DEPARTMENT OF PUBLIC WORKS

FIRE SECURITY

STANDARD TECHNICAL SPECIFICATION

FOR ZONE ALARMS

FOR A SPRINKLER FIRE EXTINGUISHING SYSTEM

STS 7
REF: FPO 2E
JANUARY 1999

FPO 2E

REVISED JANUARY 1999

DEPARTMENT OF PUBLIC WORKS

FIRE SECURITY

STANDARD TECHNICAL SPECIFICATION FOR ZONE ALARMS FOR A SPRINKLER FIRE EXTINGUISHING SYSTEM

CONTENTS

ANNEXURE A: Schedule of Particulars and Information from Tenderers

STANDARD TECHNICAL SPECIFICATION FOR ZONE ALARMS FOR A SPRINKLER FIRE EXTINGUISHING SYSTEM

1. INTRODUCTION

This Standard Technical Specification forms part of, and shall be read with, the Conditions of Contract, Supplementary Specification, Schedules, Drawings and other parts that form part of the Tender / Contract Documents.

2. SCOPE

This standard specification deals only with the general technical aspects of zone alarms for sprinkler fire extinguishing systems. Tenderers are therefore referred to the Supplementary Specification for the particular scheme for any specific technical requirements applicable to the site and service.

Small items of equipment forming part of the system are not covered by this specification. However, the Department still requires that the total system shall comply with the highest standard of design and fire protection practice.

3. STANDARDS AND SPECIFICATIONS

The completed system and its components shall be in accordance with the following:

3.1 The Wiring of Premises (SABS 0142)

3.2 Occupational Health and Safety Act (Act 85 of 1993 as amended)

3.3 Local municipal bylaws and regulations

3.4 Local fire regulations

3.5 Regulations of Telkom

3.6 Regulations of the local electrical supply authorities

3.7 National Building Regulations Act 103 of 1997 (SABS 0400) and any amendments thereto.

3.8 The Department's Standard Specification for the Electrical Equipment and Installation for Mechanical Services as amended.

4. MATERIALS AND EQUIPMENT

4.1 Material for which a SABS specification exists, shall be in accordance with such specification and shall bear the SABS mark.

4.2 All materials and equipment used on the contract shall be new and of the very best of their respective types and kind.

4.3 All items of equipment shall be completely compatible.

4.4 The equipment shall preferably be manufactured in this country.

4.5 Replacement units shall be available for the equipment and the complete maintenance of equipment shall be undertaken locally.

4.6 Recording and control equipment shall be housed in completely enclosed vermin-proof cabinets.

4.7 All items shall be fitted with nameplates containing information, such as serial numbers, model numbers, type numbers, manufacturer's name etc. This information, together with the description of each and every piece of equipment, shall be listed in the Maintenance Manual.

4.8 All components and PC boards shall also be marked with type numbers and descriptions and this information shall be contained in the Maintenance Manual.

4.9 No equipment without detailed specifications and /or testing results will be allowed.

5. THE INSTALLATION

The zone alarm installation entails the provision of flow switches at strategic points on an automatic sprinkler extinguishing system or systems in an extensive layout with the accompanying annunciation facility, wiring, conduiting and all the necessary ancillary equipment.

(NOTE: A zone alarm installation is only provided on extensive sprinkler systems or systems where the layout of the building or buildings is so complicated that it would be difficult to determine the locality of a fire in the early stages, after the water motor alarm had been activated.

The zone alarms shall, therefore, only be introduced if specifically included In the Supplementary Specification for the relevant scheme.)

6. ALARM FLOW SWITCHES

The alarm flow switches shall be acceptable to the Department and suitable for sprinkler service.

The alarm flow switch shall be sufficiently sensitive to detect a flow equal or less than that from a single sprinkler – yet still be capable of operating satisfactorily at a flow equal to that from all the sprinklers in the assumed maximum area of operation.

If so specified in the Supplementary Specification, a testing facility shall be provided on site for checking the flow switches against this standard. Provision shall be made in the test arrangement for establishing the rate of flow through the flow switches.

