Fire Protection and Life Safety Concept
Project A

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1. Scope

Hotel facilities are due their specific operations and equipment regularly exposed to very large fire hazards. In addition, a hotel fire threatens not only the existence of the company and material wealth but also largely most above high average number of lives.

Therefore, the main scope of the fire protection in Hotel A will be;

- Protection of life; guests and staff,
- Protection of the animals,
- Protection of the facility and brand,
- Protection of the environment.

In this methodology fire originating from single source will be discussed.

This fire protection concept consists of both measures for preventive fire protection (with its construction, plant engineering and operational-organizational individual constituents) and the defensive fire protection, rescue and fire-fighting operations. All these necessary components influence each other.

The entire fire protection planning is shown in detail, are compared with the building requirements, regulations, standards, codes of practice and state of the fire protection engineering know how.

Documents / preliminary

The necessary documents for planning was submitted to the contractor in Istanbul on 01.03.2016. The preliminary talks were also on 15.04.2016 with Mr. T.I. in Istanbul – at M. office

Basis for the fire protection assessment of the building are the following plans as listed below:

- Dwg plan 2 basement
- Dwg plan 1 basement
- Dwg plan ground store
- Dwg plan 1st floor
- Dwg plan 2nd floor
- Dwg plan 3rd floor
- Dwg plan 4th floor
- Dwg plan 5th floor
- Dwg plan 6th floor
- View 3D
- Dwg sectional plan

2. Basic Data's of the Construction

Property and Buildings Analysis

The building is classified by NFPA 101 & 220 in the building type II (222). The height of the top accommodation level is 20 m above ground level and there are several functional units except guest room & suits. The building will have 6 stories and 2 basements and with its 20 m height constitute no high-rise building.

3. Standards & Regulations

The following standards, guidelines in the current version will be applied for the design of the fire protection system. (Below mentioned NFPA standards; version 2015 & 2016)

- NFPA 13 Standard for the Installation of Sprinkler Systems
- NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection
- NFPA 10 Standard for Portable Fire Extinguishers
- NFPA 17A Standard for Wet Chemical Extinguishing Systems
- NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection
- NFPA 72 National Fire Alarm and Signaling Code
- NFPA 92 Standard for Smoke Control Systems
- NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking
- NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems
- NFPA 110 Standard for Emergency and Standby Power Systems
- NFPA 5000 Building Construction and Safety Code
- NFPA 80 Standard for Fire Doors and Other Opening Protectives
- NFPA 101 Life Safety Code
- NFPA 2001 Standard on Clean Agent Extinguishing Systems
- NFPA 70 National Electrical Code
- NFPA 220 Standard on Types of Building Construction
- NFPA 550 Guide to the Fire Safety Concepts Tree
- EN 1838 Lighting Applications - Emergency Lighting
- EN 12101 Smoke and Heat Control Systems
- EN 13501 Fire classification of construction products and building elements
- 2516.00 Fire Protection and Life Safety Requirement of Hotel Brand
- DIN 18232 Calculation Methodology of Smoke and Heat Exhaust Systems

In some instances, these requirements may exceed local jurisdictional requirements. Conforming to a less stringent code requirement will not be a reason for an exemption. Where the requirements of local jurisdictions and these requirements are in conflict, the more stringent requirements shall apply. Where the requirements of local regional and/or national authorities (Authority Having Jurisdiction, AHJ) exceed those prescribed by Hotel Worldwide, the more stringent standard will be followed.

The provisions of this concept shall report the materials and assemblies used for structural fire resistance and fire-resistance-rated construction separation of adjacent spaces to safeguard against the spread of fire and smoke within the hotel building and the spread of fire to or from buildings. The following words and terms shall, for the purposes of this report, and as used elsewhere in this code, have the meanings shown herein.

Building. Hotel building

combination fire/smoke damper. A listed device installed in ducts and air transfer openings designed to close automatically upon the detection of heat and resist the passage of flame and smoke. The device is installed to operate automatically, controlled by a smoke detection system, and where required, is capable of being positioned from a fire command center.

Damper. "Fire damper" and "Smoke damper."

draftstop. A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor/ceiling assemblies, roof/ceiling assemblies and attics.

F rating. The time period that the through-penetration firestop system limits the spread of fire through the penetration when tested in accordance with ASTM E 814.

Fire area. The aggregate floor area enclosed and bounded by fire walls, fire barriers, exterior walls or fire-resistance-rated horizontal assemblies of a building.

Fire barrier. A fire-resistance-rated wall assembly of materials designed to restrict the spread of fire in which continuity is maintained.

Fire damper. A listed device installed in ducts and air transfer openings designed to close automatically upon detection of heat and resist the passage of flame. Fire

dampers are classified for use in either static systems that will automatically shut down in the event of a fire, or in dynamic systems that continue to operate during a fire. A dynamic fire damper is tested and rated for closure under elevated temperature airflow.

Fire door. The door component of a fire door assembly.

Fire door assembly. Any combination of a fire door, frame, hardware, and other accessories that together provide a specific degree of fire protection to the opening.

Fire partition. A vertical assembly of materials designed to restrict the spread of fire in which openings are protected.

Fire protection rating. The period of time that an opening protective assembly will maintain the ability to confine a fire as determined by tests. Ratings are stated in hours or minutes.

Fire resistance. That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.

Fire-resistance rating. The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests.

Fire-resistant joint system. An assemblage of specific materials or products that are designed, tested, and fire-resistance rated in accordance with either ASTM E 1966 or UL 2079 to resist for a prescribed period the passage of fire through joints made in or between fire-resistance-rated assemblies.

Fire separation distance. The distance measured from the building face to one of the following:

1. The closest interior lot line;

2. To the centerline of a street, an alley or public way; or

3. To an imaginary line between two buildings on the property.

The distance shall be measured at right angles from the face of the wall.

Fire wall. A fire-resistance-rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions to allow collapse of construction on

either side without collapse of the wall.

Fire window assembly. A window constructed and glazed to give protection against the passage of fire.

Fire blocking. Building materials installed to resist the free passage of flame to other areas of the building through concealed spaces.

Floor fire door assembly. A combination of a fire door, a frame, hardware and other accessories installed in a horizontal plane, which together provide a specific degree of fire protection to a through-opening in a fire-resistance-rated floor.

Horizontal assembly. A fire-resistance-rated floor or roof assembly of materials designed to restrict the spread of fire in which continuity is maintained.

Joint. The linear opening in or between adjacent fire-resistance-rated assemblies that is designed to allow independent movement of the building in any plane caused by thermal, seismic, wind or any other loading.

Membrane penetration. An opening made through one side (wall, floor or ceiling membrane) of an assembly.

Membrane-penetration firestop. A material, device or construction installed to resist for a prescribed time period the passage of flame and heat through openings in a protective membrane in order to accommodate cables, cable trays, conduit, tubing, pipes or similar items.

