

# **FIRE DETECTION/INERGEN SUPPRESSION SYSTEM ENGINEERING SPECIFICATIONS**

## **PART 1 - GENERAL**

### **1.01 DESCRIPTION OF WORK:**

- A. Design and installation of an engineered fire detection and INERGEN total flooding, gaseous agent, fire suppression system as manufactured by Ansul Fire Protection, Marinette, Wisconsin.
- B. Drawings: The contract drawings indicate the general arrangements of the areas to receive detection and INERGEN protection. Contractor is to review all drawings so that all items affecting the operation of the fire detection/INERGEN suppression system (such as equipment location, air diffusers, damper closures, and door openings) are considered in the design of the engineered system.

### **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 thereto (latest edition):
  - 1. National Fire Protection Association (NFPA) Standards:
    - No. 2001 Clean Agent Fire Extinguishing Systems
    - No. 70 National Electric Code
    - No. 72 National Fire Alarm Code
  - 2. Factory Mutual Systems (FM) Publication  
Factory Mutual Approval Guide
  - 3. Underwriters Laboratories, Inc. (UL) Publication  
Fire Protection Equipment Directory with quarterly supplements
  - 4. Department of Transportation (DOT)  
Title 49 Code of Federal Regulations Parts 100 to 199  
Transportation of Hazardous Materials, DOT3AAZ300 or 3AAZ15T
  - 5. National Electrical Manufacturers Association (NEMA) Publication  
Enclosures for Industrial Controls and Systems
  - 6. Industrial Risk Insurers Interpretive Guide (Detection & Controls)
  - 7. U.S. Environmental Protection Agency, Protection of Stratospheric Ozone  
59 FR 13044, March 18, 1994 (Final SNAP Ruling)

8. Requirements of the Authority Having Jurisdiction (AHJ)

**1.03 REQUIREMENTS:**

- A. This installation shall be made in strict accordance with the drawings, specifications and applicable National Fire Protection Association Standards. All equipment and devices used shall be listed in both the UL Fire Equipment Directory and the Factory Mutual Approval Guide.
- B. Design and installation of the fire detection/INERGEN suppression system will be in strict accordance with the following guidelines and regulatory agencies:
  - 1. NFPA 2001 Clean Agent Fire Extinguishing Systems
  - 2. NFPA 72 National Fire Alarm Code, Latest Edition
  - 3. NFPA 70 National Electric Codes, Latest Edition
  - 4. Americans with Disabilities Act, Title 24, Latest Edition

**1.04 GENERAL:**

- 1. Furnish all engineering design and materials for a complete fire detection/INERGEN suppression system including charged INERGEN storage cylinders, nozzles, control panel, detectors, wiring, alarm and all other equipment necessary for a complete operational system.
- 2. Major system components shall be produced by Ansul Fire Protection (no alternatives) and shall be installed by Interstate Fire Protection of North Conway, NH and Gardiner, ME an authorized Ansul distributor certified for the design and installation and service of INERGEN suppression systems.
- 3. Contractor shall, as a minimum, provide 24-hour emergency service, 7 days a week and shall be able to respond to an emergency situation within 4 hours of receiving an emergency trouble call. In addition, contractor shall maintain no less than \$2 million liability insurance.

**1.05 SUBMITTAL:**

- 1. The following shall be submitted for approval prior to delivery of materials:
  - A. Material and equipment information shall include manufacturer's catalog cut sheet and technical data for each component or device used in the system. This shall include, but not be limited to, the following:
    - a. Detectors
    - b. Manual discharge switches
    - c. Control panel
    - d. Release devices
    - e. Alarm devices
    - f. Agent storage cylinders
    - g. Mounting brackets

- h. Discharge Nozzles
  - i. Abort stations
  - j. Piping isometrics
  - k. Flow calculations
- B. Provide information outlining the warranty of each component or device used in the system.
- C. 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.
- D. Drawings shall indicate locations, installation details and operation details of all equipment associated with the INERGEN 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 shop drawings. In addition, point-to-point electrical layout drawings shall be provided.
- E. Sequence of operation, electrical schematics and connection diagrams shall be provided to completely describe the operation of the INERGEN system controls.

