SECTION 6 - SUB-SECTION E

FIRE DETECTION & EXTINGUISHING SYSTEM

CONTENTS

1. General

1.1 The need for an advanced comprehensive fire detection and extinguishing system stems from the importance and unique nature of the facility and the special conditions in which its various systems have to operate.

1.2 Its purpose: Early detection of an event potentially leading to fire, and timely application of countermeasures at an early stage causing its extinction, together with measures intended to prevent the propagation of the fire.

1.3 Central fire detection and extinguishing system shall be installed in the site according to the requirements and regulations of the relevant authorities. The automatic and manual extinguishing systems shall cover all buildings, pits, shades, parking lots and areas of the premises.

2. Guidelines and Assumptions for the Planning of the System

2.1 The designers shall consider the following problems that arise in case of an event/ fire:

2.1.1 Problems of escape and orientation

2.1.2 Great dependence on technical systems generally and air conditioning and electrical systems in particular in terms of delivery of air, power, lighting, etc.

2.1.3 Problems involved in the removal of smoke, toxic gases etc. during and after the fire.

2.1.4 Difficult firefighting conditions

2.1.5 Access for firefighters from outside

2.1.6 Provision of time for the necessary preparations for firefighting and for measures to be applied after the extinction

2.1.7 The fire may destroy the highly valuable special-purpose systems.

2.1.8 The system shall be designed in accordance with Israeli standards.

2.1.9 The testing and approval of the system shall be done by the Israel Standards Institution.

3. Regulations, Specifications and Standards

3.1 Equipment and installation of the fire and smoke detection system (including auxiliary equipment) will be according to IS 1220 (in its entirety).

Not locally manufactured equipment shall be certified by NFPA 72E, NFPA 12A, FOC, VDS, FM, UL. The equipment shall always carry the approval marks of at least two of the standards listed in Chapter 34 of the MOD General Specification in addition to the Israeli Standard.

3.2 The system shall be designed and implemented according to IS 1220 Part 3. Once the installations are completed, the Contractor shall call in the SII to perform a systems check.

3.3 The entire work shall be carried out according to Chapter 34 of MOD General Specification – “Fire Detection and Suppression Systems”, and the Israeli and foreign standards specified in Clause 34001 of the MOD general specification.

4. Execution Principles

4.1 Destination

4.1.1 To detect fire at an early stage and apply prompt measures to put out the fire; also to apply measures for preventing the propagation of the fire.

4.2 Fire detection, indication, and alarm functions:

4.2.1 Automatic fire detection and sounding an alarm

4.2.2 Possibility of issuing a fire detection warning by pressing push-buttons installed in various parts of the facility.

4.2.3 Indication of the site of fire both locally and at the control center.

4.3 Fire extinguishing, indication, and alarm:

4.3.1 Automatic extinguishing of the fire and sounding an alarm

4.3.2 Manual extinguishing of the fire and sounding an alarm

4.3.3 Indicating the site of fire both locally and at the control center

4.4 Systems Control and Integration:

4.4.1 Transmission of the indications and warnings to the Radiography Equipment and Handling Control System, for additional processing and display

4.4.2 Systems integration with Building Control, Security, Air Conditioning, Electricity, etc;

4.5 Matters of Emphasis

4.5.1 The fire detection and extinguishing system of the facility and the buildings shall be built in a manner that ensures independence of every building, assembly, wing, floor, while on the other hand based on central control from the fire monitoring system.

4.5.2 At the Control central workstation there shall be a thorough integration between the fire detection and extinguishing system and other systems necessary for handling fire situations by means of the building's control system.

4.5.3 In addition to the automatic operation there shall be a capability for manual operation of the detection and extinguishing means.

4.5.4 The building shall be provided with manual extinguishing means and efficient means of communication with the control center.

