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	Company Doc. No.	Contractor Ref. No.	Date	Revision 0

## METHOD STATEMENT FOR

(FM 200 SYSTEM INSTALLATIONS, TESTING AND COMMISSIONING)

<b>Project No:</b>	
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REVISION HISTORY	ISSUE DATE	DESCRIPTION	REVIEW / STATUS

<b>PREPARED BY:</b>	<b>REVIEWED BY:</b>	<b>APPROVED BY:</b>
QA QC ENGINEER	SR. PROJECTS ENGINEER	MAINTENANCE MANAGER

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## 1. Objective

### 1.1. Purpose

The purpose and objective of this method statement is to describe the work methodology and sequential approach for timely completion and accomplishment of all FM200 Fire Suppression systems with approved materials in this project to the satisfaction of the Consultant/Client.

### 1.2. Scope of Work

The scope of work list is as following:

Installation of FM 200 Fire Suppression System-FSS

### 1.3. Responsibility

Responsibilities/accountability for ensuring that the initiatives in this methodology procedure shall be accomplished are specified at relevant steps in the procedure:

1. Project Manager
2. Construction manager
3. QA/QC Engineer
4. Site Engineer
5. HSE officer
6. FF Sub-Contractor

## Project Manager

The work progress shall be carried out as per the planned program and all the equipment required to execute the works shall be available and in good condition as per the project planned. Peculiar and necessary attention is paid to all health and safety measures and QC in coordination with Safety Engineer and Quality Assurance/Quality Control Engineer.

## Construction Manager

The construction Manager is responsible to supervise and control the work on site.

## Site Engineer

1. The check and review of the method of statement that will be submitted from the FF sub-contractor to the system as per consultant project specifications and approved shop drawings.  
Supervise and give an assignment for the FF sub-contractor.
2. Provision of all necessary information and distribution of responsibilities to his Construction team.
3. The constant coordination with the Safety Engineer to ensure that the works are carried out in a safe working atmosphere.

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4. The constant coordination with the QA/QC Engineer for any works to be carried out and initiate the Inspection for the finished works.
5. He will ensure the implementation of any request that might be raised by the Consultant.
6. Efficient daily progress shall be obtained for all the equipment and manpower.
7. He will engage in the work and check the same against the daily report received from the Foremen.
8. The passage of all the revised information to the Foremen and ensure that it's being carried out properly.

### QA/QC Engineer (MEP):

1. The monitoring of executions of works at the site should be as per the approved shop drawings and project specifications.
2. Ensure WIRs and MIRs are being raised for activities promptly and inspected by the Consultant.
3. He will follow and carried out all the relevant tests as per project specifications.
4. Obtain the required clearance before the Consultant's inspections.
5. Should acquire any necessary civil works clearances and coordination.
6. Site Foreman
7. The carrying-out of work and the proper distribution of all the available resources in coordination with the Site Engineer daily.
8. Daily reports of the works are achieved and coordinated for the future planning with the Site Engineer.
9. Incorporate all the QA/QC and Safety requirements as requested by the concerned Engineer.
10. Meeting with any type of unforeseen incident or requirement and reporting the same to the Site Engineer immediately.

### Safety Officer

1. The implementation of all safety measures following the HSE plan and that the whole workforce is aware of its proper implementation.
2. The implementation of safety measures is adequate to maintain a safe working environment during the work activity.
3. Inspection of all the site activities and training personnel in accident prevention and its proper reporting to the Construction Manager and the Project Manager.
4. The site is maintained in a clean and tidy manner.
5. Make sure that only well trained and competent persons shall operate the power tools.
6. Ensure all concerned personnel shall use PPE and all other items as required.
7. Ensure adequate lighting is provided in the working area at night time.

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8. Ensure high risk elevated areas are provided are barricades, tape, safety nets and provided with ladders.
9. Ensure service area/inspection area openings are provided with barricades, tape, and safety nets.
10. Ensure safe access to site work at all times.

## 2. Installation

### 2.1. Installation of Conduits and Cables for Fire Suppression System

- Mark the cable route as per the approved shop drawing.
- Install the saddles using fisher and screw.
- If mandatory and required, the GI conduit will be cut to the length required and threaded properly and accurately.
- Saddles shall support horizontal/vertical runs at intervals, not more than 1-meter. Bends shall be supported and secured appropriately with two saddles on each side.
- Draw in boxes shall be provided after every two bends or more than 15-meters of straight runs.
- After the conduit's fixation, the project supervisor will evaluate, check and inspect the site to make sure that the installations are as per the shop drawings.
- A formal request will be extended to the consultant engineer.
- Install the conduits via tightening the conduits to the saddle the use of a screw.
- Extend the length of the conduits by means of connecting another period the usage of GI couplers.
- Run the required cables via the conduit.