Mineral fiber. Insulation composed principally of fibers manufactured from rock, slag or glass, with or without binders.

Mineral wool. Synthetic vitreous fiber insulation made by melting predominately igneous rock or furnace slag, and other inorganic materials, and then physically forming the melt into fibers.

Penetration firestop. A through-penetration firestop or a membrane-penetration firestop.

Self-closing. As applied to a fire door or other opening, means equipped with an approved device that will ensure closing after having been opened.

Shaft. An enclosed space extending through one or more stories of a building, connecting vertical openings in successive floors, or floors and roof.

Shaft enclosure. The walls or construction forming the boundaries of a shaft.

Smoke barrier. A continuous membrane, either vertical or horizontal, such as a wall,

floor, or ceiling assembly, that is designed and constructed to restrict the movement of smoke.

Smoke compartment. A space within a building enclosed by smoke barriers on all sides, including the top and bottom.

Smoke damper. A listed device installed in ducts and air transfer openings designed to resist the passage of smoke. The device is installed to operate automatically, controlled by a smoke detection system, and where required, is capable of being positioned from a fire command center.

T rating. The time period that the penetration firestop system, including the penetrating item, limits the maximum temperature rise to 325°F (163°C) above its initial temperature through the penetration on the non-fire side when tested in accordance with ASTM E 814.

The fire rating of walls and separations are as shown below, provided that the entire building is sprinkler protected.

TYP II (222) Project A	½ hour	¾ hour	1 hour	1½ hour	2 hour
Load bearing walls, columns and beams					X
Between Guest rooms (sprinklered)	X				
Between corridors and guest rooms	X				
Rooms containing gas fired equipment					X
Laundry			X		
Stairs and elevator/lift shaft					X
Flue enclosure					X
Linen chute					X
Trash collection room					X
Recycle storage room					X
Kitchen					X
Restaurants			X		
Bar & Cafes			X		
Retail units			X		
Wardrobe			X		
Ballroom			X		

Meeting room			X		
Technical rooms					X
Staff Cantine			X		
Spa & Wellness			X		
Kidsroom			X		
GYM & pilates room			X		
Business units			X		
Car park					X
Compartmentation					X
Stair & Vestibule enclosure doors				X	
Door in travel of exit	X*				
Storage low hazard			X		
Storage high hazard					X

* 20 min

The hazardous area protection in Hotel is as listed below:

Hazardous Area Description	**Separation/Protection**
Boiler and fuel-fired heater rooms serving more than a single guest room or guest suite	1 hour and sprinklers
Employee locker rooms	1 hour and sprinklers
Gift or retail shops	1 hour and sprinklers
Bulk laundries	1 hour and sprinklers
Guest laundries ≤ 9.3 m2 outside of guest	1 hour and sprinklers
Rooms or guest suites	1 hour and sprinklers
Guest laundries >9.3 m2 outside of guest	1 hour and sprinklers
Rooms or guest suites	1 hour and sprinklers
Maintenance shops	1 hour and sprinklers
Storage rooms	1 hour and sprinklers

Interior floor finish

- Exits (Stair, vestibules): Class A

Plenum material: non-combustible

- Lobby + corridor: Class A or B
- Others: Class A or B or C

Interior Wall and Ceiling Finish in Exit Enclosures. Class A or B
Interior Floor Finish in Exit Enclosures (Stairs and risers) Class II *
*(cr. radiant flux; >0.22 W/cm2 & <0.45 W/cm2)

Exterior walls: Class A or B
Fire retardant wood allowable when no bearing func. for exterior walls

Fire Resistance Rating for the construction (hour)

- Exterior bearing walls:

  No support function ex. roof: 1

  Bearing function: 2

- Interior bearing walls:

  No support function ex. roof: 1

  Bearing function: 2

- Columns

  No support function ex. roof: 1

  Bearing function: 2

- Beams, Girders, Trusses and Arches

  No support function ex. roof: 1

  Bearing function: 2

- Floor/Ceiling Assemblies 1
- Roof/Ceiling Assemblies 1
- Interior Nonbearing Walls Exit access ½, others 0
- Exterior Nonbearing Walls 0

Fire Dept. Access

Fire Department Access Road: Within 15 m of one exterior wall

Width: 6100 mm

Vertical clearance 4.1 m

Vehicle turning radius; shall be provided for dead ends >46 m

Grade: max. 1/20

Combustible Materials.

Combustible materials shall be permitted in accordance with the following:

(1) **Foamed plastic insulation** (Foam plastic insulation, exterior facings, and coatings shall be tested separately in the thickness of intended use per ASTME 84 or UL 723. Each component shall have a flame spread index of 25 or less and a smoke developed index of 450 or less.

(2) **Metal composite material** (in accordance with EIMA 99A, Exterior Insulation and

Finish Systems (EIFS))

(3) **Thermal and acoustical insulation**, other than foamed

plastic, (in accordance with the requirements of ASTM E 84, Standard Test Method of Surface Burning Characteristics of Building Materials; or UL 723, Standard for Test of Surface Burning Characteristics of Building Materials)

Insulating materials shall meet the following criteria:

(1) Where concealed as installed in buildings of any type construction,

insulating materials shall have a flame spread index of not more than 75 and a smoke developed index of not more than 450.

(2) Cellulose loose-fill insulation that is not spray applied and meet a smoke developed index of not more Than 450.

Exposed Insulation.

(1) Where exposed as installed in buildings of any type construction, insulating materials shall have a flame spread index of not more than 25 and a smoke developed index of not more than 450.

(2) Cellulose loose-fill insulation that is not spray applied and meet a smoke developed index of not more than 450.

(4) Interior floor finish and interior finish, trim, and millwork,

such as doors, door frames, window sashes, and window frames

(5) Light-transmitting plastic

(6) Class A, Class B, or Class C roof coverings

(7) Blocking

Attic floors.

Exposed insulation materials installed on attic floors shall have a critical radiant flux of not less than 0.12W/cm2 when tested in accordance with ASTM E 970, *Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source.*

Roof Insulation. The use of combustible roof insulation shall be permitted in any type construction, if it is covered with approved roof coverings directly applied there to.

Thermoplastic exposed insulation

- no ignition when tested in accordance with ASTM E 970.
- self-ignition temperature > 400 ºC or greater

Interior Finishing's

- shall be classified based on test results from ASTM E 84, Standard Test Method of Surface Burning Characteristics of Building Materials, or UL723, Standard for Test of Surface Burning Characteristics of Building Materials

- Fixed or movable walls and partitions, paneling, and wall pads and crash pads, applied structurally or for decoration, acoustical correction, surface insulation are interior finishing.