An alarm flow switch shall be fitted to each zone of a high-rise installation immediately downstream of the subsidiary valve.

The alarm flow switches shall, unless special approval is obtained, be fitted on a horizontal distribution pipe. If an alarm flow switch is required at a sprinkler control valve, it shall be located as close as possible to such valve. Where more than one zone is served by the same sprinkler control valve, care shall be taken to ensure that there are no branches from the distribution pipes which are not served by a flow switch.

A 25 mm diameter test valve shall be fitted close to the alarm flow switch, complete with drainage facility unless a remote sprinkler test arrangement has already been provided which would activate the flow switch.

7. ANNUNCIATION AND MONITORING

Annunciator, repeater (remote) and indicator panels shall be suitable for sprinkler service and be completely assembled, wired and tested by the manufacturers before being dispatched from the factory.

Control panels shall conform to BS 5839 Part 4 or EN 54-2:

A control panel shall be able to function as a stand-alone unit, together with its own power supplies, and shall not be dependent on external control equipment, such as computers, for functioning.

Provision in the form of suitable terminals, connectors or ports, shall be made on the control panel for the connection of peripheral equipment, such as computers, printers and interface equipment, to enable the accumulations of data generated by the flow switches and the control panel, to be used for future reference, or for the relaying thereof to remote monitor or control equipment.

Control panels shall be constructed for minimum power usage in both battery and mains power supply modes.

The control panel shall be of the wall mounted type, and shall also be suitable for mounting flush in a console, if so required in the Supplementary Specification.

Battery charging equipment mounted in the control panel, or elsewhere, shall be mounted in such a way that 230 Volt terminals and wiring and other mains voltage equipment are shielded against accidental contact. All shields shall be marked "230 VOLT".

No 230 Volt terminals shall be placed directly next to other terminals containing wiring at other voltages.

Reset of the control panel shall only be possible through the use of a password or key by the person responsible for the system and who is trained on the system, and for system maintenance.

Terminals shall be clearly grouped and marked with a label strip for identification, so as to simplify installation and connection of wires on site by installation personnel. All outgoing and incoming terminals, and all other equipment in the control panel, shall be suitably labelled to simplify maintenance and installation, and all panel mounted equipment shall likewise be labelled. Outgoing and incoming power and field wiring shall be individually, and correspondingly, numbered at each point of termination.

The control panel shall have knock-outs in the bottom plate thereof to terminate conduiting for all power cabling, and knock-outs in the top plate thereof to terminate conduiting for signal and other electronic cabling/wiring. Holes drilled on site for this purpose will not be acceptable.

All identification labels, as well as wire terminal numbers, shall be clearly shown on all wiring diagrams in the Maintenance Manual.

It shall be possible to silence the audible alarms without influencing the visual alarms or alarm transmissions to the Fire Brigade.

Generally on smaller systems conventional fire alarm panels as used for conventional fire detectors will be required. On large systems analogue addressable fire alarm panels may be required. Where an analogue addressable fire detection system is already in operation or will be provided, the flow switches could be connected to such an analogue addressable alarm panel via compatible input units.

The actual configuration required shall be as stated in the Supplementary Specification.

Repeater (remote) panels, where required, shall indicate all alarm and fault conditions and, where applicable, user messages displayed on the main control panel. Such panels shall function completely independently of the control panels, and shall not affect the functioning of the control

panels.

8. INPUT UNITS

Where input units are required, these shall be compatible with the control panel provided.

Input / output units may be used although the output facility will not be used.

It is essential that each interface / input unit on an addressable system has its own address and that the user message would also indicate that it is a flow switch or, alternatively, an alarm on the sprinkler system.

9. TIME DELAY

An integrated time delay relay shall be incorporated either in the flow switches or the control panel in order to obviate false alarms caused by pressure variations in the pipes.