4.5.5 The facility and the central building shall be divided into fire zones isolated from one another in terms of the possibility of fire propagation.
The zones and the time necessary shall be determined during the detailed planning in accordance with various considerations, such as:

A. The function of the facility and the buildings;

B. Constraints affecting the technical systems generally and the air conditioning and electrical systems in particular;

C. Fire detection shall be possible throughout the facility and in all parts of the buildings, including shafts, cable ducts, etc.

4.6 Automatic fire extinguishing shall take place in the various parts of the facility and buildings as specified hereafter.

5. Fire Fighting Switchboard Specification

5.1 General

5.1.1 The fire detection and extinguishing system shall comprise the following components:

A. Analog addressable switchboard with display;

B. Addressable smoke and fire detectors;

C. Push-buttons, bells, and associated equipment

D. Valves, tanks, and related equipment

E. Piping and cables

F. Integration with other systems

5.2 Fire Detection and Extinguishing Switchboard

5.2.1 The switchboard of the fire detection and extinguishing system shall be located in the control room.

5.2.2 The switchboard shall be computerized, of an addressable type with the capability of connecting to the building control system and to switchboards in other buildings.

5.2.3 The entire automatic fire detection and extinguishing equipment shall be connected to the switchboard.

5.2.4 The system shall have conditional logic control zones; this shall enable operation of type "If A then B" logic.

5.2.5 The main display and control unit of the switchboard shall be mounted on the control desk at the shift manager’s workstation. There shall be an alternative for operating the system in a complete manner even independently of the panel and the operations done on the control desk; no communication fault shall impair the functioning of the switchboard.

5.2.6 In every separate building and on every floor of the buildings there shall be a centrally located synoptic secondary panel of the switchboard.

The panel shall contain a drawing of the floor and a clearly visible marking of the fire detection and extinguishing system and equipment on the floor. During fire detection or extinguishing there shall be a visual indication to this effect, showing the location and the zone number. The floor drawing shall be identical to that shown on the display of the control desk for this purpose.

5.2.7 The switchboard shall be provided with a fault control system. All lines from the detectors and other equipment items connected to the board shall be protected; in case of short circuit or disconnection, or in case of disconnected or missing equipment, the system shall issue a fault warning. The fault indication shall show the zone of the fault, or that the fault is a general one. All other zones shall continue to operate in case of localized fault.

5.2.8 All system lines leading from the switchboard outward, as well as the switchboard itself, shall be protected against lightning and overvoltage.

5.2.9 The fire detection system shall be of the addressable type. There shall be an address in the system for every detector or push-button or detection equipment or display. Upon a detection and/or indication and/or pressing a push-button, the above information shall be displayed on the switchboard together with the code number of the equipment that issues the warning.

5.2.10 All detectors in areas provided with automatic extinguishing shall be of a type with at least three adjustable sensitivity levels. Sensitivity changes shall be feasible from the switchboard or on the detector.

5.2.11 All detection and extinguishing lines shall be connected to the switchboard by means of standard modular units intended for this purpose, as follows:

A. Modules for connection of detectors of the smoke, optical, heat, flame types, and of the heat type by means of a pair of wires if it forms part of a zone where additional detectors of other types are to be connected.

B. Modules for connection of detectors of the heat type, by means of two-wire cables.

C. Modules for connection of special detectors, such as protected beam smoke detectors.

D. Modules of a type intended for automatic operation and control using standard, ecologically acceptable gas. Such modules shall comprise the following equipment:

1) Extinguishing time delay programming units, with an extinguishing delay button to be installed in the extinguishing area. The delay time shall be adjustable from the switchboard.

2) Indication of fault, fire detection warning, extinguishing activated.

3) Indication that the gas pressure in the tank is too low.

4) Activation of extinguishing as a result of detection conveyed by at least two detectors in the area of the space being extinguished.

5) Activation of extinguishing as a result of an extinguishing push-button.

6) Activation of extinguishing whistle and pilot lamp for the above in the extinguishing area.