- Cover Materials less than 0.9 mm directly to the surface of walls and ceilings are exempted from testing when applied on Class A

  Textile Wall or Ceiling Materials: Class A rating + some dimensional requirements

  Expanded Vinyl Wall or Ceiling Coverings: Class A rating + some dimensional requirements

  Cellular or Foamed Plastic: Shall tested and listed (min. density of 320 kg/m3, up to 13 mm thickness & 100 mm width and max. 10% of wall is permitted.)

  Light-Transmitting Plastics: shall be fire tested

  Metal Ceiling and Wall Panels: Class A and listed + painted

  Carpet and carpetlike interior floor finishes; shall comply with ASTM D 2859

Fire Safety Elevator: place for at least for 8 Person

Fire safety vestibule: shall story occupant load/2 * 0,28 m2 + 1-wheel chair

Exit stair vestibule: shall be 1120 mm in width and 1830 mm in length

Life Safety Precautions

Means of Egress

Under the provision that the building is protected throughout by an approved, supervised automatic sprinkler system!

Nr. of exits

Acc. to NFPA 101;

- at least 2 protected exits shall be available for every story; up to 500 occupancy loads
- If occupancy load > 500, 3 exits shall be provided
- If occupancy load > 1.000, 4 exits shall be provided

Guest rooms/dwelling units larger than 185 m2; 2 exits shall be available

- Minimum width means of egress (exit access): 1120 mm (up to 2000 person)
- If occupancy load > 2000; 1420 mm corridor width
- Minimum width for exit doors: 810 mm
- Minimum width of security vestibule if provided: 1120 mm
- Minimum length of security vestibule if provided: 1830 mm

Exit stair design criteria

- Minimum tread depth 100 mm-180 mm
- Tread width min 280 mm
- Maximum height between landings: 3660 mm
- Headroom space: min. 2030 m (Normally 2285 mm with projections up to 2030 mm)
- Handrail height from bottom: between 865-965 mm
- Clearance of handrail from wall: min. 510 mm
- Min. handrail thickness: 25 mm

Travel Distance to Exit with Sprinkler (Hotel Reg.)

- Length of dead-end corridor: 20 m
- Distance from guest room corridor door to exit: 61 m
- Distance from guest room corridor to exterior exit 76 m
- Length of common paths of travel for 2 exits; max. 30 m
- Distance within guest room to corridor door: max. 38 m

Generally, the travel distances are shown below; (NFPA 101)

Occupancy	Common Path Limit (m)		Travel Distances (m)		Dead-End Corridors (m)	
	Non-sprinklered	*Sprinklered*	*Non-sprinklered*	*Sprinklered*	*Non-sprinklered*	*Sprinklered*
Assembly Areas	23	**23**	61	**76**	6.1	**6.1**
Business units	23	**30**	61	**91**	6.1	**15**
Kitchen	15	**30**	15	**15**	61	**75**
Car Park	15	**15**	46	**60**	15	**15**
Exit access	10.7	**15**	30	**61**	10.7	**15**
Suites	-	**-**	23	**38**	-	**-**

Occupancy Load Factors:

- Kitchen; 9,3 m2/person
- Exercise rooms with equipment; 4,6 m2/person
- Casino, gaming place; 1 m2/person
- Ball room: Nr. of fixed places
- Business area; 9.3 m2/person
- Storage; 46.5 m2/person
- Floor except public walkways; 27,9 m2/person
- Guest rooms: 18.6 m2/person
- Sales area: 5.6 m2/person
- Day care: 3.3 net m2/person
- Swimming pool deck: 2.8 m2/person
- Doctor room: 9.3 m2/person
- Restaurant: 1.4 net m2/person

Exit Capacity:

Exit capacity shall be determined as follows:

- Stairs –7.6 millimeters per person
- Level travel and doors – 5 millimeters per person

	Occupancy Load	Aisle Width	Cumulative stair occ. load	Stair Width mm	Provision	Nr. Of Exit	Provision	Exit Width mm	Provision
6 Floor	245	1120 mm	245	1120	OK	2	OK	1225	2700
5 Floor	72	1120 mm	317	1120	OK	2	OK	362	2700
4 Floor	72	1120 mm	390	1120	OK	2	OK	362	2700
3 Floor	72	1120 mm	462	1120	OK	2	OK	362	2700
2 Floor	72	1120 mm	535	1120	OK	2	OK	362	2700
1 Floor	72	1120 mm	607	1120	OK	2	OK	362	2700
Gr Floor	430	1420 mm	-	-	OK	4	OK	11730	13500*
1 Basement	895	1120 mm	1190	1120	OK	3	OK	4475	4500
2 Basement	295	1120 mm	295	1120	OK	2	OK	1474	2700

*11 exit doors with total 13,5 m capacity

Exit Signage

- Exits and exit access shall be provided with visible exit signage.
- Exit signs shall always be lit internally or externally.
- Emergency power shall be provided for a minimum of 60 minutes

For signs, the letters shall be not less than 150 mm high, with the principal strokes of letters not less than 19 mm wide.

The word EXIT shall be in letters of a width not less than 51 mm, except the letter I, and the minimum spacing between letters shall be not less than 9.5 mm.

Sign legend elements larger than the minimum established shall use letter widths,
strokes, and spacing in proportion to their height.

Doors

Doors that open onto exit access corridors shall have not less than a 20-minute fire protection rating

Door openings in means of egress shall be not less than 810 mm in clear width, but where a pair of door leaves is provided, one door leaf shall provide not less than a 810 mm clear width opening.

Where means of egress doors are locked in a building that is not considered occupied, occupants shall not be locked beyond their control in buildings or building
spaces

Where serving a room or area with an occupant load of 50 or more, door leaves in horizontal exits shall be required to swing in the direction of egress travel.

The forces required to fully open any door leaf
manually in a means of egress shall not exceed;

- 67 N to release the latch,
- 133 N to set the leaf in motion, and
- 67 N to open the leaf to the minimum required width.

A door leaf normally required to be kept closed shall not be secured in the open position at any time and shall be self-closing or automatic-closing

Door leaves shall be permitted to be automatic-closing, if all of the following criteria are met:

(1) Upon release of the hold-open mechanism, the leaf becomes self-closing.

(2) The release device is designed so that the leaf instantly releases manually and, upon release, becomes self-closing, or the leaf can be readily closed.

(3) The automatic releasing mechanism or medium is activated by the operation of approved smoke detectors installed in accordance with the requirements for smoke
detectors for door leaf release service in NFPA72 Fire Alarm and Signaling Code.

(4) Upon loss of power to the hold-open device, the hold open mechanism is released, and the door leaf becomes self-closing.

(5) The release by means of smoke detection of one door leaf in a stair

enclosure results in closing all door leaves serving that stair.

- Egress doors must be operable without the use of any special device or knowledge.

- Egress hardware that does not require more than a single, simple action to operate (often referred to as 'panic hardware') shall be required for any door with a latch serving 100 or more persons.

