PYROSHIELD® CLEAN AGENT FIRE SUPPRESSION SYSTEM

WITH

FIRE DETECTION AND CONTROL SYSTEM

ENGINEERING SPECIFICATIONS.

ELECTRICAL FIRE DETECTION AND MECHANICAL GAS EXTINGUISHING

ENGINEERING SPECIFICATIONS

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK:

A. Design and installation of an engineered fire detection and environmentally friendly PYROSHIELD total flooding, gaseous fire suppression system as manufactured by Alien Systems & Technologies (Pty) Ltd or similar and equal inert gas system.

B. Drawings: The contract drawings indicate the general arrangements of the areas to receive detection and PYROSHIELD protection. Contractor is to review all drawings so that all items affecting the operation of the fire detection/PYROSHIELD 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. BS 6266 : 1992 - Fire Protection for EDP Installation

2. SABS0139 or BS 5839 : Part 1 : 1988 - Fire Detection and Alarm System for Buildings

3. SABS/ISO 14520 - Standard on Clean Agent Fire Extinguishing Systems

4. BS7273 : Part 1 : 1990 - The Operation of Fire Protection Measures for Gaseous Extinguishing Systems.

1.03 REQUIREMENTS:

A. This installation shall be made in strict accordance with the drawings, specifications and applicable International Standards. The Gas protection system used shall have a full system approval certificate, which shall be submitted at time of tender by the installation contractor. This certificate will cover the whole system and shall have been validated by the SABS. Component certification is not acceptable.

B. The system design shall be performed on software written, verified, approved or tested by an internationally accredited approval body (ie VdS, LPCB, SABS etc). Proof of software acceptance shall be submitted at time of tender. System design shall be performed by persons who are competent in the field of fire engineering. Individuals performing this work shall be registered with the engineering council of South Africa as Professional Engineers or Technologists in the field of fire engineering (i.e. Pr Eng or Pr Tech Eng), proof of qualifications shall be submitted at time

of tender. In addition the company performing the design work in South Africa shall be accredited to the SABS/ISO 9001 quality management standard. Proof of accreditation shall be submitted at time of tender.

C. Design and installation of the fire detection/PYROSHIELD suppression system will be in strict accordance with the following guidelines and regulatory authorities:

1. BS 6266 : 1992 - Fire Protection for EDP Installation

2. SABS0139 or BS 5839 : Part 1 : 1988 - Fire Detection and Alarm System for Buildings

3. SABS/ISO 14520 - Standard on Clean Agent Fire Extinguishing Systems

1.04 GENERAL:

A. Provide all engineering design and materials for a complete fire detection/PYROSHIELD suppression system including PYROSHIELD storage cylinders, nozzles, control panel, detectors, wiring, enunciators, alarm and all other equipment necessary for a complete operational system.

B. Major system components shall be produced by Alien Systems & Technologies (Pty) Ltd.

1.05 SUBMITTAL:

A. Working documents as defined in SABS/ISO 14520 part 1, Appendix A shall be submitted for approval within 4 weeks of contract award and prior to delivery of materials.

This shall include, but not be limited to, the following:

a. Extinguishing Control Panel
b. Detectors
c. Release devices
d. Alarm devices
e. PYROSHIELD storage cylinders
f. Mounting brackets
g. Discharge Nozzles
h. PYROSHIELD Distribution Pipe work Isometrics
i. Computer 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 PYROSHIELD system. Floor plans shall be provided showing equipment locations, piping, point-to-point wiring and other details as required. Floor plans shall be drawn to a scale of not less than 1.50. Elevations, cross sections and other details shall be drawn to scale as required. Isometric pipe work layouts shall be provided. 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 PYROSHIELD system controls.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION AND OPERATION:

A. The system shall be a PYROSHIELD total flooding, gaseous, clean agent, fire suppression system designed to provide a uniform concentration within the protected area. The amount of PYROSHIELD to be provided shall be the amount required to obtain a uniform (minimum) concentration as required by the design manual for ten (10) minutes. Take into consideration such factors as unclosable 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 38,5 % at the minimum expected temperature.

B. Coincidence Zone Smoke Detection: The PYROSHIELD system shall be automatically actuated by cross-zoned detection circuits. Smoke detectors shall be ionisation detectors and Photoelectric with compatibility listings for use with the control unit. Smoke detectors shall be installed to meet the required local and international Standards. The detectors shall be alternated throughout the protected area with the system requiring two (2) detectors in alarm prior to automatic PYROSHIELD release.