## **PART 2 – PRODUCTS**

### **2.01 SYSTEM DESCRIPTION AND OPERATION:**

1. The system shall be an INERGEN total flooding, gaseous, clean agent; fire suppression system designed to provide a uniform concentration of INERGEN for the protected area.
  - A. The amount of INERGEN to be provided shall be the amount required to obtain a uniform (minimum) concentration as required by the design manual for ten (10) minutes. (Ansul INERGEN design, installation, recharge & maintenance manual part # 416655-09; U.L. file # EX 4510.) Take into consideration such factors as un-closable openings (if any), “rundown” time of fans, time required for dampers to close (and requirements for any additional dampers), and any other feature of the facility that could affect concentration. The design concentration shall be by volume at 70 F.
  - B. Cross-Zone Smoke Detection: The INERGEN 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 m) 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:

- A. Activation of any single detector in any detection zone shall:
  - 1. Cause a first-stage alarm (Horn/Strobe slow cadence).
  - 2. Operate relay contacts for building alarm annunciation. Relay contacts are provided by two onboard relays, one for each protected zone. Wiring and termination to owner's equipment shall be provided by others.
  - 3. Energize a corresponding lamp on the activated detector and control panel.
  
- B. Activation of a detector on the second zone shall:
  - 1. 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.
  - 2. Initiate a programmable time delay (INERGEN agent release).
  - 3. 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.
  
- C. Upon completion of the time delay the INERGEN system shall:
  - 1. Cause a discharge alarm to be activated, Horn/Strobe and Strobe. Horn shall sound a steady tone
  - 2. Energize release actuator for INERGEN cylinders releasing gaseous agent into the protected area

## 2.03

### AUXILIARY COMPONENTS:

- A. Double action manual releasing stations shall be provided at each exit of the protected area and shall, when activated, immediately release the INERGEN 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.

- B. Abort stations shall be provided at each exit of the protected area and shall, when operated, interrupt the discharge of INERGEN 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 and FM guidelines.

### **PART 3 - MATERIAL AND EQUIPMENT**

#### **3.01 GENERAL REQUIREMENTS:**

- A. Materials and equipment shall be of a single manufacturer (Ansul Fire Protection). 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:**

- A. 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.
- B. Unless specifically provided otherwise in each case, all conductors may be U.L approved, plenum rated fire wire, run without a conduit or raceway.
- C. Any conduit or raceway exposed to weather or other similar conditions shall be properly sealed and installed to prevent damage. Provisions for draining and/or drying shall be employed.
- D. NEMA rating and/or electrically hazardous classifications shall be observed and any equipment or materials installed must meet or exceed the requirements of service.
- E. Any wiring shall be of the proper size to conduct the circuit current but shall not be smaller than #18 AWG unless otherwise specified for a given purpose. Wire that has scrapes, nicks, gouges or crushed insulation shall not be used. The use of aluminum wire is strictly prohibited.
- F. Splicing of circuits shall be kept to a minimum and are only to be found in an electrical device suited for the purpose.
- G. Wire spliced together shall have the same color insulation.
- H. Wire splices shall be made with appropriate devices suited for the purpose.

- I. White colored wire shall be used exclusively for the identification of the neutral conductor of an alternating current circuit.
- J. Green colored wire shall be used exclusively for the identification of the earth ground conductor of an AC or DC circuit.

**3.03 CONTROL SYSTEMS - GENERAL:**

- A. All control systems shall be UL Listed or FM approved and be utilized with listed or approved compatible operating devices and shall be capable of the following features:
  - 1. Ground fault indication
  - 2. Supervised detection circuit(s)
  - 3. Supervised alarm circuit(s)
  - 4. Supervised release circuit(s)
  - 5. Supervised manual pull circuit
  - 6. Supervised primary power circuit
  - 7. Alarm overrides trouble logic
  - 8. Battery standby
  - 9. Front panel indicating lamps (LEDs)
  - 10. Key lock steel enclosure
  - 11. Programmable time delay
  - 12. Programmable detection logic
  - 13. Prioritized trouble logic
  - 14. Microprocessor based logic
  - 15. History buffer

**3.04 CONTROL PANEL – ANSUL Z-10 CONTROL SYSTEM:**

- A. The control panel shall be an Ansul model Z-10 and 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.
- B. 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, onboard class A adapter modules are available.
- C. 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

D. System Control Switch Operation –

1. Acknowledge Switch: Activation of the control panel acknowledge switch acknowledges system status during normal operation.
2. 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.
3. 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 piezo sounder.