Door rating	Sprinklered	Non- Sprinklered
One-Hour Fire-Resistive Walls	20 minutes	30 minutes
Two-Hour Fire-Resistive Walls	60 minutes	90 minutes
Guestroom Entry Doors	20 minutes	30 minutes

Enclosure

A smoke proof enclosure shall be continuously enclosed by barriers having a 2-hour fire resistance rating from the highest point to the level of exit discharge. Where a vestibule is used, it shall be within the 2-hour-rated enclosure and shall be considered part of the smoke proof enclosure.

Vestibule

Where a vestibule is provided, the door opening into the vestibule shall be protected with an approved fire door assembly having a minimum 1½-hour fire protection rating, and the fire door assembly from the vestibule to the smoke proof enclosure shall have a minimum 20-minute fire protection rating. Door leaves shall be designed to minimize air leakage and shall be self-closing or shall be automatic-closing by actuation of a smoke detector within 3050 mm of the vestibule door opening.

Signs

Following areas shall be adequate signed & labeled.

- escape routes, exits, exit access, exit discharges
- fire, smoke doors to be kept closed,
- exit doors, ramps
- portable extinguisher and fire hose cabinet
- safe assembly areas
- where parking is forbidden,
- fire brigade connection point
- telephone number to report fire,
- fire intervention plan
- elevators, that shall not be used in case of a fire,
- where smoking is forbidden,
- places of smoking areas

Emergency Lighting

Emergency lighting shall be provided at a minimum in all public spaces, including exit, exit access, exit discharge, corridors, technical areas.

Performance of System

Emergency illumination shall be provided for a minimum of 1 hours in the event of failure of normal lighting.

Emergency lighting facilities shall be arranged to provide initial illumination that is not less than an average of 10.8 lux and, at any point, not less than 1.1 lux, measured along the path of egress at floor level.

Stairs, landings, change of levels, change of direction, intersections, at emergency stairwell doors (corridor side), at emergency exit doors from area of risk such as kitchens and public assembly spaces and at emergency exit doors form BOH (Transformer, plant rooms, switch gear rooms…) shall have a minimum illumination of 10.8 lux.

At the floor in front of the firefighting equipment / appliances, fire panels, and pool stations throughout the building shall have an illumination of minimum 5,4 lux.

Illumination levels shall be permitted to decline to not less than an average of 6.5 lux and, at any point, not less than 0.65 lux at the end of 1½ hours.

The maximum-to-minimum illumination shall not exceed a ratio of 40 to 1.

Emergency generators providing power to emergency lighting systems shall be installed, tested, and maintained in accordance with NFPA 110, Standard for Emergency and Standby Power Systems. Stored electrical energy systems other than battery systems for emergency shall be installed and tested in accordance with NFPA 111, Standard on Stored Electrical Energy Emergency and Standby Power Systems.

Emergency Power

The property must be provided with reliable emergency power. In the event of loss of normal power service, the emergency service must be designed to provide to building systems to critical to the safety/security of property guests and employees as indicated at 2516.06

Following areas shall be equipped with EPS; (acc. To Hotel Reg.)

- Computer room cooling system and equipment.
- Computer equipment located at the front desk, PBX and administrative areas including key encoders.
- One meeting room (full power and lighting) designated as an Emergency Command Center.
- General manager and security offices' computers and telephones.
- One walk-in freezer and one walk-in refrigerator.
- One exhaust fan over cooking line in main kitchen.
- All steps within the restaurant/lobby.
- Sump pumps
- Sewer lift stations
- Pool light
- All cash stations
- Minimum lighting in engineering control room.
- Fire Fighting Systems like Fire pumps, fire & smoke detection, alarming ans announce system, pressurization if provided, smoke exhaust system.
- Exits, exit access, exit discharges, corridors, elevators, lobby, fire fighter entrance, emergency signage

The duration of EPS for safety and firefighting systems shall provide at

least 60 min. of power. (For business and retail purposes Hotel regulation demands 2 days' fuel stock)

Fire and Smoke Damper

Approved fire dampers shall be provided where air ducts penetrate or terminate at openings in walls or partitions required to have a fire resistance rating of 2 hours or more.

Fire dampers shall not be required where other openings through the wall are not required to be protected.

Approved fire dampers shall be provided in all air transfer openings in partitions that are required to have a fire resistance rating and in which other openings are required to be protected

Following areas shall be provided with fire dampers;

Penetrations through;

- Kitchen
- Mechanical rooms
- Shafts
- If necessary, exit stairs
- Floor vertical crossing
- Fire dampers shall be installed at each direct or ducted
- opening into and out of enclosures unless
- otherwise permitted by AHJ.

A fire damper shall not be required where an air duct system serving only one story is used only for exhaust of air to the outside and is contained within its own dedicated shaft.

- A fire damper shall not be required where the following conditions exist:

(1) Branch ducts connect to enclosed exhaust risers
(2) The airflow moves upward.
(3) Steel subducts at least 560 mm (22 in.) in length are carried up inside the riser from each inlet.
(4) The riser is appropriately sized to accommodate the flow restriction created by the subduct.

Smoke Damper

If the air duct penetrates only guest rooms without crossing the floor and is less than 4" no damper is required. (NFPA 90 A)
If the air duct penetrates guest room and the floor, smoke damper shall be required.
Smoke dampers shall be listed (min. 140 °C, air filters 163 °C)

If;

- The ducts are been used as a part of smoke control system,
- Provides fresh air in case of fire
- Having exhaust capacity less than 425 m3/h in restrooms
- Part of the kitchen hood system

then, no damper shall be installed.

Evacuation Diagram

A floor evacuation diagram shall be posted, that reflect floor evacuation diagrams; the actual floor arrangement and exit locations shall be posted and oriented in a location and manner acceptable to the authority having jurisdiction and shall comply ISO 23601 in every floor and guest room and other public spaces like ball room, meeting rooms, car park, kitchen, restaurant, SPA, GYM etc.

Active Fire Protection

Fire Suppression

Automatic fire suppression shall be installed in all areas of all buildings with the following exceptions:

Buildings with occupied floor levels less than 82 feet (25m) above the lowest level of fire department vehicle access, where allowed by local codes and standards.

Small out buildings less than 9.3m2 and other out buildings that are not critical to business operations.

Parking structures for passenger vehicles that (1) are not located under the hotel, (2) are at least 50% open to the exterior, and (3) are either separated from the hotel by 2-hour fire resistance rated construction, by a minimum of 9 m, by a sprinkler system designed for exterior exposure protection per NFPA 13 or an alternative design approved by the local AHJ, if required.

Closets less than 24 square feet (2.2m) and not containing any electrical appliances.

Guestroom bathrooms that do not exceed 8.4 m² (according to NFPA 13 5.1 m²) with non-combustible construction and limited combustible contents.

