech suppression system provides a total flooding fire suppression system in accordance with EN15004, NFPA 2001 or ISO14520

Inert Gas may be used in the protection of the following types of facilities:

- Data processing
- Process control rooms
- Telecommunications facilities
- Fuel Stores
- Engine rooms
- High value assets

Inert Gas is NOT suitable for but may inhibit the spread of fire to normal combustibles for the following types of fire:

- Certain chemicals or mixtures of chemicals, such as cellulose nitrate and gunpowder, that are capable of rapid oxidation in the absence of air
- Reactive metals such as lithium, sodium, potassium, magnesium, titanium, zirconium, uranium, and plutonium
- Metal hydrides
- Chemicals capable of undergoing automatic thermal decomposition, such as certain organic peroxides or hydrazine

4.02 Flow Calculations

A. Computerized verification of flow calculations shall be submitted for each FSL Inertech fire suppression system and include the following data as a minimum:

- Quantity of agent per nozzle
- Orifice union/nipple and nozzle orifice diameters
- Pressure at nozzle (psi)
- Nozzle body nominal pipe size (inch)
- Number and size of cylinders
- Total agent
- Pipe size per pipe section
- Pipe schedule per pipe section
- Number, size and type of fitting per pipe section
- Actual length per pipe section (feet)
- Equivalent length per pipe section (feet)
- Discharge time (seconds)

Only use the FSL Inertech calculation program. This program will:

- Calculate the quantity of extinguishant based on the space volumes and temperature.
- Calculate the optimum pipe sizes based on the input schematic.
- Calculate the nozzle orifice size.

Containers, fills, valves, pipes and nozzles must be installed exactly as input to and specified by the program or the flow distribution and discharge time will not be accurate.

PART 5: EQUIPMENT AND MATERIAL (MECHANICAL)

Each Inertech system is specifically designed to accommodate the individual demands of the areas to be protected. The wide range of configurations of the components provides the flexibility necessary for this custom design.

An Engineered system requires that hydraulic flow calculations are undertaken to size the pipe work and discharge nozzles. Only the FSL program shall be used. Normal system design shall be at 21°C.

5.01 Cylinder/Container Assembly

Inert Gas is stored in specially designed storage cylinder assemblies. Storage cylinders are available in various sizes and are pressurised to 150, 200 or 300 bar. Each storage cylinder is equipped with an identification label indicating the quantity of Inert gas, pressurisation level and supplier.

The steel storage cylinders are manufactured to the requirements of the National Standards appropriate with their country of use.

Europe are EN 13322-1 Transportable cylinders – seamless, Transportable Pressure equipment Directive (TPED 99/36 EC) and the carriage of dangerous goods by road regulations (ADR).
USA is DOT 4BW500

Storage cylinders must be secured with the supplied racking to a solid wall or framework.

Only cylinders of the same capacity and pressure shall be manifolded together.

5.02 Cylinder Valve and Pressure Controller

Storage cylinder discharge valves have a forged brass body and accept connections for the discharge outlet, actuator, pilot gas connection and a pressure gauge/switch. The 200/300 bar differential pressure valve (*Figure 5.2.1*) can be actuated pneumatically, manually and electrically through the top screwed connection.

The storage cylinder valve has five connections:

1. Outlet with DIN477 connection
2. Pressure gauge/pressure switch connection: This is a threaded connection housing a check valve and must be fitted with FSL approved devices to function correctly
3. Valve 'discharge pressure' connection G1/8 to pneumatically actuate slave storage cylinders. The plug is removed and used to plug the last pneumatic actuator port on NON selector valve systems.
4. Top mounted actuator connection
5. Rupture disc to discharge the gas should the working pressure of the storage cylinder be exceeded. Rupture discs are supplied rated for the charge pressure and the maximum working pressure of the container.

The pressure controller connects directly onto the outlet of the discharge valve and receives the high pressure inert gas of up to 300 bar at its connection. The device produces a controlled output pressure of inert gas at its connection. This controlled pressure will be a maximum of 60 bar.