E. System Operation –

1. 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.
2. Supervisory: A short circuit on this zone shall cause the supervisory LED to flash. The tone silence switch shall silence the piezo causing the supervisory LED to illuminate steady. An open circuit shall report as a zone trouble.

F. Optional modules shall include:

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

G. The control panel shall also include the following functions:

1. Output circuits shall be protected against false activation by using a 2-step electronic activation circuit.
2. Battery/earth fault supervision shall be provided.

3. Adjustable delay timer shall be available, zero to thirty seconds.
4. Cross-zone option shall be selectable (two zones in alarm before release).
5. Three abort functions options shall be selectable: (1) Standard UL method; (2) IRI method; and (3) local AHJ method.
6. A second release zone and circuit are available and fully programmable.
7. A supervised manual release circuit shall be provided which, when activated, shall override the Abort.
8. 7 AH to 12 AH battery options shall be available providing up to 90 hours standby.
9. A watchdog timer to supervise microprocessor shall be provided.
10. Slide-in zone identification labels shall be provided.

#### H. Power Supply –

1. The power supply shall be integral to the control panel and provide all control panel and peripheral device power needs.
2. 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.
3. The power supply shall also provide 2 amperes of regulated 24 VDC 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.
4. The power supply shall be designed to meet UL and NFPA requirements for power-limited operation on all notification and initiating circuits.
5. Positive-temperature-coefficient thermistors, circuit breakers, fuses, or other over-current protection shall be provided on all power outputs.

#### I. 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.

J. Batteries –

1. Batteries shall be 2 - 12 volt, Gel-Cell type providing 24 VDC.
2. 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.
3. 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. A manual pull station shall, when operated, cause an immediate release of the INERGEN 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.
- B. All operated stations shall have a positive, visual indication of operation.
- C. 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.
- D. 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.
- E. Operation shall require two (2) actions.

**3.06 SMOKE DETECTORS**

- A. Smoke detectors shall be 24 VDC and shall be UL listed and FM approved.
- B. Each detector shall include a visual status indicator, provide remote LED output, and include a built-in test capability.
- C. The sensitivity shall be factory set per UL 268.
- D. The detector cover and screen shall be easily removable for field cleaning.

- E. 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.
- F. Ionization-type smoke detector shall be the dual chamber type and compatible with the Ansul control system. The detector shall have an LED in its base, which is illuminated in a steady-on mode when in alarm, and pulse mode when in standby. Reset of the detector shall be performed by the control unit reset switch.
- G. The design of the ionization detector compensating circuits shall provide stable operation with regard to minor changes in temperature, humidity and atmospheric conditions
- H. Photoelectric type smoke detector shall be the light reflective type and compatible with the Ansul control system. The detector shall have an LED in its base, which is illuminated in a steady-on mode when in alarm, and pulse mode when in standby. Reset of the detector shall be performed by the control unit reset switch
- I. The design of the photoelectric detector compensating circuits shall provide stable operation with regard to minor changes in temperature, humidity and atmospheric conditions.
- J. Photoelectric-type smoke detector with heat detector shall be the light reflective type and compatible with the Ansul control system. The detector shall have an LED in its base, which is illuminated in a steady-on mode when in alarm, and pulse mode when in standby. Reset of the detector shall be performed by the control unit reset switch.

### **3.07**

#### **INDICATING APPLIANCES:**

- A. Sounder/Strobe Combination –
  - 1. The sounder/strobe combination shall operate on 24 VDC and shall be approved for use with the listed control system.
  - 2. The sounder/strobe combination shall be polarized and powered from the control unit.
  - 3. The device shall be UL listed or FM approved.
  - 4. 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.