Water Supply Requirements: Water supply tests shall be conducted to determine the available water supply to the property.

A reliable water supply shall be provided to provide a minimum of 90 minutes of demand.

The hydraulic calculations for minimum design pressure shall be based on recent water supply test data with a 10% safety factor.

Automatic Sprinklers

Wet pipe automatic sprinklers shall be provided in all areas, including combustible void spaces. Areas subject to freezing shall incorporate dry pipe systems or listed dry sprinklers, where appropriate. Antifreeze and heat tracing are not permitted, but may remain in place in existing buildings where installed in accordance with all requirements of NFPA 13.

Hazard Classification acc. NFPA 13

Guest Rooms	Light
Corridors	Light
Meeting Rooms	Light
Toilet Room	Light
Restaurant Seating	Light
Kitchen	Ordinary Group 1
Parking Garage	Ordinary Group 1
Mechanical Rooms	Ordinary Group 1
Electrical Rooms	Ordinary Group 1
Storage Rooms	Ordinary Group 2
Ballroom	Ordinary Group 2

Standard	NFPA 13 2016
System Type	Wet Pipe Automatic Sprinkler System
Fire Pump	Hydraulically Calculated according to NFPA 20
Water Reservoir	Calculated acc. NFPA 13, designed acc. NFPA 22
Protection	Throughout
Pipe Sizing	Hydraulically Calculated
Hazard Class and Water	Light Hazard - 4.1 lt/min/m^2
	Ordinary Hazard Group I - 6.1 lt/min/m^2
	Ordinary Hazard Group II(3)- 8.1 lt/min/m^2
Sprinkler Operation Area	139 m^2
Protected Area per Floor	max. 4,830 m^2
Distance between Branches	max. 4.6 m
Sprinkler Protection Area	Light Hazard - max. 20.9 m^2/sprinkler
	Ordinary Hazard - max. 12.1 m^2/sprinkler
Water Supply Duration	min. 90 min
Piping	Galvanized steel or Black Steel
Seismic Protection	Acc. To NFPA 13 Cpt. 9
Total Combined Hose	379 lt/min
Duration of Water Supply	60 min
Pipe Joining	For pipes DN50 and smaller: Threaded
	For pipes DN65 and smaller: Grooved and/or Shop Welded

Automatic sprinkler systems shall be hydraulically designed by qualified licensed fire protection professionals.

Concealed sprinkler heads must be used in all public areas.

In areas subject to freezing (including unheated interior building spaces and freezers), corrosive atmospheres (pool areas, saunas and laundries) and exposure to salt air, convenient protection like wax protected or dry type sprinkler shall be used according to NFPA 13.

If sprinkler is used, pre-action (single interlock pre-action or single non-interlock pre-action) sprinkler must be used in all electrical rooms.

Intermediate Temperature classification sprinkler shall be used in steam room, kitchen where ambient temperature is higher than normal conditions.

All new systems and renovations shall utilize quick response sprinklers

(sprinklers with a listed response time index (RTI) of 50 (ft. sec)1/2 (35 (m sec)1/2 or lower) in all light hazard areas included in the affected area.

Guestroom sprinklers in new builds and renovations shall be concealed, institutional type or otherwise designed to resist tampering or misuse.

Melt-away or drop-out ceiling tiles shall not be used.

Sprinklers shall be located so they are coordinated with interior design to minimize coverage obstructions.

Sprinklers should be suited for the environment.

Wax coated or corrosion resistant sprinklers must be used in pools, spas, saunas, pool equipment rooms and other corrosive environments.

For sprinklers located in unconditioned spaces in high humidity or salt air environments, nickel-plated or corrosion resistant sprinklers must be utilized.

Sprinklers shall be located at the top and bottom and at alternate floors in linen chutes. Where lined linen chutes are provided in compliance with NFPA 82 and permitted by the AHJ, sprinklers may be omitted.

Sprinklers shall be in at 3m intervals in kitchen exhaust ducts greater than 23m.

Sprinkler piping shall be ferrous or CPVC, and in compliance with the standards.

CPVC piping, if used, shall be installed in a protective enclosure, and according to all manufacturer's instructions.

Gas Suppression Systems

For IT rooms, if gas suppression system is to be used, shall be designed according to NFPA 2001. Agent shall be listed clean agent, fully engineered with a design concentration of at least % 8. System shall be actuated both manual and automatic. The suppression system shall be UL or FM approved.

Kitchen Hood and Duct Systems:

Fire suppression systems with both manual and automatic activation mechanisms shall be provided for all indoor cooking operations, where grease-laden vapors are produced, fat fryers and grills are used.

Suppression systems shall be listed or approved (UL 300) wet chemical fire extinguishing systems, such as those produced by Ansul, Amerex, Kidde, Tyco Ansul systems, Tyco Piranha wet chemical suppression.

Systems shall provide protection for cooking appliances and associated exhaust hood and plenum.

Kitchen suppression systems must trigger fire alarm and shut down gas/power to cooking equipment.

Kitchen exhaust systems shall be constructed of approved non-combustible material that will not leak or degrade from heat.

All seams, joints, and penetrations of the hood enclosure that direct and capture grease-laden vapors and exhaust gases shall have a liquid-tight continuous external weld to the hood's lower outermost perimeter.

Seams, joints, and penetrations of the hood shall be permitted to be internally welded, provided that the weld is formed smooth or ground smooth, so as to not trap grease, and is cleanable.

Internal hood joints, seams, filter support frames, and appurtenances attached inside the hood shall be sealed or otherwise made grease-tight.

Penetrations shall be permitted to be sealed by devices that are listed for such use and whose presence does not detract from the hood's or duct's structural integrity.

Listed exhaust hoods with or without exhaust dampers shall be permitted to be constructed of materials required by the listing.

Listed exhaust hoods with or without exhaust dampers shall be permitted to be assembled in accordance with the listing requirements.

Access panels shall be provided to facilitate cleaning of all portions of the system.

Kitchen exhaust systems that run through adjoining spaces shall be contained within 2-hour fire rated construction or be provided with equivalent protection.

Fire Extinguishers

Portable fire extinguishers must be provided and installed in accordance with the AHJ.
Fire extinguishers must be contained in recessed cabinets in public spaces as allowed by the AHJ.
At a minimum, fire extinguishers must be provided in the following nonpublic areas:

a. Office areas
b. Laundry
c. Engineering and mechanical spaces
d. Kitchens
e. Storage rooms

Intelligent Addressable Fire Alarm System

The whole building shall be protected throughout by monitored suppression systems, addressable smoke detectors or heat detectors where appropriate must be provided within each area as follows:

a. Interior guestroom corridors

b. Elevator lobbies

c. Mechanical and electrical rooms

d. Computer/telecom/PBX rooms

e. Storage rooms

This document sets out the minimum requirements of an integrated Life Safety System for the protection of life and property. Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed and will accommodate the future requirements and operations of the site owner.