2.02 SEQUENCE OF OPERATIONS:

A. Activation of any single smoke detector in any detection zone shall:
1. Cause a first stage audible alarm.
2. Energise a lamp on the activated detector and control panel (and graphic enunciator, if included).
3. Transmit an alarm signal to remote monitoring or building alarm panel.
4. Operate auxiliary contacts for air conditioning shutdowns and automatic dampers.

B. Activation of a second smoke detector shall:
1. Cause a second stage (pre-discharge) alarm to operate.
2. Activate audible alarms .
3. Operate auxiliary contacts for emergency power off of all electrical equipment (excluding lighting and emergency circuits for life safety).
4. Initiate a programmable time delay (PYROSHIELD agent release).

C. Upon completion of the time delay, the PYROSHIELD system shall:
   1. Energise control solenoid for PYROSHIELD cylinders releasing gaseous agent into the protected area.
   2. Indicate gas released on the control unit.

2.03 FIRE DETECTION:

A. All components and the design of the fire detection system shall comply with BS 6266 : 1990, BS 7273 : Part 1 : 1990 and BS/EN 5839 Part 4.

2.04 PYROSHIELD CONTROL PANEL:

A. A PYROSHIELD control panel shall be located adjacent to the main entrance/exit to the protected space as indicated on the Tender Drawings. The panel shall be of rigid construction and shall be capable of being either surface mounted or semi recessed as indicated, where a semi-recessed collar shall be provided of identical color to provide a neat appearance.

B. The panel facias shall be equipped with light emitting diodes to indicate fire, fault and operational status together with push action switches to control functions. The operation of the switches shall be accessed via a key operated security key switch or lockable front cover. The following components shall be provided on the control panel facia:-

   a. Silence alarm switch
   b. Test evacuate alarm switch
   c. Alarm silenced lamp
   d. Isolate remote signal - switch and lamp
   e. System general fault - lamp and buzzer
   f. Buzzer silence
   g. Power on lamp
   h. Lamp test switch
   i. Extinguishant system automatic mode - lamp
   j. Extinguishant system manual mode - lamp
   k. Manual/Automatic mode - push switch
   l. Isolate extinguishant release circuit - switch and lamp
   m. Hold extinguishant released - switch and lamp
   n. Key operated security switch
   o. Manual release unit

   It is recommended that the gas control functions be housed in a separate enclosure.

C. A sealed lead acid battery shall be provided within the PYROSHIELD control panel to provide 24 hours of panel operation and a ½ hour under alarm conditions.

2.05 SMOKE DETECTORS:

A. Ionisation and optical type smoke detectors shall be located as indicated on the Tender Drawings. Detectors shall be connected together within each space to provide two zones of protection. Both zones shall additionally connect to detectors in both ceiling and floor voids where applicable.

2.06 REMOTE STATUS INDICATION PANELS:

A. Remote status indication panels shall be located as detailed on the Tender Drawings.

B. Remote panels shall display lamps indicating system manual, automatic or discharged conditions.

2.07 MANUAL RELEASE UNITS:

A. Manual release units shall be located as indicated on the Tender Drawings.

B. Manual release unit’s casings shall be colored yellow and shall be inscribed with the lettering "MANUAL GAS RELEASE".

C. Mounting heights for manual release units shall be 1,4 meters above floor level.

2.08 SOUNDERS:

A. Fire Alarm sounders shall be located as indicated on the Tender Drawings. First stage alarm bells shall be colored red. Second stage alarm shall be a combined electronic sounder and xenon beacon unit. The sounder frequencies shall comply with SABS0139 or BS 5839 : Part 1 : 1988 - Fire Detection and Alarm System for Buildings.

B. Mounting heights for the sounders shall be agreed on site.

2.09 REMOTE LAMP UNIT:

A. Remote lamp units shall be provided to give indication of an activated Smoke Detector within a ceiling or floor void.

2.10 AIR CONDITIONING SHUT DOWN RELAY:

A. An Air Conditioning Shut Down Relay shall be provided to shut down air conditioning on receipt of a first stage fire signal.

2.11 POWER DISTRIBUTION UNIT SHUT DOWN RELAY:

A. A PDU Shut Down Relay shall be provided to shut down the PDU on receipt of a second stage fire signal.

2.12 HOUSE LINK RELAY:

A. A House Link Relay shall be provided to interface between the PYROSHIELD System and the House Fire Alarm System.

2.13 ELECTRICAL INSTALLATION:

A. All wiring associated with the system will have a red cable sheath and shall be FP200 or equivalent for circuits requiring prolonged operation during a fire. FR20 cable may be used for detector circuitry only.