### 2.2. Installation of Fire Suppression System Detection Devices

- Mark the vicinity of the gadgets/device as according to authorized shop drawings.
- Cutting is to be finished as in keeping with the marking through the civil contractor.
- Fix the bottom of the gadgets/device.
- Mark the cables as per the necessities if required.
- Terminate the cables to all devices as in keeping with the product catalogue.

### 2.3. Installation of Panel

- Mark the vicinity of the panels as in keeping with authorised shop drawings.
- Install GI conduits/Trunk to run the cable to the panel. (Surface mount)
- Individual conduits must be established for the main power deliver.
- Make important holes on the panels and install adapters.
- Install the panel the use of fisher and screw.
- Run the cables thru the conduits/trunks as much as the panel.
- Identify the cables with tags and terminate cables with ferrules.

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- Terminate the cable to the Fire Alarm Circuit Board as per the approved shop drawing and product catalogue.

## 2.4. Installation of Clean Agent Fire Suppression System – Mechanical Parts

### A. Cylinder Installation:

- Identify the real place of the cylinder based totally at the accredited save drawings.

#### Install the supports:

- Mark the drill area at the wall corresponding to the mounting bracket furnished with the cylinder.
- Drill the holes as per drop-in anchor size and install the mounting bracket at the wall the usage of drop-in anchor bolts.

#### Install the Cylinders:

- Mount the cylinder on the mounting bracket and tighten the cylinder at the mounting bracket with the furnished strap using bolts.

### B. Installation of pipes:

#### Painting of Pipes:

- Clean the black pipe with a cotton rag to take away any dust or grease on the pipes.
- After cleaning, paint the black pipes with 1 layer undercoat of wash primer. Ensure all sides (pinnacle & bottom) are painted flippantly.
- Put the painted pipes in suitable air flow situation for 24 hours for the paint to dry.
- After the paint is dried, then paint the pipes with 2 layers of the end coat. Ensure all facets (top & backside) are painted lightly.
- After the finish coat is dry, deploy the pipes as in step with approved store drawings of easy agent fire suppression gadget/device.

#### Installation of Pipe Support:

- Identify the real location of the hanger based on the approved save drawing. Mark the position for putting in the drop-in anchor after coordination with Structural Engineer.
- Locate the required support locations as in step with the approved store drawing and marks the holes to be drilled at the wall/slab.
- Drill the hollow within the marked role as in step with the anchor bolt sizes.
- Insert the drop-in anchor in the hollow.
- Tighten the GI angles on the drop-in anchor the usage of bolts.
- Rigid bracing is required at each directional alternate fitting, tee and nozzle.

#### Threading Procedure:

- Pipe Cutting
- Cut the required length (as per the scope of work) of the pipe to thread.
- Properly check that the cut ends of the pipe are square.

#### Install the Threading Dies:

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- Install the correct die head with threading teethes on the threading machine properly for the corresponding pipe size.

**Thread the Pipe:**

- Insert the end of the pipe to be threaded in-between the die head and tighten & secure the chuck to hold the pipes properly.
- Support and secure the other end of the pipe using the pipe stand.
- Start the machine and have interaction the die head into the threading function.
- Thread the pipe till the required period of the thread is done.
- After the threading, loosen the chuck and put off the pipe.

**C. Nozzle Installation**

- Install the FM 200 system pipe as per approved shop drawings with the provision to install the nozzles at the location as highlighted on the approved shop drawing.
- Provide and install the support near the last bend of each nozzle location.
- Make sure that there are no residuals/left out/or waste present inside the pipe before installing the nozzles.
- Install the FM 200 nozzles by tightening and securing the nozzles at the last end of the FM 200 system pipe at the location highlighted on the approved shop drawings.