Proof should be provided via a cross-check calculation that the proposed system and loop load with the proposed batteries that the standby and alarm time is met. Loop wire specification, load spread over the loop, outputs load, specific variations of the fire panel (modular options) should be all taken in consideration doing the cross-check calculation.

Integrated control

The Life Safety System shall provide the following services in a single coherent integrated control system.
a. Smoke and fire detection
b. Visual and audible alarms
c. Remote notification

Flexibility

The Life Safety System shall consist of a network of Life Safety control panels with associated field devices. The System shall be distributed and modular in design with software configuration options to ensure flexibility and reliability. The ability to quickly, easily and economically reconfigure and adapt the system to ever changing site requirements is essential.

Manufacturer

The Life Safety System control panels and fire detection devices shall all be from a single manufacturer in order to achieve a single source of responsibility for equipment performance and compatibility

Service providers

Only service providers trained by the manufacturer may commission or reconfigure the Life Safety System. Two or more providers of installation, commissioning and maintenance services must be available in addition to (or instead of) the manufacturer.

Compliance

Equipment

The equipment and installation shall comply and certified where applicable with the current provisions of the European product and installation directives, standards and guidelines, in addition to any further national or local standards or provisions specific to the project.

Responsibilities

The supplier shall provide evidence, with his submittal, of certificates of all proposed equipment and combinations of equipment. If there is a conflict between the referenced standards or local codes, and this specification, it is the bidder's responsibility to

immediately bring the conflict to the attention of the Engineer for resolution. European standards shall prevail unless national standards or local codes are more stringent. The bidder shall not attempt to resolve conflicts directly with the local authorities unless specifically authorized by the Engineer.
The supplier shall be responsible for filing of all documents, paying all fees (including, but not limited to plan checking and permit) and securing all permits, inspections and approvals.

Compliance

European Directives

CE

The Fire detection and alarm equipment shall comply and certified where applicable with the current provision of the following European product directives:
a. EMC directive 2004/108/EC
b. CPD 89/106/EEC
c. LVD 2006/95/EC
The above-mentioned equipment needs to carry the CE logo physically on the product and in the accompanying documentation.

Standards

NFPA 72: National Fire Alarm and Signaling Code
EN54-2:1997+AC:1999+A1:2006, Control and Indicating Equipment (also known as Fire panels)
EN54-3:2001+A1:2002+A2:2006, Fire alarm devices (sounders)
EN54-4:1998+AC:1999+A1:2002+A2:2006, Power Supplies
EN54-5:2000+A1:2002, Heat detectors (point detectors)
EN54-7:2000+A1:2002+A2:2006, Smoke detectors (point detectors) since the 31st of July 2005
EN54-10:2002+A1:2005, Flame detectors (point detectors) since the 31st of August 2007
EN54-11:2002+A1:2005, Manual Call Points since 30th of September 2008
EN54-12:2002, Smoke detectors (line type, also known as Beam detectors) since the 31st of December 2005
EN54-17:2005+AC:2007, Short circuit isolators since the 1st of Jan 2009
EN54-18:2005+AC:2007, Input / Output device since the 1st of Jan 2008
EN54-20:2006, Aspirating smoke detectors since the 1st of July 2009

Speakers

Speakers must be in the following areas;

- Each guestroom and parlor
- Public assembly rooms
- Corridors and elevator lobbies
- Rooms over 92 m²
- Every fifth floor in interior exit stairs
- Mechanical rooms
- Roof areas accessible by exit stairs

Delivery, storage and handling

Receiving and handling

The Contractor shall be responsible for all receiving, handling, and storage of his materials at the job site.
Use of loading docks, service driveways, and freight elevators shall be coordinated with the Owner.

Storage

The Owner will provide the Contractor with a lockable storage space for the Contractor's use during this project. The Contractor shall be responsible for the security of this space.

Overnight storage of materials is limited to the assigned storage area. Materials brought to the work area shall be installed the same day or returned to the assigned storage area unless previously approved by the Owner.

Rubbish

The Contractor shall remove rubbish and debris resulting from his work daily. Rubbish not removed by the Contractor will be removed by the Owner and back-charged to the Contractor.

Removal of debris and rubbish from the premises shall be coordinated with the Owner.

Equipment Disposal (WEEE)

Products marked with the recycling bin cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points.

Quality assurance

Project experience

The contractor shall have successfully installed similar system fire detection, signaling control components on a previous project of comparable size and complexity. The owner reserves the right to reject any control components for which evidence of a successful prior installation performed by the contractor cannot be provided.

Qualified staff

The contractor shall have in-house engineering and project management capability consistent with the requirements of this project. Qualified and approved representatives of the system manufacturer shall perform the detailed engineering design of central and remote-control equipment. Qualified and approved representatives of the system manufacturer shall produce all panel and equipment drawings and submittals, operating manuals. The contractor is responsible for retaining qualified and approved representative(s) of those system manufacturers specified for detailed system design and documentation, coordination of system installation requirements, and final system testing and commissioning in accordance with these specifications.

Certificate

A copy of the installer's Certification shall be provided

Warranty and Maintenance

Warranty

Material

The contractor shall warranty all material for two (2) year from date of acceptance, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with close-out documentation and

Installation and workmanship

The contractor shall warranty all installation and workmanship for one (1) year from date of acceptance, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with close-out

Spare parts

The Contractor shall supply the following spare parts:

a. Automatic detection devices - Two (2) percent of the installed quantity of each type.
b. Manual fire alarm call points - Two (2) percent of the installed quantity of each type.
c. Glass rods for break glass manual fire alarm call points (if used) - Ten (10) percent of the installed quantity, but no less than 10 pieces.
d. Audible and visible devices - One (1) percent of the installed quantity of each type, but no less than two (2) devices.
e. Keys - A minimum of one (1) set of keys shall be provided and appropriately identified.

Training

The System Supplier shall schedule and present a minimum of 2 hours of documented formalized instruction for the building owner, detailing the proper operation of the installed System.

The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.

The instruction shall cover the schedule of maintenance required by national standards and any additional maintenance recommended by the system manufacturer.

Instruction shall be made available to the Local Municipal Fire Department if requested by the Local Authority

Intelligent Addressable Fire Alarm System

- Addressable Photoelectric (Optical) Smoke Detectors
- Addressable Heat Detectors
- Addressable Multi-Sensors
- Point Detectors and Manual Call Points

This specification covers the general technical specification and components for addressable fire detection and notification devices for Hotel A.

General description (detection)

1. The detectors shall be suitable for connecting to a 2-wire, 24VDC CIE (Control and Indicating Equipment i.e. fire alarm control panel) and operate satisfactorily within the supply voltage range of 17 to 28 VDC. The quiescent current of any detector shall not exceed 200 µA.