Controlling the pressure over the discharge time allows for smaller bore pipe work throughout of the system than traditional orifice plate systems.

Cylinders shall only be mounted with the valve uppermost and secured with the supplied straps to sound wall or secured racking. All racking systems use a BS6296:1988. Channel. The orientation of the valve outlet is indicated by an arrow on the cylinder.

The storage cylinder valve protection caps should not be removed until the entire racking system is complete, secure and ready to be commissioned.

5.03 Discharge Manifold and Pipe Network

The Inertech system will operate at no more than 60 bar (downstream of the pressure controller)

1. For multi space protection using selector valves the discharge manifold shall be fitted with a pressure gauge and a relief valve
 2. The manifold will supply the pressure for selector valve with pneumatic actuation via a pressure reducing regulator
 3. The DN32 manifold spacing for the 150 L storage cylinder is 376mm
 4. The DN32 manifold spacing for the 80 L storage cylinder is 286mm
 5. For larger systems a DN50 manifold shall be used, allowing for higher flow rates due to the larger bore.
-
1. Check for changes to protected space.
 - a. The pipe work design, discharge rate and nozzle size shall be calculated in accordance with this design manual and the Inertech design software. If the protected spaces change a new calculation must be undertaken using the Inertech calculation software.
 2. Pipe work fixing - Horizontal and vertical pipe work hangers must:
 - a. Support the pipe work under all conditions
 - b. Allow expansion and contraction of pipes
 - c. Relieve stress on other equipment by taking weight of the pipes
 - d. Be anchored in to beams, columns, concrete walls to stop longitudinal or lateral movement.
 - e. Support riser piping independently from horizontal piping
 - f. Must not be supported by other piping e.g. water pipes
 - g. Maximum recommended spacing between hangers are given in EN 15004 -1 6.3.4
 3. Pipe Work Requirements:
 - a. In corrosive environments the pipe work shall be protected. In general all steel pipe work should be galvanised or zinc plated
 - b. Use only appropriately pressure rated pipe and fittings for 60 bar pressure
 - c. Take into account closed sections when selector valve with pneumatic actuators are used
 - d. Use concentric reducer and reducing couplings/bushes for pipe size reductions
 - e. Screwed pipe joints are made with sealing tape/compound. Do not cover the first 2 threads to prevent sealant entering pipe work
 - f. Screwed pipe must be clean cut with full length threads
 - g. Welded joints must permit full bore flow
 - h. Do not use mitre welds
 - i. Follow the guidance in the international standards and local regulations on protecting the system and pipe work from mechanical damage, the effects of fire, earthing (see EN 15004-1 5.5) and electrical clearance (see EN 15004-1 5.4), marking of pipe work and the competency of the installer. Do not install pipe work where it could be subjected to mechanical damage.
 - j. All pipe work must be free from deformities and ridges that can impede the flow and all burrs and sharp edges must be removed
 - k. Pipe work must be painted or banded to identify use in accordance with national standards.
 - l. Each pipe section shall be cleaned internally after preparation and before assembly by means of swabbing, utilizing a suitable non-flammable cleaner
 - m. The pipe network shall be free of particulate matter and oil residue before installation
 - n. To be installed by a competent pipe fitter with full knowledge of the relevant standards

No changes to the pipe work layout are permitted without the authority of the system designer. Any changes in lengths, pipe diameter and number of fittings will have a significant impact on the flow calculations.

5.04 Hangers and Bracing

All system piping, both vertical and horizontal must be suitably supported with hangers. Pipe hangers shall be capable of supporting the pipe under all conditions of operation and service. They shall allow the expansion and contraction of the piping, and prevent excessive stress resulting from transmitted weight being induced into the connected equipment. Pipes must be anchored to the building structure such as beams, columns, concrete walls etc., in order to prevent longitudinal or lateral movement or sway. Where practical, riser piping shall be supported independently of the connected horizontal piping. The piping must not be hung or supported from other piping systems (i.e. water, air pipes, etc.)