### 3. Testing

#### 3.1. Pneumatic Testing

- The pneumatic leak test using air medium shall be conducted with all the temporary openings sealed by plugs/end caps – with no system components installed (like gas discharge nozzles).
- An air compressor shall be connected to the pipework at one of the manifolds ensuring that after pressurization of the pipeline being tested, the unit can be disconnected with the pipes pressurized (from the line of the cylinder – via check valve – to manifold/pipes end).
- 2- Nos. of calibrated pressure gauges, each having a range from 0 – 20 bars shall be used for testing. One pressure gauge shall be fitted at the start point and the second pressure gauge at the high-level point at the farthest end.
- The testing shall be done at the ambient temperature range.
- The system shall be gradually pressurized in steps of 5 PSI to reach 40 PSI (2.76 bar). A five-minute interval shall be provided after each step to allow the air pressure to stabilize.
- After reporting the required test pressure, check for leaks with a soap solution at each joint. If any leak is found, depressurize the system, repair the leak(s) and re-test.



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- The test pressure of 40 PSI (2.756 bar) shall be maintained for 10 minutes minimum. The pressure drop shall not exceed 20% of the test pressure at the end of 10 minutes. If the pressure drops more than 20%, the testing shall be discontinued and leaking joint(s) shall be identified/repaired and a new test conducted.
- On satisfactory completion of the pneumatic test, the pressure shall be gradually reduced and the system depressurized.
- The test certificate shall be completed with the necessary signatures obtained.

### 3.2. Integrity Test

- The enclosure is measured, a sketch plan made and the type and quantity of extinguishing recorded. The height of the highest hazard in the enclosure (risk height) is noted.
- Where relevant, doors within the enclosure are opened and several false floors and ceiling tiles are removed so that the protected enclosure is tested as one space. False ceiling tiles are not removed where the ceiling void is not protected. A return air path is established outside the enclosure by opening doors/windows as appropriate.
- The door fan equipment is set up in a suitable door opening. The door does not need to be removed. Personnel may continue to work within the enclosure during the test and may enter and leave, subject to access, except when pressure readings are being taken. Access restrictions will not exceed a few minutes at a time and can be discontinued at once if necessary.
- Any air handling equipment involving supply into, or extract from, the enclosure will need to be set by the client or end-user into the same condition as would occur on system discharge (usually dampers closed and fans off). This need occurs only whilst pressure readings are taken. Recirculation and a/c units without fresh air make-up may be left operating throughout the test to prevent temperature build-up in the enclosure. Details of the arrangements are noted.
- The extinguishing system and enclosure data obtained earlier are entered onto the computer.
- This calculates the design concentration and the column pressure (typically between 4 and 20Pa) that would be exerted by the gas after discharge.
- The door fan(s) is used to pressurize and depressurize the enclosure to the column pressure and the fan pressure required in each case is recorded. For certain system designs, a series of pressure readings are taken. The pressures used are very low and present no risk to the enclosure or the equipment.
- The pressure data is entered onto the computer which calculates the airflow, equivalent leakage area and retention time.

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- If the result satisfies the specified retention time (usually 10 minutes) the enclosure is deemed to have passed the test.
- If the retention time is less than that required, a detailed inspection is undertaken to establish the main leakage paths. This includes floor and ceiling voids as relevant.
- Should the leakage path distribution be found to be other than the worst-case situation assumed in the initial computer calculation, the retention time is recalculated accordingly. Also, if practicable, major leaks may be temporarily sealed, new pressure readings taken and a revised retention time calculated. Retention times meeting requirements are recorded as passes, subject to any necessary corrective actions; those not doing so are reported to have failed.

## 4. Testing and Commissioning of Fire Suppression System

### PRE-COMMISSIONING

- Remove the Solenoid output cable from the control panel
- Apply AC power and connect Battery
- Check all LEDs status
- Check Auxiliary voltage it should be 24 Volt DC
- Check zones circuit.
- Check Sounder circuits (First Stage & Second Stage)

### ZONE TEST

- Apply detector test liquid on the detector and check the following sequence.
- The First Sounder stage alarm starts.
- The detector goes into fire condition after applying test liquid.
- Check the common fire LED and the respective zone LED should indicate
- Check the common fire LED and the respective zone LED should indicate
- Check common fire relies upon output.
- Press the silence/sound alarm button and reset buttons.
- Repeat the same above procedure for Zone 2 Test

### CROSS ZONE TEST

- Remove the solenoid output terminal from the Control panel
- Apply test liquid on zone 1 & Zone 2 (or whatever is applicable) detectors.
- Check both sounder stage alarm statuses.
- Monitor the seven-segment display and check the delay counter timer start
- Place the multimeter across the solenoid terminal and check the voltage at the end delay timer. It should be 24
- Check VDC at fraction of a second to operate the solenoid valve
- Check all cable polarity +, – etc.