2. Two alarm indicator LEDs shall be provided on every detector allowing for an alarm indication visibility of 360°. These LED indicators shall illuminate with a RED color after the CIE acknowledged that the detector reached its pre-set alarm level. The indicator shall be operated independently of the detector from the CIE.

3. Each detector shall provide the optional facility to be supplied with an integral 8segment display. This 8-segment display may replace one of the alarm indicators. The 8-segment display will be used to provide additional information that will be transferred from the CIE. Additional display information at the detector shall include: • Detector address • Detector analogue real time value • Detector disabled • Detector hardware failure • Detector in fault • Detector in pre-alarm • Detector in soak test • Detector in test mode – not tested • Detector in test mode – test OK • Detector maintenance required "Clean-me™" • Detector polling

4. Provision shall be made for an output from the detector suitable for operating a remote indicator or other device. The remote indicator current limitation shall not exceed 4 mA.

5. A single, common mounting base shall be provided to allow for the insertion of any of the detectors in the range. This separate mounting base shall enable easy removal of the detectors for maintenance. The base shall be fitted with stainless steel terminals and saddles ready for the acceptance of communication loop wiring cables of up to 2.5 mm^2.

6. The detector and base combination shall allow for the detector to be locked into position in situations where unwanted removal of detectors could take place.

7. For communication loop isolation it shall be possible to supply an isolator base with dual isolation capability, common for all detectors in the range. Should a short circuit or overload condition present itself in the communications loop, this isolator base shall prevent the detector from losing communications with the CIE by isolating the affected part of the cable. It shall be possible to install an isolator base at every detector location. The isolator base shall have a yellow LED indicator located on the base to indicate the activation of the isolator. The isolator shall reset automatically (without resetting of the CIE) once the overload condition has been removed from the communication loop.

8. One additional terminal shall be provided in every detector base to allow for the connection of the cable shield and to provide cable shield continuity.

9. Data transmission to and from the CIE from the detector shall be via an integrated communications module that is factory fitted to the detector by the original detector manufacturer. It will form a complete and integral part of the detector.

10. Every detector shall be supplied complete and ready for operation, fully tested, factory calibrated and ready for installation into the base.

11. The unique address of the detector and standard IO units shall be set by the installer on installation of the device by means of 2 rotary dials. These rotary dials shall allow for direct numeric setting of the address without using any binary or hexadecimal conversion tables to avoid addressing errors.

12. The detector shall be capable of being remotely tested from the CIE, both automatically and on request. This will be done by means of the transmission of a test code to the addressed sensor. The detector shall perform this internal hardware test and replay to the CIE with an analogue value representing the current test status of the detector. The CIE will recognize this test signal and log and report any failures.

13. All detectors shall be equipped with an internal magnetic reed switch. Activating this switch with an external magnet shall result in the sensor displaying its address, followed by its real time analogue value on its 8-segment display. This local information at the detector shall be available at any time without putting the CIE or any part of the system into any mode different than its normal running mode.

14. All detectors and modules shall use state-of-the-art technology such as ASICs, microcontrollers and SMD components.

15. The communication protocol shall be of proven integrity and provide at least a 4-bit CRC (Cyclic Redundancy Check) error checking.

Point Detectors and Manual Call Points

Addressable Photoelectric (Optical) Smoke Detectors

1. The photoelectric (optical) smoke detectors shall be suitable for detecting visible smoke such as is produced by slow smoldering fires including burning PVC. They shall be of the light scattering type using a pulsed internal LED light source and a photocell sensor.

2. The detector shall be capable of operating within the following environmental limits.

Temperature operating range -10°C to +70° C Humidity operating range 0% to 95% RH (no condensation) Wind - not affected

It shall have at least IP43 ingress protection

3. The construction of the detector and bases shall be in off-white, self-extinguishing ABS plastic. All circuitry must be protected against moisture and fungus. Smoke entry points must be protected against dust and insect ingress by corrosion resistant gauze.

4. The detector shall be unobtrusive when installed, having a dimension not exceeding 50 x 100 mm diameter maximum.

5. The detector shall be capable of protecting an area up to 100 m² at a height of up to 12 meters. The installation and placing of the detectors must conform to the applicable national standards.

6. The build-up of dust or similar contamination within the photo-optical chamber will cause the output signal from the detector to gradually change. The control panel shall be capable of monitoring this change in signal, float the background and at a predetermined compensation level indicate when the detector is in need of servicing.

7. It shall be possible to service a contaminated sensor in the field without the need of any measuring tools. The sensor shall be equipped with a field exchangeable and disposable optical chamber.

Addressable Heat Detectors

1. The detector shall monitor ambient temperature by means of an exposed thermal transistor.

2. The detector shall be capable of operating within the following environmental limits.

Temperature operating range -10°C to +70°C (no icing) Humidity operating range 0% to 95% RH Wind - not affected

It shall have at least IP43 ingress protection

3. The construction of the detector and bases shall be in off-white self-extinguishing ABS plastic. Full circuitry must be protected against moisture and fungus. The detectors must be unobtrusive when installed, having a dimension not exceeding 50 x 100 mm diameter maximum, including the mounting base.

4. Each detector shall be suitable for protecting an area up to 50 m² at a height of up to 7.5 m. The installation and placing of the detectors shall be carried out in accordance with the applicable national standards.

Addressable Multi-Sensors (Optical/Heat)

1. The multi-sensor will combine the smoke sensitivity of an optical smoke detector with the enhancement of heat sensing. It will only occupy a single address on the addressable loop and be able to operate in no less than five operating modes:

a. Optical smoke detector enhanced by heat detection (high sensitivity) In this mode the optical sensor will operate in normal sensitivity mode until abnormal temperature is detected. As the temperature increases, the optical sensor will become increasingly more sensitive, allowing burning fires with low smoke levels to be detected quickly. Temperature (heat) alone shall not be able to activate this detector in this mode.

b. Optical smoke detector enhanced by heat detection (normal sensitivity) In this mode the optical sensor will operate in low sensitivity mode until abnormal temperature is detected. As the temperature increases, the optical sensor will become increasingly more sensitive until it reaches the standard operating sensitivity. This mode will allow for problem areas with intermitted low smoke levels to be safeguarded against unwanted alarms. Temperature (heat) alone shall not be able to activate this detector in this mode.

c. As a dual detector, one smoke and one heat detector where each sensor operates independently In this mode the optical sensor will operate as a standard optical detector, whilst the heat detector will operate as a standard temperature detector. Both sensors will be able to give an independent fire alarm signal to the panel, whether it be a smoke or heat alarm. The dual sensor will perform as if there are two detectors (one optical and one heat detector) installed at the same location.

d. As an optical detector only in this mode the optical sensor will operate as a standard optical detector, whilst the heat detector will be disabled.

e. As a heat detector only in this mode the optical sensor will be disabled, whilst the heat detector will operate as a standard heat detector.