5.3 The switchboard shall include a device for measuring the distance of heat detection by means of a cable with a pair of wires.

5.3.1 The device shall be provided with a selector for connection to any one of the above detection zones.

5.3.2 Every detection zone shall comprise a resetting system for every zone separately, so that the measurement shall be correct for every single zone, independently of the distance between the beginning of the detector cable and the switchboard.

5.3.3 The resolution of the detection shall be adjustable for every zone.

5.3.4 The beginning of distance measurement shall be from the beginning of the above mentioned detection cable from the end near the switchboard.

5.4 The switchboard shall include an electromagnetic operating system for holding doors open.

5.4.1 On detection by at least one of the detectors and/or on the activation of the extinguishing operation, the system shall close the doors in order to isolate the fire zone.

5.4.2 The doors equipped with a mechanical pneumatic or hydraulic device intended for this purpose shall be closed by means of this device after the electromagnet has ceased to hold the door open.

5.5 The switchboard shall activate a system of sirens mounted throughout the facility and building following the detection of fire, in addition to the alarm sirens. There shall be a Public Address (PA) system operated from the control room. The interrelations between them will be finalized during the detailed planning stage (such as the possibility of muting the sirens from the control room when the PA announcement is to begin, etc.).

5.6 The system shall contain an Automatic Telephone Dialer to 10 preset five fighting forces.

5.7 The switchboard shall offer an alternative for controlling the resolution, including switching off every detector separately. In such case the corresponding zone shall be marked on the switchboard with a specific indication showing that the zone has been switched off partly or entirely. This is to be done for carrying out special works in the zone, such as welding etc., which generate smoke and may trigger the system unnecessarily.

Disconnecting a detector shall not affect other zones or detectors. The above operations shall not impair the possibility of activating the automatic extinguishing operation manually by means of a push-button.

5.8 The switchboard shall contain accumulators according to the General Specification and the standards; however, the duration of system operation under maximum alarm load from the accumulators shall be 72 hours (instead of 24 hours), and the duration of operation under ordinary load shall be 120 hours (instead of 72 hours). The switchboard shall be powered from the UPS system installed in the building.

5.9 Display of the Computerized System

5.9.1 Images and graphics shall be displayed on 19" (at least) color monitors; the display shall be included also in the building control system.

5.9.2 The images displayed on the fire detection and extinguishing screen shall be “live” in that the background of the zone from which the warning comes shall be rendered in red color (without erasing the lettering and marks of the building). The zone from which an indication of applied automatic extinguishing by means of gas or water shall be rendered in a different color. The display of the latest event shall be according to the procedure with regard to the latest fault - the entire red background blinking, and the acknowledgment shall be followed by a constant red color. The detection and extinguishing push buttons, the location of extinguishing means, and the borders of the fire zone shall be marked on the images.

5.9.3 The possibility of presenting two or more images on a single screen will be examined during the detailed planning stage. On the other hand, it is possible that a table or diagram will be attached on a number of screen images, thus allowing a scrolling operation.

5.9.4 The screens shall have a resolution of at least 640-480 dot matrix.

5.9.5 The display on the fire detection and extinguishing screens shall include:

A. Map of the site.

B. Overall sectional map;

C. Drawing of every floor;

D. There shall be a separate image for every floor in every building (if existent).

E. Energy systems assembly/building;

F. Diagram showing the fire extinguishing water with valves and hydrants, and fire extinguishing systems using water;

G. Diagram showing the fire detection and extinguishing system using gas;

H. Orientation images

I. Escape maps (isometric)

J. In addition, there shall be a display by means of a synoptic table including the diagram of the building with all floors, indicator lamps, and controls.

6. Power Supply Unit

6.1 The power supply unit shall be according to BS EN54 Part 4. The power supply shall be an integral part of the control units and shall be constructed as follows:

6.1.1 Converter unit from 230 (+15%) VAC to 24 VDC capable of continuous delivery of 6A current;

6.1.2 Battery charger unit;

6.1.3 Lead/acid batteries, sealed, 6-40 Ah.

Implementation of batteries based on innovative technologies may be considered, subject to withstanding standards.