Generally no section of pipe should be without a hanger or brace. Maximum recommended spacing between hangers are given in NFPA 2001 and BS EN 15004-5:2008

5.05 Selector Valve (inc.) Pneumatic Actuator, Position Indicator and Solenoid Valve

These valves are used in order to select a discharge pipe network for a multi area system served by a single cylinder bank allowing the inert gas to be discharged into the selected risk area. They can also be used to vent a pressure build up in the manifold. 2" valves and below are threaded full bore, 2-½" and above are flanged to ANSI/ASME B16.5 class 600 raised face, full bore. All selector valves are supplied complete with pneumatic actuator, position indicator switch and solenoid valve for remote actuation.

5.06 Discharge Nozzles

The discharge nozzle plays an important role in the system in that it controls the flow of extinguishant and distribution of extinguishant into the protected space.

2 types of nozzle are available namely 180 Degree for side wall mounting and 360 degree for centre space mounting.

- The Nozzle controls the flow rate and quantity of gas discharge into the risk.
- The orifice size must be determined by the Inertech calculation program to discharge the correct amount of gas in the required discharge time. Minimum nozzle pressure 2 bar.
- Orifices smaller than 3mm diameter require inline strainer at inlet of nozzle.
- 360° Nozzles should be mounted vertically and 180° nozzles should be angled at 45°

The discharge nozzles shall be installed as directed by the installation drawing in a manner so that they will not potentially cause injury to personnel. When discharged from the nozzle, the agent should not directly impinge on areas where personnel might be found in the normal work area. The agent shall not impinge on any loose objects on shelves, cabinet tops, or similar surfaces where loose objects could be present and become missiles.

5.07 Venting Considerations

In general the same quantity of air needs to be vented from the protected space as is discharged by the system or unacceptable room pressures are experienced. The Inertech calculation program will calculate the minimum free vent area based on the maximum pressure that the protected space can withstand.

The protected space structure including the windows needs to be of adequate strength to withstand these under and over pressures.

After discharge the Inertech must be retained for a sufficient period of time to allow the cooling of the ignition source to prevent re-ignition. Refer to NFPA 2001 & BS EN 15004-5:2008 for guidance on the period.

To ensure that the retention time is achieved a room integrity test must be carried out in accordance with the standards.

PART 6: WARRANTY

6.01 Warranty

All FSL Inertech system components furnished under this contract shall be guaranteed against defect in design, material and workmanship for the full warranty time, which is standard with the manufacturer and/or supplier but not less than one (1) year from the date of system acceptance. In addition, the installing contractor must guarantee the system

PART 7: MAINTENANCE

7.01 Periodic Maintenance

At least semi-annually, the FSL Inertech system shall be inspected by FSL authorised and trained distributor.

7.02 Maintenance Procedures

The following shall be done at least semi-annually by an authorised FSL distributor certified for the design and installation and service of FSL Inertech suppression systems:

1. Full functions test of all Detection and Control Systems
2. Agent quantity and pressure of each cylinder shall be checked using a separate, calibrated device. If the agent cylinder shows a loss in pressure (adjusted for temperature) of more than 5 percent, it shall be refilled or replaced.

A written report shall be submitted to the system owner upon completion of each FSL Inertech system inspection. It shall include the following:

1. System location and size.
2. Type of Detection & Control Panel used.
3. Results of Inspection and Maintenance Procedures (Pass/Fail).
4. A record of any system defects discovered.
5. A record of any structural conditions in the protected hazard that have the potential to adversely affect system performance.

FSL
The Business Centre
Unit 6, Molly Millars Lane
Wokingham, RG41 2QZ

t +44 (0) 118 989 7910
f +44 (0) 118 989 2099

enquiry@firetec-systems.com
www.firetec-systems.com

A NITIN GROUP COMPANY

