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Our Ref: OM-SC/021

9 September 2004

**MEMORANDUM**

To: All Staff

From: Andrew Loh

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**REVISION TO MASTER SPECIFICATIONS FOR FIRE FIGHTING & ALARM INSTALLATION**

Master Specifications for Fire Fighting & Alarm Installation (DSC & NSC) for Section 6 – Halon 1301 System has been replaced with the attached Section 6 - FM 200 System.

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Andrew Loh

cc TLS/RT
cc Memo File

enc

/na

BCA
ISO 9000
CERT. NO.: 236
SS ISO 9001 : 2000

**FEEDBACK REPORT FORM**

**Alpha**
**Engineering Consultant**

Ref No: 80-260804(C)

To: LCT From: CLM 26/8/04

Job No./Project: — *(where applicable)*

Source of feedback: MASTER SPECS (AAI)

Scope of Feedback: *Quality System/Administrative/Contractual/Technical/Specification/Others

**Section A : Problem & Cause**

Section 6 — Halon 1301 system
— No longer in use — To delete.

**Section B : Suggested Corrective Action**

To replace with FM200 system (see attached)
Section 6

**Section C: Approved Corrective Action**

Approved By : Date: 1/9

**Section D : Action**

Action By: NA

Targeted Completion: Sept '04

Actual Completion: 09/09/04 Verified By:

* *Delete as appropriate*

Distribution:

# FIRE FIGHTING & ALARM INSTALLATION

## SECTION 6 – FM 200 SYSTEM

*09/09/04*

### 6.1 Design Rules & Regulations

The design and installation shall comply with the requirements of the local Authorities and current editions of the codes in the National Fire Protection Association (NFPA) 2001 – Clean Agent Fire Extinguishing System.

*09/09/04*

### 6.2 Design Requirements

The system shall be designed based on manual/automatic release total flooding principle to provide rapid fire knockdown at a concentration allowed under NFPA or supporting authorities governing the use of this extinguishing system.

The Contractor shall carry out necessary calculations to verify the actual amount of FM 200 gas required for each space to ensure that sufficient gas is provided to extinguish the fire taking into consideration the leakage through openings. Pipework, nozzles and cylinders layout as shown on drawings are indicative only. The Contractor shall carry out hydraulic calculation to verify the pipe sizes, routing layout, nos. of cylinders and nozzles required.

The FM 200 system shall be activated by smoke detectors. The smoke detection system shall comply with SS CP10 and the requirements of the local authorities.

*09/09/04*

### 6.3 Safety Features

The following safety devices and components shall be installed in and adjacent to the protected area:

(a) Provision of warning and instruction signs inside and at entrances to the protected enclosures. These signs should inform personnel entering the protected area that a FM 200 system is installed, and may contain instructions relevant to the hazard.

(b) Provision of a time delay to enable evacuation of personnel before the commencement of FM 200 discharge.

(c) Provision of continuous visual alarms at entrances to protected enclosures until the room condition has been restored to normal.

(d) Provision of means to lock off or disarm the system during periods of system inspection, maintenance or modification, or on entering a normally unoccupied area protected by the system.

(e) Provision of instruction and drill for all personnel working within the protected enclosures to ensure they react correctly when a system operates.

(f) "No Smoking" sign shall be permanently displayed in the FM 200 protected room.

*09/09/04*

### 6.4 Alarm Warning System

The alarm warning system shall consist of both audible and visual alarms as follows:

(a) Operation of the Fire Detection System (1st Smoke Detector)

Audible alarm (bell) and visual alarm ('Evacuate Area', flashing indicator sign) within the protected area shall be activated. The zone identification light on the FM 200 control panels shall also light up.

(b) Commencement of Time-Delay Period (2nd Smoke Detector)

Audible alarm (siren) within the protected area shall be activated.

(c) Commencement of Agent Discharge

Visual alarm ('Gas Discharged' flashing indicator sign) outside the protected area at all entrances shall be activated.

Warning signs shall also be prominently displayed at all the entrances (inside and outside) to the area protected.

An alarm silencing switch shall be provided to silence an alarm. The switch shall not incapacitate the alarm bell from resounding should another fire detection be received. The alarm indicator shall be caused to flash until the alarm has been silenced, upon which the light will then become steady.

A buzzer to be provided at the control panel shall be caused to sound continuously upon detecting a fault in the system. The buzzer can be silenced by a fault buzzer silencing switch or when the fault is corrected. The silencing of the buzzer shall not de-energise the 'FAULT' light and should not prevent the buzzer from resounding when another fault is detected. The 'FAULT' light shall be de-energised only when the respective fault has been rectified. The fault buzzer silencing switch shall be independent of the alarm silencing switch.

All visual alarm warning signs shall be approved by the local authority and shall comply with NFPA's requirements.

*09/09/04*

## 6.5 FM 200 Control Panel

The control panel shall be located as shown in the Specification drawings.

The control panel shall include the following minimum items:

(a) Power supply indicator and control:

* Green to indicate 'Supply On'
* Amber to indicate 'Power Failure'
* Green to indicate 'Battery On'
* Amber to indicate 'Battery Failure'

(b) Zone alarm indicating units:

* Red to signal a fire in the zone.
* Amber to indicate a fault.
* Green to indicate normal 'healthy circuit' condition.