6.1.4 An audio-visual alarm shall be displayed in emergency, when the system operates on batteries.

6.1.5 The control unit shall be equipped with a battery and battery charger for power outage events with 24 hours of operation capacity. After that time the system is capable to sound an alarm for 30 more minutes.

6.1.6 Power cut of less than 15 minutes duration shall not cause audio or visual display on the control panel.

7. Peripheral Detectors and Equipment

7.1 Detectors

7.1.1 The detectors shall be advanced variable sensitivity, panel controlled, interactive type, based on up to date technology.

7.1.2 Non radioactive smoke detectors;

7.1.3 Electro - Optical detectors.

7.1.4 Flame detectors with infra-red sensors;

7.1.5 Linear heat detectors;

7.1.6 Detectors containing a pair of heat sensitive wires such as, or equivalent to, “Protector wire line heat and fire detector”. These shall be connected as a separate zone or as part of a zone where additional detectors are to be connected.

7.1.7 Detectors of the “Linear beam smoke” type;

7.1.8 Air suction detectors;

7.1.9 If a required change of sensitivity is to be done on the detector, it shall be done on the detector body or base, and there shall be a capability for doing so without disconnecting any wiring.

7.2 Push-buttons

7.2.1 For detection

7.2.2 For extinguishing

7.2.3 For delay of extinguishing;

7.3 Sirens with Flashlights

7.3.1 The sirens shall be electronic horn type 100 dB, combined with flashing red lights.

7.3.2 For alarm due to detection

7.3.3 For alarm due to extinguishing.

7.4 Pilot Lamps

7.4.1 For the indication of detection;

7.4.2 For the indication of extinguishing;

7.5 Electromagnets of various types for releasing the hold on doors in the open state and allowing the doors to be closed automatically in case of fire;

7.6 Extinguishing gas of an environmentally harmless type FM 200; waterless fire suppressant

7.6.1 For storage of extinguishing gas;

7.6.2 With equipment intended to indicate that the gas pressure in the tank is too low.

8. Installation of the Detection Equipment in the Building

8.1 The detectors shall be installed as follows in all spaces:

8.1.1 In all the areas of the buildings, shades, truck tunnels etc.

8.1.2 In double ceiling spaces

8.1.3 In the space of all rooms/corridors/stores

8.1.4 In the spaces of double floors in communication and computer rooms

8.1.5 In electrical and communication, boards, racks etc.

8.1.6 The return air ducts that collect air from the various zones of the building shall be equipped with detectors designed for such places. The same applies to smoke removal ducts near the fans.

8.2 The horizontal and vertical main cable ducts shall be provided with fire / heat detection by means of heat detectors with a pair of heat sensitive wires, such as “Protector wire Line Heat and Fire Detector”, or equivalent.

8.2.1 The heat sensitivity of the detectors shall be adjusted according to the site and the specifications so as to allow detection at several heat levels.

8.2.2 With the exception of special cases, the above mentioned detectors shall be connected in separate areas on the board. In special cases it will be possible to connect such detection line as electric feed line between two other detectors.

8.3 All detectors installed in a concealed place such as above a double ceiling underneath a double floor, or in air conditioning ducts, shall be provided with a pilot lamp installed in a visible place, in addition to the one on the detector body. These pilot lamps shall be marked to indicate the position of the detector.

8.4 Detection at main electric boards and on all boards provided with automatic extinguishing by means of gas shall be by one of the following two methods:

8.4.1 By means of a fire / smoke and/or optical detector;

8.4.2 By means of heat detector with a pair of wires such as “Protector wire Line Heat and Fire Detector”, or equivalent. Such detector shall be installed outside the wiring ducts of the board and near them in all compartments of the boards.