PART 3 - MECHANICAL INSTALLATION

3.01 GENERAL:

A. All pipe work and fittings downstream of the pressure reducing orifice shall be painted heavy grade steel pipe. Pipe shall be seamless and be certified to ASTM A106 Gr B. Fittings shall comply with the requirements of BS 3799 and be of the 3000 # type. Test certificates for all piping and fittings shall be provided by the installation contractor. All pipe work shall be banded with a priority band at a minimum of every 3 meters and where pipe work passes through walls etc.

3.02 PIPEWORK INSTALLATION:

A. All fittings shall be of the same size as the line in which they are installed.

B. The laying out of fittings at branch connections or other fixed points of the system shall be such as to allow provision for movement without causing undue stress on the pipe work. Pipe work shall be arranged to reduce the strain due to expansion on all equipment.

C. The Fire Suppression System Specialist shall clean all completed pipe work fittings, support steelwork and brackets.

3.03 SLEEVES:

A. Where pipe work passes through walls, floors, or ceilings tubular pipe sleeves of a non-combustible material compatible with the pipe work shall be fitted. The internal diameter of the sleeves shall except where necessary to allow for expansion and contraction or where otherwise specified not exceed the outside diameter of the pipe work enclosed by more than 20mm and shall project 3mm beyond finished surfaces.

B. All sleeves shall be built into the structure by the Contractor in such a manner as to maintain the integrity of the structure and the fire barriers.

3.04 PIPEWORK ANCHORS:

A. The Fire Suppression System Specialist shall provide for all pipework and necessary anchors which shall be fit for its purpose.

B. The specialist shall also provide and fix in position ready for building all cleats, brackets and steelwork required for the anchor points.

3.05 PYROSHIELD ENTRANCE WARNING SIGNS:

A. PYROSHIELD entrance warning signs shall be provided and displayed at each entrance to the protected area.

3.06 PYROSHIELD MANUAL RELEASE WARNING SIGNS:

A. PYROSHIELD manual release warning signs shall be provided and displayed next to each extinguishant release unit.

PART 4 - PYROSHIELD CYLINDER INSTALLATION

4.01 CYLINDERS:

A. A multiple of 80 litre 200 bar capacity PYROSHIELD cylinders shall be installed to provide the overall required storage capacity. The system shall be operated by a pilot cylinder incorporating both manual and electrical solenoid operation. Operation of the system using detonators shall not be permitted.

B. Cylinders shall be manufactured from steel with a seamless construction in accordance with EEC/84/585. Each cylinder shall have been pressure tested to a test pressure of 300 bar. Each cylinder shall be fitted with a pneumatically actuated quick action discharge valve and a removable dial faced pressure gauge.

C. Cylinders shall be floor mounted and securely fastened back into a purpose made racking and braced installation.

D. Each cylinder shall be provided with a certificate provided by the company who charge the vessel with the PYROSHIELD gas mixture.

4.02 PRESSURE GAUGE

A. Each cylinder shall be fitted with a dial faced type pressure gauge with a range from 0 to 400 bar.

4.03 MANIFOLD:

A. Each of the cylinders shall be interconnected with a passivated steel manifold. The manifold shall be tested at works to a pressure of at least 300 bar. Each branch connection from the manifold to a vessel shall be fitted with a steel non-return valve assembly.

4.04 ROOM INTEGRITY TESTING:

A. The system installer shall perform a room integrity test using door-fan testing equipment as required in ISO/SABS 14520 Appendix E. The test

shall be performed by a certified individual and company and a test certificate shall be issued stating the minimum hold time for the room.

4.05 COMMISSIONING AND WITNESSING:

A. The Engineer shall inspect all components of the PYROSHIELD systems at work. The Fire Suppression System Specialist shall advise the Engineer of the earliest possible date to witness the complete system.

B. The Fire Suppression System Specialist shall allow within his works for a demonstration of the correct operation of all components of the system.

C. On completion of the commissioning the Fire Suppression System Specialist shall issue a certificate that the system is operating correctly and shall leave the system in a 'live' condition.

4.06 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Full operating and maintenance instructions shall be provided by the Fire Suppression System Specialist. These shall be included in the OEM manual along with as built drawings, computer calculations and room integrity test report.