5. The sounder shall have eight (8) tone options selected by means of programming clips.
- B. Strobe –
1. The strobe shall operate at 24 VDC and shall be approved for use with the listed control system.
  2. The strobe shall be polarized and powered from the control unit.
  3. The strobe shall be UL listed or FM approved.
  4. 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:**

- A. The abort switch shall be used where an investigative delay is desired between detection and actuation of the fire suppression system.
- B. 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.
- C. This switch shall be rated at 28 VDC @ 1.1 amp make/break or 6 amp continuous carry.
- D. The terminal connections shall be of the screw type.

**3.09 MAINTENANCE LOCK-OUT SWITCH:**

- A. The maintenance lock-out switch shall be used where it is desired to disable the fire suppression system during routine maintenance.
- B. 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.
- C. 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.
- D. The terminal connections shall be of the screw type.

### **3.10 SELECTOR SWITCH:**

NOT APPLICABLE TO THIS INSTALLATION.

## **PART 4 - SYSTEM ARRANGEMENT**

### **4.01 INERGEN SUPPRESSION SYSTEM:**

- A. INERGEN fire suppression system shall be of the engineered, permanently piped, fixed nozzle type with all pertinent components provided by Ansul Fire Protection.
- B. All agent storage cylinders shall be centrally located as vertical, freestanding cylinders with wall and/or floor mounted retaining brackets. Where multiple cylinders are required for the same hazard, a common manifold shall be employed. (Cylinders mounted horizontally shall be installed in accordance to the manufacturer's design manual.)
- C. On multiple cylinder arrangements (discharging into a common hazard), one cylinder shall be designated as the pilot cylinder and employ the restorable electric actuator, mechanical manual actuators, or both. All remaining cylinders shall be pneumatically operated from the INERGEN agent.
- D. Manifolded cylinders shall employ a flexible discharge hose to facilitate installation and system maintenance. Each cylinder on a manifold shall also include an agent check valve installed to the manifold inlet.

### **4.02 FLOW CALCULATIONS:**

- A. Computerized verification of flow calculations shall be submitted for each INERGEN fire suppression system and include the following data as a minimum:
  - 1. Quantity of agent per nozzle
  - 2. Orifice union/nipple and nozzle orifice diameters
  - 3. Pressure at nozzle (psi)
  - 4. Nozzle body nominal pipe size (inch)
  - 5. Number and size of cylinders
  - 6. Total agent
  - 7. Pipe size per pipe section
  - 8. Pipe schedule per pipe section
  - 9. Number, size and type of fitting per pipe section
  - 10. Actual length per pipe section (feet)
  - 11. Equivalent length per pipe section (feet)

12. Discharge time (seconds)

**PART 5 - EQUIPMENT AND MATERIAL (MECHANICAL)**

**5.01 PIPE MATERIAL - INERGEN SYSTEM:**

- A. System piping shall be of non-combustible materials having physical and chemical characteristics such that its integrity under stress can be predicted with reliability.
- B. As a minimum, piping materials shall be black steel pipe conforming to ASTM A-53A ERW or ASTM A-106A seamless.
- C. Under no conditions shall ordinary cast iron pipe, steel pipe conforming to ASTM A-120 or ASTM A-53/A-120 be used.
- D. Piping joints shall be suitable for the design conditions and shall be selected with consideration of joint tightness and mechanical strength.
- E. As a minimum, fittings beyond the orifice union/nipple shall be black, 300 lb. class fittings conforming to ANSI B-16.3. Ordinary cast iron fittings shall not be used. Distribution piping downstream of the orifice union must be a minimum of Schedule 40.
- F. The system manifold up to the orifice union/nipple must be constructed of Schedule 80 piping and 2000 lb. or 3000 lb. forged steel fittings.
- G. All piping shall comply with NFPA 2001.
- H. Piping shall be installed in accordance with good commercial practice to the appropriate codes, securely supported with UL Listed hangers and arranged with close attention to the design layout since deviations may alter the design flow performance as calculated.
- I. Piping shall be bracketed within 12" (.3 m) of all discharge nozzles.
- J. All piping shall be reamed, blown clear and swabbed with appropriate solvent to remove mill varnish and cutting oils before assembly.
- K. Multi-outlet fittings other than tees shall not be permitted.
- L. Assembly of all joints shall conform to the appropriate standards. Threaded pipe joints shall utilize Teflon tape applied to the male threads only.