(c) Fault buzzer, fault alarm muting switch, fire alarm muting switch and reset switch.

(d) Gas discharge indicator: Audio-Visual.

(e) Battery tricker charger, changeover contactor and all associated voltmeters, ammeters, control switches, HRC fuses, relays and main failure visual and audible alarms.

(f) All necessary labels (clear perspex reversed engraved and machine screws), HRC fuses, terminal blocks, relays, wirings, etc.

A suitable perspex with colour reversed engraved diagrams showing in reduced scale the areas covered by the System, smoke detectors, manual call points, zone delineations etc., shall be provided and mounted on this panel.

*09/09/04*

## 6.6 Standby Power Unit

A DC power supply units shall be provided and each DC power supply unit shall comprise 24 volt heavy duty batteries of sufficient capacity such that it is capable of maintaining the standing loss or losses of the portion of the system for at least 72 hours plus the maximum alarm load for at least one hour. For each DC power supply unit, a proprietary make fully automatic two rate battery tricker charger (constant voltage type) comprising double-wound vacuum impregnated transformer. Full-wave bridge connected to rectifier and relays, etc. shall be provided to keep the batteries fully charged under all condition of service for all the panels. The charger must be capable of recharging fully the batteries within 4 hours after a full discharge. The batteries and charger shall be supplied complete with HRC fuse distribution board, first grade MISC ammeters to read DC charging current and DC load current, DC voltmeters marked to indicate both float and boost charge voltages, mains on indicating lamp, non-locking load test switch and suitable rated test load with the voltmeters scale clearly marked in red showing the terminal voltage considered desirable when feeding the test load, float/manual selector switch, battery charger failure alarm, battery cut-off alarms, battery earth leakage detector, engraved instruction labels for manner and duration of tests, all necessary louvres at the front plate. The internal shall be fully lined with formica or other materials against corrosive elements from the batteries.

"Each DC power supply unit shall be provided with a fault alarm circuit complete with indicating lamp, buzzer, buzzer muting switch etc. to alarm where there is no main power supply to the unit."

*09/09/04*

## 6.7 Discharge Nozzles

The discharge nozzle shall consist of an orifice and any associated horn, shield or baffle. It shall be constructed of corrosion resistant metal and shall be of adequate strength to withstand the working temperatures and pressures.

The location of the nozzles and area coverage per nozzle shall comply with the requirements specified in NFPA and each nozzle shall be permanently marked to facilitate identification of the type, size and orifice diameter.

*09/09/04*

## 6.8 Smoke Detectors

Smoke detectors shall be of the solid state ionisation type capable of detecting fire in its incipient stages. The units shall be neat and compact in appearance, finished in light colour, suitable for ceiling mounting. Smoke detectors shall be installed in such a way that each may be readily withdrawn from service for testing or replacement without affecting the effectiveness of the remaining detectors and installation. Smoke detectors shall be suitable for operation on

24 volt D.C. system and of the type acceptable to the Fire Safety and Shelter Department, Singapore Civil Defence Forces.

Remote extended indicators shall be provided for smoke detectors in raised floor and ceiling void.

*09/09/04*

## 6.9 FM 200 Gas Storage Containers

The FM 200 gas shall be stored in containers designed to hold it in liquefied form at ambient temperatures.

Each container shall have a permanent name-plate specifying the agent, bare and gross weight in addition to the super pressurisation level. The date of charging and subsequent re-charging shall also be indicated on the name-plate.

The containers shall be designed, constructed, installed and tested to comply with the relevant codes.

A reliable means of indication shall be provided for determining the pressure in the containers. The means of indication shall account for variation of container pressure with temperature.

Each container shall be equipped with a suitable discharge valve assembly capable of discharging the gas at the required flow rate and pressure.

*09/09/04*

## 6.10 Breathing Apparatus

Self contained breathing apparatus shall be provided as shown in the Specification drawings. The breathing apparatus shall comply with the requirements of the relevant codes.

*09/09/04*

## 6.11 Type of Pipework

Piping shall be designed and installed to deliver the required rate of agent at each nozzle. Pipeworks and fittings shall be of threaded galvanised steel type to BS 1387 (Class C).

*09/09/04*

## 6.12 Other Items

All other items e.g. manual release stations, abort switches etc., which are necessary for the complete installation of the FM 200 system shall be provided.

*09/09/04*

## 6.13 Control Wirings

All wirings shall be enclosed in galvanized steel conduits. The wiring circuits shall be separated from other circuit runs and shall not in any circumstances contain wiring other than that associated with the FM 200 system.

*09/09/04*

## 6.14 Testing and Commissioning

The testing and commissioning of the complete system shall be performed by qualified personnel from the manufacturer of the FM 200 system.

Upon completion of the system installation, commissioning test shall be performed in the presence of representative from the Architect and upon satisfactory completion, results

together with the operation and maintenance manual shall be submitted. All design calculations shall also be submitted for record.