10. BLOCK PLANS, MIMIC PANELS AND ENGRAVED SCHEDULES

The Supplementary Specification will clearly state whether a block plan, mimic panel or engraved schedule will be required for the identification of the positions of the flow switches.

On a system where the positions of the various flow switches can be easily identified by description only, this shall be done by engraving the description of the flow switch position in black, sans serif letters, 5 mm high, on anodised aluminium.

If a block plan or mimic panel has been provided for a detection system for the same building(s) then the positions of the flow switches shall be indicated thereon. In the case of a mimic panel a red LED indicating a fire alarm and an amber LED indicating a fault shall be provided.

If a block plan has been specified in the Supplementary Specification, it shall be as specified in such specification or as detailed on the project drawings. Unless specified otherwise, the block plan shall be printed on white, non-transparent, heat-resistant plastic, not less than 0.08 mm thick, mounted behind 4 mm thick clear “Perspex” on 16 mm chipboard, in a meranti frame with 19 mm quadrants to keep the “Perspex” in position.

If a mimic panel has been specified in the Supplementary Specification, it shall be as specified in such specification or as detailed on the project drawings. Unless specified other wise, the mimic panel shall consist of 24 mm x 24 mm or 48 mm x 48 mm press-fit removable poly-carbonate blocks; alternatively an anodised aluminium square not bigger than 120 mm x 120 mm screwed to a sub-frame. High brilliance, 3 mm diameter, flush LEDs shall be fitted at each position representing a flow switch – one red LED to indicate a fire alarm and one amber LED to indicate a fault. All lettering shall be in clear, sans serif letters and zones and building outlines clearly indicated. In addition, three 6 mm diameter LEDs shall be provided to indicate a fire alarm (red), a fault (amber) and power on (green) respectively. A lamp test button, an audible alarm (65 dB(A) at 1m) and an acceptance button to silence the audible alarm shall also be provided.

Generally, a graphic display on a computer monitor will not be required for a system with only flow switches for fire alarms. Should it be specified in the Supplementary Specification that the flow switch circuits are to be integrated with a graphic display system, then compatible interfaces shall be provided.

11. AUDIBLE ALARMS (SOUNDERS)

If so specified in the Supplementary Specification, the activation of a fire alarm by means of a flow switch shall set off a system of audible alarms (sounders) throughout the premises. The provision of the necessary equipment to relay the alarm to the audible alarm system shall be completely compatible with the rest of the flow switch system.

The audible alarm system, if required, shall be according to the requirements of the Supplementary Specification.

12. ELECTRICAL SUPPLY

Unless specified otherwise in the Supplementary Specification, a single phase 230 Volt, 50 Hz, AC supply 15 amp power plug outlet will be provided by others in the room for the control equipment.

Notwithstanding any reference to a nominal rating of 230 Volt supply, all equipment connected directly to the main supply shall operate satisfactorily and without reduction of its effective life at the voltage supplied by the local authority.

All equipment connected to the main supply shall be equipped with over voltage protection and spike arrestors to prevent damage to such equipment by lightning or other spikes, or damage due to over voltage.

13. STANDBY BATTERY POWER SUPPLY

The standby battery power supply for the flow switch alarm system shall be kept separate from any other system in this contract except where it is directly connected to an automatic fire alarm detection installation.

Unless specified otherwise in the Supplementary Specification, the system shall operate off a 24 Volt supply.

The power pack shall be able to accept an incoming single phase supply as described under “Electrical Supply” and shall be equipped with transformers, rectifiers, condensers and integrated circuits for the supply of stabilised power to the control circuits.

The battery charger shall be able to deliver the full charging current to discharged batteries, and thereafter the charger shall automatically vary the charging current to the batteries as may be required by battery voltage conditions. Batteries shall not be subjected to overcharging.
The battery charger shall be protected against reverse polarity and short circuits on the DC supply side.

The power pack of the control panel shall regulate the supply voltage.