8.5 Fire detection in the generator area shall be implemented by means of appropriate detectors.

8.5.1 The installation of detectors shall be preceded by trial detection and test of the resistance of equipment to the conditions prevailing on the site.

8.5.2 The equipment shall correspond to the environmental conditions: extremely high temperature and high humidity

8.5.3 There shall be capability for adjusting the sensitivity of detection.

8.6 The detection push-buttons and all other push-buttons used for detection, delay, etc. shall be provided with a transparent cover and door, or other approved arrangement, for preventing the inadvertent activation or excessively light activation by the operators.

9. Division of the building into zones

9.1 A fire zone is defined as an area in which a fire outbreak may remain contained for some time without spreading to adjacent areas.

To this end, a fire zone shall be isolated from adjacent zones by suitable walls or other means.

The divisions will be effected as follows:

9.1.1 Fire detection zones

9.1.2 Fire zones - sub-zone within fire detection zones (or the entire zone)

9.1.3 Zones of automatic fire extinguishing with gas - sub-zone within fire zone (or the entire zone)

9.2 The meaning of the zone will be as follows:

9.2.1 Separate escape and public address system zone for speedy evacuation of persons.

9.2.2 Automatic closing of fire door zone;

9.2.3 Automatic air-conditioning closing zone;

9.2.4 Possible closing of electricity zone, from control center;

9.3 Readings in the control center for purposes of illustrating the fire detection zone will be by section of fire zones.
This will allow control and partitioning according to the functions of the buildings.

9.4 Zones of automatic fire extinguishing with gas;

9.4.1 Zone within which an automatic fire extinguishing system by gas/aerosols was planned;

9.4.2 The reading in the control center for purposes of illustrating the automatic fire extinguishing by gas zone will be in this section.

9.5 Division of the building into the aforesaid zones will be determined at the time of the detailed planning according to the building functions.

9.6 The number of fire-resistant hours will be determined according to the needs of the location and according to its importance and the fire load within it.

9.7 Details of the minimum actions to be carried out in order to meet the fire compartmentation are presented below.

9.7.1 Doors
Each door between one zone and another will have an automatic closing device. Doors through which there is routine and constant passage and which must remain open, will be equipped with an electromagnet to keep them in an open position.
Upon indication of fire detection or extinguishing, the electromagnet will cease to keep the door in this position and the door will close.

9.7.2 Passages for cables and pipes

These will be sealed using equipment fire separation frames (MCT) and sealing materials that will prevent the passage of the fire to the neighboring zone.

9.7.3 In the air-conditioning conduit (ducts) passages, partitioning will be effected using fire and smoke dampers.

A. Closing of the dampers will be implemented as follows:

7) As a result of the heat around them following burning or passage of air or smoke.

8) As a result of an order from the control center.

9) Manual operation locally.

B. Generally, access to the duct dampers for maintenance and for opening after a fire is difficult, and they will be planned in order to avoid this problem.

9.7.4 In the passages in smoke evacuation ducts, the compartmentation will be effected using smoke dampers.

9.7.5 The cables on both sides of the passage frames will have a fireproof coating in a way and of a length to be adapted to the requirements in each location.
The coating will retard fire damages, will not affect the properties of the cables and will be resistant to environmental damages.

10. Automatic extinguishing by gas

10.1 General

10.1.1 Automatic fire suppression in the buildings and panels shall use an environment friendly gas such as FM200 or equivalent approved by EPA, CNPP or VDC. The equipment shall be approved, among others, by UL or FM and will conform to NFPA standards.

10.1.2 Gas distribution pipes and nozzles shall be planned using a computerized plan of the equipment manufacturer and shall be approved by the customer.

10.1.3 Design of piping and nozzles installed in the ceiling and the floor shall be coordinated with design of other systems (power, air conditioning) under architect guidance.