**5.02 EXTINGUISHING AGENT:**

- A. The agent shall be INERGEN, a trademark name registered to Ansul Fire Protection.

### **5.03 INERGEN STORAGE CYLINDERS:**

- A. Cylinder assemblies shall be of steel construction with a standard RED epoxy paint finish. Each cylinder shall be equipped with a pressure seat-type valve and gauge. The system shall utilize Ansul's CV-98 valve assemblies. When the system's capacity exceeds 40 cylinders, a second pilot valve shall be provided and used for cylinder activation. Each valve shall be constructed of forged brass and shall attach to the cylinder providing a leak tight seal. Each valve shall also include a safety pressure relief device that provides relief at 3000-3360 PSI per CGA test methods.
- B. Filling of the cylinder assembly shall be by Ansul Fire Protection or an authorized INERGEN systems distributor in conjunction with a factory authorized INERGEN agent filling station. Initial filling and recharge shall be performed in accordance with the manufacturer's established procedures and shall not require replacement components for normal service.

### **5.04 CYLINDER BRACKET:**

- A. Each cylinder assembly shall be furnished with a bracket made from welded steel. The bracket shall hold the cylinders in a saddle with a front bracket piece that secures the cylinders. The brackets shall be modular in design to allow added bracketing or stacking of cylinders depending on installation requirements.
- B. Cylinder brackets shall be UL listed and/or FM approved for use with the INERGEN system.

### **5.05 VALVE ACTUATORS:**

- A. Electric valve actuators shall be of brass construction and stackable design with swivel connections to allow removal of actuators for maintenance or testing.
- B. Operation of actuators shall not require replacement of components. NO ELECTRO-EXPLOSIVE DEVICES may be used to actuate the valve assembly.
- C. Electric actuators shall be continuous duty type for 24 VDC operation.
- D. Actuation devices shall be UL listed and/or FM approved for use with the INERGEN system.

### **5.06 DISCHARGE HOSE/CHECK VALVE:**

- A. When manifolding, all cylinder assemblies shall include a flexible discharge hose and check valve for connection to the manifold inlet.
- B. All hose/check valves shall be UL listed and/or FM approved for use with the CV-90 or CV-98 INERGEN valves as manufactured by Ansul Fire Protection.

**5.07 DISCHARGE NOZZLES:**

- A. Discharge nozzles shall be of two-piece construction and sized to provide flow rates in accordance with system design flow calculations.
- B. A nozzle inlet orifice plate shall be included. A computerized UL listed flow calculation program shall determine the orifice size.
- C. Orifice(s) shall be machined in the nozzle body to provide a horizontal discharge pattern based upon the approved coverage arrangements.
- D. Nozzles shall be permanently marked with the manufacturer's part number. The nozzles shall be threaded directly to the discharge piping without the use of special adapters.
- E. Nozzles shall be UL listed as manufactured by Ansul Fire Protection.

**5.08 ORIFICE UNION/NIPPLE ASSEMBLIES:**

- A. An orifice union/nipple shall be included in the manifold to reduce pressure in the downstream pipe network.
- B. Orifice union/nipple assemblies shall be rated at 2000 lb. Class minimum.
- C. Orifice union/nipple assemblies shall be permanently marked with the manufacturer's orifice code. The orifice union/nipple shall be threaded directly to the manifold piping without the use of special adapters.
- D. Orifice union/nipple assemblies shall be UL Listed and/or FM Approved for use with the INERGEN system.

**5.09 SYSTEM CHECKOUT AND TESTING:**

- A. The completed installation shall be inspected by factory authorized and trained personnel (Interstate Fire Protection of North Conway, NH or Augusta, Me.) The inspection shall include a full operational test of all components per the equipment manufacturer's recommendations. A full discharge test, including concentration testing will not be conducted unless specifically requested by the A.H.J.