Upon loss of mains power, the power supply unit shall automatically revert to battery power, whereafter the system shall remain fully operational for a period of 72 hours as well as the total alarm load for a further period of one hour. The unit shall automatically revert back to mains power upon mains power restoration and manual resetting of the unit shall not be necessary.

The power supply shall be equipped with the following indications on the front of the unit:

(a)	"MAINS ON”		green LED
(b)	“CHARGER FAULT"	-	amber LED

Batteries shall be mounted in a separate ventilated padlockable cubicle. Batteries shall be mounted in such a way that contamination of other equipment by batteries cannot take place. Batteries shall be in a special plastic container to contain any possible spillage.

Any supply fault, charging fault or low battery voltage shall be transmitted to the console or control panel so that an alarm can be generated.

No fuses or switches shall be accessible on the front of the power supply unit without opening the door

Every charger shall be provided with a voltmeter and an amp meter.

Batteries shall be of the sealed lead acid type and the sizes of the batteries to be used shall be indicated on a label in the battery cubicle.

Batteries shall be charged to 80% of their capacity within 8 hours.

The supplier of the battery charger must provide a certificate in which he confirms that the battery charger is suitable for the batteries offered.

14. CIRCUIT WIRING

All wiring associated with the flow switch alarm system shall be carried out in compliance with the requirements of the “Standard Specification for Electrical Equipment and Installations for Mechanical Services” of the Department.

The cross-sectional area of the wire shall not be less than 0.5 square mm even though voltage loss may prove that thinner wires will meet the voltage requirements of the operating devices.

It shall be the responsibility of the Contractor to ensure that the wire sizes are adequate for the equipment he proposes using.

The insulation shall be of the fire retardant type.

The flow alarm wiring shall be in separate conduits or trunking and shall not be wired in conduits or trunking with other fire protection or security system wiring except that of fire detection alarm systems.

Wiring in horizontal trunking shall be secured at 2 m intervals or less and wiring in vertical trunking at intervals not exceeding 1.5 m.

15. CONDUITS AND TRUNKING

The quality of materials and the methods of installation of conduits, conduit accessories and trunking shall be carried out in compliance with the requirements of the “Standard Specification for Electrical Equipment and Installations for Mechanical Services” of the Department.

The Contractor for the flow alarm switch system shall be responsible for the supply and installation

of all conduits, conduit accessories, wiring trunking and cable trays, as may be necessary or required for the system, unless specified otherwise in the Supplementary Specification.

Steel conduit and conduit accessories shall be cast in, or built into, the building structure in new buildings. No surface mounting will be acceptable in new buildings or structures.

Surface mounted conduit and conduit accessory work will be allowed only in existing buildings.

Steel conduit and conduit accessories surface mounted on building structures, steelwork and woodwork, shall be done neatly and in straight lines and shall be firmly fixed by means of saddles at a maximum spacing of 2 m and at a distance not exceeding 150 mm before and after each 90^0 bend.

M4 machine screws shall be used for fixing of spacer saddles onto steelwork. Suitable holes shall be drilled and tapped in the steelwork for this purpose.

Steel conduit and conduit accessories, surface mounted in roof spaces of buildings or structures with pitch roofs, shall follow the roof structural elements.

The conduits and conduit accessories for the wiring of the flow switch circuits where exposed to the elements and in the roof spaces shall be of galvanised mild steel. Conduits and accessories for these applications shall comply with SABS 162 and shall be hot-dip galvanised to SABS 763.

Conduit installations shall be done in such a way that the circuit wiring can be done without interruption and without T-joints.

No PVC conduits shall be used on flow switch alarm wiring systems unless specified otherwise in the Supplementary Specification.

Trunking shall be fitted throughout with covers.

PVC trunking may not be used on flow switch alarm wiring system.

No wiring trunking may be used in microfilm vaults or in high risk areas such as fuel, oil, tyre, paint, wood, paper, cardboard box storage areas, record rooms and vaults.

16. COMMISSIONING AND HANDING OVER TESTS

The testing of the system shall be done in the presence and to the satisfaction of an authorised representative of the Department.