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### PHYSICAL INSPECTION

- Check all the devices installed as per the approved drawings.
- Check the control panel is mounted properly
- Check all detector bases are mounted properly
- Check whether the EOL 18 V Trans orb is fitted or not in the last detector.
- Check whether all necessary EOL is mounted or not.
- Check installation of Extinguishing devices (Piping, cylinder, LPS, Solenoid) etc.
- Check all the supports are properly installed.
- Check power ON LED & Operating Access LED should be lit and all other LEDs should not be lit.
- Check whether all the cables are properly labelled or not.

### SYSTEM CHECK

- Check the Solenoids cable is disconnected from the panel.
- Check the panel status contacts (Fault & Fire) to an external building fire alarm panel.
- Create any fault, like by removing the battery terminal or switching off AC power or removing detectors or removing sounders etc. and observe fault LED and status contacts.
- Stimulate fire to zone 1 detector by using spray liquid and observe, the detectors go into the fire
- (LED) & Corresponding Zone LED in the panel.
- Check the fire status contacts to the building fire control panel
- Check the sounder1 is working or not Silence the sounder and reset
- Check the panel goes into normal condition after resetting it
- Repeat the above procedure for all the detectors.

### CROSS ZONE FUNCTION:

- Stimulate fire for both zones detector simultaneously and monitor below sequence.
- Check all sounders should be activated
- Fire LED should be activated in the control panel
- Check Delay timer start (3 Seconds)
- Check the voltage at the solenoid end, 24 Volt DC should come after the end of the delay timer.
- The voltage should keep showing 5 Seconds
- Reset the control panel.

### ABORT FUNCTION:

- Stimulate fire for both zones detector and observe the above sequences.
- Press any one Abort switch to stop extinguishing
- Abort LED should light in the control panel

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- The Multimeter should not show 24 VDC at end of the delay timer.
- Release the abort switch and reset the panel.
- Check the panel should go into normal mode after reset.

#### MANUAL RELEASE (Electrically Remote operation)

- Check the panel is in normal
- Slide the Aero mark symbol in the plate which is shown in the manual gas release.
- Insert the Ker (Red) into the manual release and turn it.
- The top cover will come out and then press the button and monitor the below sequence.
- Check Manual release and actuator LEDs should light
- Check two sounders (Flasher & Horn) Working properly
- Check the delay timer (30 Seconds)
- Measure the voltage (24 Volt DC) across the solenoid at end of the delay timer.

**The testing and commissioning procedures shall comply with Specifications and applicable NFPA standards.**

- Pipe Pressure Test will be done and results shall be provided.
- Room Integrity Test will be provided.
- Interfacing with Fire Alarm Panel will be provided and confirmed.
- The functionality of the Alarm Bell will be provided and confirmed.
- Agents Discharge time and duration.
- Loop and insulation tests of the cables will be provided
- Visual verification of solenoid valve functionality shall be tested and demonstrated.
- Room Integrity Test
- When deploying a Clean Agent system, it is vital to test the 'integrity' of a room is to ensure the
- the protected area is well sealed and the Clean Agent extinguishing media won't escape.

**Compliance with NFPA 2001 (2008 ED.) requires:**

- The enclosure protected by the clean agent shall be thoroughly inspected at least every 12 months to determine if penetrations or other changes have occurred that could adversely affect agent leakage or change the volume of hazard, or both. Where the inspection indicates conditions that could result in the inability to maintain the clean agent concentration, the conditions shall be corrected.
- Where external visual inspection indicates the container has been damaged, additional strength tests shall be required.
- All persons who could be expected to inspect, test, maintain, or operate fire systems shall be thoroughly trained...
- All total flooding systems shall have the enclosure examined and tested to locate and effectively seal any significant air leaks that could fail in the enclosure to hold the

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specified agent concentration level for the specified holding period. The current preferred method is using a blower door fan unit and smoke pencil.

- “Room Integrity” tests should be carried out at the design stage of Clean Agent systems and annually thereafter—and even more frequently if the space may have changed due to renovations, or layout changes.

## 5. Manpower Resourcing

S. N.	Position	Number of Employees
1	Site Supervisor	
2	Site worker	
<b>Total</b>		

## 6. Appendices (As Applicable)

1. Risk Assessment (Attached)