- B. Inspection shall be performed in the presence of the owner's representative, architect or engineer's representative, insuring authority and/or the local authority having jurisdiction.
- C. All mechanical and electrical components shall be tested according to the manufacturer's recommended procedure to verify system integrity.
- D. Inspection shall include a complete checkout of the detection/control system and certification of cylinder pressure. A written report shall be filed with the owner.
- E. As-built drawings shall be provided by the contractor (2 copies) indicating the installation details. All routing of piping and accessories shall be noted.
- F. Equipment installation and maintenance manuals shall be provided in addition to the as-built drawings.
- G. Prior to final acceptance, the contractor shall provide operational training in all concepts of the system to the owner's key personnel. Training shall consist of:
  - 1. Control system operation
  - 2. Trouble procedures
  - 3. Abort procedures
  - 4. Emergency procedures
  - 5. Safety requirements
  - 6. Demonstration of the system (excluding INERGEN release)
- H. The quantity of agent shall reflect the actual design quantity of INERGEN agent.
- I. A functional test shall be completed consisting of detection, release, alarm, accessories related to the system, control unit and a review of the cylinders, piping, fittings, hangers and cylinder pressure.

## **PART 6 - WARRANTY**

### **6.01 WARRANTY:**

- A. All INERGEN 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 against false actuation or leakage due to faulty equipment, design or workmanship for a period of one (1) year from final acceptance. In the event of INERGEN agent leakage or system discharge from any of the above conditions, the installing contractor shall completely recharge and recondition the system at no cost to the owner.

## **END OF SECTION**

### **PART 7 -MAINTENANCE**

#### **7.01 PERIODIC MAINTENANCE:**

- A. At least semi-annually, the INERGEN system shall be inspected by INTERSTATE FIRE PROTECTION of North Conway, NH or Gardiner, ME.

#### **7.02 MAINTENANCE PROCEDURES:**

- A. The following shall be done at least semi-annually by INTERSTATE FIRE PROTECTION of North Conway, NH or Gardiner, ME an authorized Ansul distributor certified for the design and installation and service of INERGEN 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.
- B. A written report shall be submitted to the system owner upon completion of each INERGEN 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.

## **END OF SECTION**

### **PART 8 –SYSTEM LOCKOUT PROTOCOL**

#### **8.01 REQUIREMENTS FOR SYSTEM LOCKOUT:**

- A. The following are circumstances that may arise that will require the INERGEN System release circuits to be locked out:
  - 1. INERGEN System Inspection and/or Maintenance.
  - 2. INERGEN System modification.
  - 3. Structural work on the protected space, or equipment in the protected space that has the potential to generate the following:
    - a. smoke

- b. dust or dirt
- c. water spillage on INERGEN System components
- d. excessive vibration

**8.02 PROCEDURE:**

- A. Communicate the date, time, nature and expected completion of the circumstance which will require the INERGEN System to be locked-out. Advise the necessary party that a system lock-out will generate a "Trouble" condition on the FACP.
- B. Communicate the above information to the following parties:
  - 1. INTERSTATE FIRE PROTECTION of North Conway, NH or Augusta, ME.
  - 2. The System owner.
  - 3. The Building Supervisor of the protected space.
  - 4. The local Fire Department.
  - 5. The vendor providing the Building Fire and/or Security Alarm System monitoring and maintenance service.
- C. The Maintenance 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. A key to operate this switch shall either be on the Maintenance Switch or located inside the FACP. The key shall be tagged.
- D. Upon completion of any procedure requiring system lock-out, the Maintenance Switch shall be operated to return to the "Normal" position. The red indicator lamp shall extinguish and the trouble condition shall be automatically eliminated by the FACP.
- E. After the system is returned to the normal condition (no indicated faults on the FACP), all relevant parties shall be advised that the visit is complete and that the INERGEN System is no longer locked-out, and has been returned to normal stand-by condition.

**END OF SECTION**