Tests shall include simulation of fire conditions in each zone to prove the efficiency of all aspects of the system to the satisfaction of the Department.

All equipment, material, etc., which may be necessary for these tests shall be supplied by the Contractor.

The Contractor shall do his own complete commissioning tests before the actual first take-over tests are done. This is to satisfy himself that everything is working and is in accordance with the specification.

17. OPERATING INSTRUCTIONS

The tenderer shall make provision for framed operating instructions in English, which clearly stated the procedure to be followed in the event of a fire alarm. These instructions must be framed under

"Perspex" in a robust 25 mm kiaat or metal or other approved frame and must be neatly displayed adjacent to the control or indicator panels.

In the case of the control panel the instruction chart must also indicate the procedure to be followed if a fault alarm is indicated.

18. INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS

Full installation operating and maintenance instructions shall be supplied in quadruplicate with each system and shall include schematics and detailed wiring drawings with a full component list indicating not only component values but sources of supply. The installation will not be accepted until this information has been handed to the Department.

19. MAINTENANCE OF INSTALLATION

The tenderer for this contract shall allow in his tender price for the maintenance of the complete installation for a period of twelve (12) months, starting from the date of the first take-over of the contract by the Department

It is a specific requirement of this contract that the Contractor shall allow for quarterly inspection visits during the 12-month maintenance period, and that he shall submit full reports for each such visit. The reports shall contain the status of the system well as the faults, which occurred on the system during the previous three months.

The reports shall be submitted to the Department within seven (7) days of the service. Serious faults shall immediately be reported to the Regional Representative and the Consulting Engineer by telephone.

No maintenance or repair work shall be done on site without the knowledge and approval of the user Department.

20. COMPREHENSIVE MAINTENANCE, SERVICING AND REPAIR CONTRACT

After the completion of the required maintenance period the Department may insist on entering into a comprehensive maintenance contract with the installer for a period which may vary between one and three years at the sole discretion of the Department

21. INFORMATION REQUIRED WITH TENDER

Tenderers shall supply the information as requested in the Schedule of Equipment and Materials which is attached to this specification as an Annexure, together with their tender.

Should a Tenderer fail to do so his tender may be disqualified.

22. INFORMATION TO BE OBTAINED FROM THE SUPPLEMENTARY SPECIFI- CATION AND / OR TENDER DRAWINGS

22.1 Whether a separate control unit is required.

22.2 If a control unit is to be provided, whether it should be conventional or addressable.

22.3 Particulars of the control unit, if not already part of an automatic fire detection system.

22.4 Whether an engraved panel, a block plan, a mimic panel or graphic display is required.

22.5 Detail specification of such engraved panel, block plan, mimic panel or graphic display.

22.6 The position of all flow switches to be installed.

22.7 Whether a system of audible alarms (sounders) is to be provided in conjunction with the zone alarm system.

22.8 Whether conduits and trunking are to be provided under this contract or sub-contract and exact requirements for same.

23. SCHEDULE OF PARTICULARS AND INFORMATION FROM TENDERERS

THE SCHEDULE WHICH ACCOMPANIES THIS TENDER NOTICE, FORMS AN INTEGRAL PART OF IT AND MUST BE DULY COMPLETED IN EVERY DETAIL, FAILING WHICH THE TENDER IN QUESTION MAY BE REJECTED.

Under no circumstances will statements such as the following be acceptable to the Department:

"See attached pamphlets."
"Refer to catalogue."
"Data to follow."
"As given by supplier, etc."

Equipment offered and listed in the Schedule must be capable of performing the specified duties and shall comply in all respects with the requirements of the specification.

SHOULD it transpire that such equipment, even when offered by make, model and/or type, is unsuitable of meeting or performing in accordance with the Specification requirement in any respect, the Contractor or Subcontractor shall nevertheless be responsible for any additional costs incurred in providing the required or suitable equipment.