10.1.4 Each cylinder shall be equipped with a handle for mechanical operation of the system. A gauge mounted on the cylinder shall permanently indicate the gas pressure, which shall be transmitted by a pressure sensor to the control panel Gas identification, weight and required pressure shall be noted on an ID sticker on the cylinder.

10.1.5 To avoid unnecessary operation, the cylinder shall operate only when two detectors installed in the same zone set on alarm.

10.1.6 A start pushbutton shall be connected to the suppression system for local manual/electrical activation.

10.1.7 The Contractor shall supply the MOD a detailed description of the security precaution required while dealing with gas based automatic fire suppression system and especially with the gas tanks.

10.1.8 The Contractor shall supply the MOD a detailed description of the periodic tests required to be performed while dealing with gas based automatic fire suppression system and especially with the gas tanks.

10.1.9 Automatic water extinguishing system by sprinklers shall be specified in Chapter 10 - "Sanitary Installations".

10.2 In electrical and communication panels:

10.2.1 The extinction will be affected in such a way that the gas will reach every compartment in the panel.

10.2.2 In general, automatic activation will be effected according to the reading of a two-wire heat detector or one smoke or heat detector only. At the planner's discretion and according to the panel's function, it will be possible to implement a command for extinguishing according to a reading from two detectors (cross zoning).

10.2.3 The gas canister will be in a prominent place and within reach, close to the panel; manual/mechanical operation of the canister will be simple.

10.2.4 The manual/electric activation push-button will be close to the door used by pedestrians and will be clearly marked.

For extinction in a panel, the push-button will be close to the panel.

10.3 Inside the rooms:

10.3.1 The gas canister will be outside the room area, within reach during escape; it will be close to the door used by pedestrians and in a prominent and in prominent place, so that extinguishing can be activated manually or mechanically.

10.3.2 The manual/electric activation button will be close to the pedestrian door. If there is more than one door used frequently be pedestrians, there will be as many push-buttons as there are doors.

10.3.3 Close to the manual/electric activation button, there will be a button for delaying of the automatic extinguishing activity, to allow room evacuation.

10.4 In double floors:

10.5 The level of concentration of the gas will be adapted to each place separately. Strict attention will be paid to avoid concentrations or conditions which lead to poisoning.

10.6 In his implementation stage, the contractor will include a "real" test of operation of the system with all its parts and the command and control parts from the control room.

10.7 An automatic fire extinguishing by gas zone will be a room or space of great importance or with a high fire load that could endanger its surroundings during a fire.

Automatic extinguishing will be carried out at least in the following places.

10.7.1 Computer and electronic equipment rooms;

10.7.2 Control rooms and X-ray equipment rooms.

10.7.3 Rooms with high danger of explosion (generator rooms);

10.7.4 Electrical boards (over 60A) and communication panels;

10.7.5 All the cavities of the floating floors;

10.7.6 Electrical, UPS, Trafo, Switchgear and communication rooms;

11. Smoke evacuation

11.1 The smoke evacuation system will be implemented using special (high temp.) blowers for this purpose.

11.2 The evacuation ducts will have smoke dampers which will open or close according to prior planning in accordance with the fire zones from which smoke must be removed.

12. Integration with other systems in the control center

The company will present proposed integration at PDR subject to customer approval.

12.1 In addition, other activities will be carried out in the building control system, as a result of the detection and extinguishing events and other events in the building and in the technical systems in the building.
A partial list of automatic or manual operations of the building control as a result of readings of the fire detection and extinguishing is presented below:

12.1.1 Closing and opening of air-conditioning, ventilation and smoke evacuation (truck exhaust) etc;

12.1.2 Closing of fire doors and dampers;

12.1.3 Closing/opening of smoke dampers;

12.1.4 Turning smoke blowers on/off;

12.1.5 Turning water pumps on/off for increase of water pressure for fire extinguishing.

12.1.6 Disconnection of electric circuits in accordance with the type of incident;

12.1.7 Neutralization of X-ray inspection systems;

12.1.8 Neutralization of gates and doors which are in a permanently closed and protected state;

12.1.9 Neutralization of special doors (protected against radiation) and the conveyor system;

13. Passive fire fighting equipment

13.1 Manual and automatic (sprinklers) fire suppression systems using water and fire extinguishers are specified - "Sanitary Installations".