Whenever a specific make, model or type of equipment has been prescribed in the Specification and the tenderer offers an alternative, or equal make or type of equipment in his tender, the Department will, on acceptance of such a tender, inform the prospective Contractor in writing as to the make and/or type of equipment accepted. HOWEVER, it should be noted that the use of words "OR EQUAL" by the tenderer is to be discouraged and could lead to the disqualification of the tender.

THE CONTRACTOR WILL NOT BE ALLOWED TO SUPPLY EQUIPMENT OTHER THAN THAT OFFERED IN HIS TENDER WITHOUT THE WRITTEN APPROVAL OF THE DEPARTMENT.

SCHEDULE OF PARTICULARS AND INFORMATION FROM TENDERERS

ITEM	PARTICULARS	INFORMATION FROM TENDERER
1	**CONTROL PANEL / UNIT (if required)**	
	Manufacturer	
	Country of origin	
	Type or model	
	Is the equipment acceptable to the Department of Public Works?	Yes / No
	Has the equipment previously been installed for the Department of Public Works?	Yes / No
	State where	a) b)
	Are there any deviations from the specification?	Yes / No
	Furnish particulars	
	Do panels comply with EN 54 and / or BS 5839 Part A?	Yes / No
	State which	
	Give names of at least two international institutions which have approved the equipment (attach copies of Certificates of Approval)	
2	**ALARM FLOW SWITCHES**	
	Manufacturer	
	Country of origin	
	Type or model	
	Is the equipment acceptable to the Department of Public Works?	Yes / No
	Has the equipment previously been installed for the Department of Public Works?	Yes / No
	State where	a) b)

ITEM	PARTICULARS	INFORMATION FROM TENDERER
	Are there any deviations from the specification?	Yes / No
	Furnish particulars	
3	**AUDIBLE ALARM (SOUNDERS) (if required)**	
	Manufacturer	
	Country of origin	
	Type or model	
	Is the equipment acceptable to the Department of Public Works?	Yes / No
	Has the equipment previously been installed for the Department of Public Works?	Yes / No
	State where	a) b)
	Are there any deviations from the specification?	Yes / No
	Furnish particulars	
4	**BATTERY CHARGER (if not already provided with the fire detection system)**	
	Make	
	Country of origin	
	Maximum charging capacity	amps
	Recharging time for batteries supplied	hours
	Have all the specified meters been provided?	Yes / No
	Is the equipment acceptable to the Department of Public Works?	Yes / No
	Has the equipment previously been installed for the Department of Public Works?	Yes / No
	State where	a) b)
	Are there any deviations from the specification?	Yes / No
	Furnish particulars	

ITEM	PARTICULARS	INFORMATION FROM TENDERER
5	**BATTERIES (If not already provided with the fire detection system)**	
	Make	
	Battery type	
	Country of origin	
	Guarantee period	years
	Number of batteries	
	Total capacity	amp hours
	Is the certificate from the battery manufacturer attached, stating that the charging equipment mentioned above is suitable for the batteries offered?	Yes / No
6	**CIRCUIT WIRING**	
	Manufacturer	
	Country of origin	
	Type	
	Does it bear the SABS mark?	Yes / No
	Does it bear a BS mark?	Yes / No
7	**CONDUITS**	
	Manufacturer	
	Country of origin	
	Type	
8	**TRUNKING**	
	Manufacturer	
	Country of origin	
	Type	
9	**FIRE BRIGADE SIGNALLING FACILITY (If not already provided with the fire detection system)**	
	Manufacturer	
	Country of origin	
	Type or model	
	Is the equipment acceptable to the Department of Public Works?	Yes / No

ANNEXURE A TO THE STANDARD SPECIFICATION FOR ZONE ALARMS FOR A SPRINKLER FIRE EXTINGUISHING SYSTEM

ITEM	PARTICULARS	INFORMATION FROM TENDERER
	Has the equipment previously been installed for the Department of Public Works?	Yes / No
	State where	a) b)
	Is the equipment compatible with the receiving equipment of the local Fire Brigade?	Yes / No