13.2 The passive defense equipment will include all the requisites for all aspects of manual fire fighting and additional equipment as appears in the Israeli Building Law.

Its location will be in accordance with the escape routes, the routes of arrival of the fire fighting teams and the fire load in the locality.

13.3 The water hoses for extinguishing, on extinguishing reels, will be of a length sufficient to arrive with the hose mouth to the door of the furthest room.

13.4 Reserve 2" dia. water hoses and ejectors shall be stored next to each hydrant in a fire fighting cabinet.

13.5 Close to every reel there will be a fire extinguishing water pump on/off push-buttons, for purposes of increasing the water pressure from the emergency water reservoir.

It will be possible to turn the pumps on/off from the control room.

13.6 Close to every reel there will be preparation for installation of intercom/telephone contact infrastructure.

13.7 Close to every reel there will be a emergency lighting element.

13.8 The fire-extinguishers will be dispersed in rooms and corridors. A manual fire-extinguisher will be installed next to each automatic and manual fire station.

13.9 All the building materials will be non-flammable.

13.10 All the doors throughout the escape routes will be easily opened in the direction of the escape. The partitioning for security and entrance control purposes will be planned so that it does not contradict this instruction and will make evacuation possible during escape.

13.11 The emergency lighting will be sufficient for escape. In addition to the emergency lighting required for routine escape purposes, emergency lighting will also be installed in the following places:

13.11.1 Close to the synoptic fire detection and extinguishing panel.

13.11.2 Close to every water extinguishing reel.

13.11.3 Close to every automatic gas fire-extinguishing canister.

13.11.4 Close to every automatic water extinguishing system.

13.11.5 Close to every electrical panel.

14. Reserves

14.1 In the switchboard there will be a 30% reserve space which will include all the equipment required for connection of more detection zones to be added in the future.

14.2 In addition there will be further 30% spare room for additional automatic water and gas extinguishing zones.

15. Wiring and passage of cables

15.1 All the wiring will be with cables as specified in the standard.

15.2 Passage of the cables will be in conduits and/or ladders. Passage of cables between fire zones shall be through special frames (MCT).

15.3 Where there are no conduits and/or ladders, the cables will be laid in pipes in accordance with the requirements of the Israeli standard.

16. Signposts and marking

16.1 As part of the signposts for escape purposes, "no exit" signs will be installed in the direction of places where exit is impossible either because of danger or because there is no exit from them.

16.2 Safety signs will be installed in special places and special cases, for instance:

16.2.1 "Radiation danger” - no entry and/or do not extinguish with water.

16.2.2 On the front of electricity panels - "Electricity - do not extinguish with water".

16.2.3 Fire extinguishing equipment - with details of the contents of the station;

16.2.4 Smoke outlet openings.

16.2.5 Rescue equipment station - with details of the contents of the station.

16.2.6 Warning signs next to indispensable obstacles.

16.3 Signposts and signs will be clear and easily readable and visible without need for ladders or auxiliary equipment. There will be signs on every part of equipment which can be dismounted.

16.4 Every cable end and every strand end, including the reserve strands, will be marked.

16.5 The cable passage conduits or ladders of the fire detection and extinguishing system will be marked every 3 meters, and every meter from each angle of the conduit or ladder.

16.6 The same marking will be on the system cables.

16.7 The switchboard will contain plans, including the wiring, the area that it serves as regards detectors and detection and extinguishing zones. Another plan of the wiring of the center and instructions for use will be fixed on the wall or the inside of the door.

16.8 To avoid any doubt, it should be noted that the signposts and signs will be in accordance with the requirements of the Israeli standard.