2. It will be possible to switch the detector automatically, on a pre-programmed schedule, to any of its operating modes at any time.

3. The detector will be capable of operating within the following environmental limits. Temperature operating range -10° to +70° C Humidity operating range 0% to 95% RH (no condensation) Wind - not affected IP Rating - IP43 (as a minimum)

4. The construction of the detector and base will be in off-white, self-extinguishing ABS plastic. All circuitry will be protected against moisture and fungus. Smoke entry points

will be protected against dust and insect ingress by corrosion resistant gauze. For special applications additional protection will be available as an option.

5. The detectors will be unobtrusive when installed, having a dimension not exceeding 60 x 100 mm diameter maximum, including the mounting base. The detector will be capable of protecting an area of up to 100 m2 at a height of up to 12 m when used as an optical or optical enhanced by heat detector, and up to 50 m2 at a height of up to 7.5 m when used as a temperature or dual detector. The CIE will allow for an audible warning and warning indications when these operating modes are switched during operating times and coverage is reduced. The installation and positioning of detectors will be carried out in accordance with the applicable national standards.

6. It will be possible to service a contaminated or dirty optical sensor in the field. The sensor will be equipped with a field exchangeable and disposable optical chamber that may be replaced on site without the need for any measurement or re-calibration equipment.

Optical Beam Smoke Detectors

1. An optical beam smoke detector will consist of a transmitter unit, a receiver unit and a control unit, all housed in a single enclosure. The transmitter will project a modulated infrared beam on to a reflective mirror that in turn reflects the beam back to the receiver. The receiver will analyze the signal and if smoke is detected in the path of the beam, an alarm signal will be sent to the control unit. The controller will in turn report this alarm to the CIE on the standard detector communications loop line. The controller will allow for single point control of the entire beam smoke detector system from the CIE.

2. The beam smoke detector will be addressable and consume only one address on the addressable loop. It will communicate through the system protocol to the CIE on the same cables as standard detectors and will be powered from the fire detection loop. It will be capable of operating on a 24 V supply system even when supply voltage drops to a value as low as 17 V.

3. The beam detector will be available in at least 2 variants, effective over a range of from 5 m to 50 m and 50 m to 100 m respectively, with lateral detection effective no less than 7.5 m on either side of the center line of the actual beam.

4. The beam smoke detector will be provided with a self-check function and automatic compensation for dust accumulation, component ageing and temperature changes.

Addressable Manual Call Points (MCP)

1. The MCP will be manufactured from self-extinguishing polycarbonate plastic or metal. It will incorporate an integral communications module and have a flush mounted RED alarm indicator located on the unit. The LED will illuminate when the MCP is activated or on command from the CIE.

2. Every MCP will use a single address on the standard fire detector loop and have a response time of no more than 3 seconds from time of activation until alarm notification.

3. Every MCP will be available in at least the following colors in the same overall design: red, yellow, blue and green. It shall be possible to install the indoor manual call points in either surface- or recess mount options.

4. It shall be possible to supply the MCP with an integral dual isolator. The isolator will be supported by a yellow alarm indicator indicating when the isolator is active. Any single short circuit on either side of the MCP will not disconnect the MCP from the communications line but simply allow it to communicate via the other side of the communications loop.

5. It shall be possible to supply the MCP in an IP67 environmental enclose for outdoor applications.

Input/output Controllers

Conventional Sounder Circuit Controllers

1. The sounder controller shall be capable of locally driving and supervising a zone of conventional sounders. It shall be connected to the same 2-wire loop that is used for standard detector communications, and will be powered from an EN54 approved, external 24 VDC supply. The sounder controller will supervise the external power supply for failure conditions and be able to switch up to 2A @ 24 VDC to the conventional sounder circuit.

2. The unit will use a single device address set by the same, easy to use, standard rotary addressing system used on the detectors.

3. The sounder controller will continuously supervise the sounder line for overload and open circuit conditions and will operate the sounders through polarity reversal switching.

4. It will be possible to operate the sounder controller output from the CIE in two distinct operating modes: continuously or intermitted. For a fire in its own zone it would be possible to use a continuous output, whilst and intermittent output may be chosen for

an alarm in adjacent zones. Sounder circuit controller operation will be freely programmable from the CIE.

Conventional Zone Monitoring Units (ZMU)

1. The ZMU will be capable of monitoring a single conventional zone of nonaddressable detectors consisting of up to 20 detectors. It will be connected to and powered from the same 2-wire loop as the detectors. In turn it will power the 2-wire conventional detector zone and supervise it with the use of a standard end-of-line resistor for both overload and open-circuit conditions.

2. The ZMU will be available for use for both standard as well as intrinsically safe (IS) applications. For use in intrinsically safe (IS) environments, it will be possible to switch the standard ZMU into IS mode and supervise the zone of IS detectors through an approved galvanic isolated barrier. It will be possible to connect up to 20 conventional IS detectors to the ZMU in IS mode.

3. The unit will use a single device address set by the same, easy to use, standard rotary addressing system used on the addressable detectors.

4. The ZMU will report fire alarms, faults and maintenance conditions to the CIE under a single device address. The alarm LED and any remote indicators used on the conventional detectors will light up in alarm condition.

5. The ZMU will have its own local output to drive a common zone remote indicator.

Single and Multiple Input/output (I/O) Units

1. All I/O units will be connected to and powered from the same 2-wire loop communication bus as the normal smoke detectors. A local on-board yellow LED will indicate any fault condition on any of the inputs on the unit.

2. All inputs will be monitored by an end-of-line resistor. It will be possible to select the following input modes: • input mode with full supervision allowing for active1, active2, open and short circuit detection • input mode without supervision for open and closed detection • and with partial supervision allowing for active and open circuit detection • and with partial supervision allowing for active and short circuit detection

3. All outputs on the I/O units will allow for common (COM), normally open (NO) and normally closed (NC) changeover relays. The relays will be of the magnetic latch type to limit current consumption on the loop when the units are activated.

4. Any I/O unit will use a single device address set by the same easy to use, standard rotary addressing system used on the addressable detectors, regardless of the number of inputs or outputs available on the unit. It will allow for individual input and output operation and recognition, completely freely programmable from the CIE and unrelated to each other.

5. The range will at least allow for following modules: •

4 Inputs on the same unit using one address for all • 4 Inputs and 4 Outputs on the same unit using one address for all • 2 Inputs and 1 Output on the same unit using one address for all • 2 Inputs and 2 Outputs on the same unit using one address for all • 1 Input

6. The single input unit shall have special functionality for switch monitoring. This unit will allow for the supervision of a normally open or normally closed contact and allow for notification of a change of state in its input to the CIE of less than 3 seconds. This functionality will be completely user programmable from the CIE.

7. All I/O functionality will be freely programmable from the CIE for notification of fire, fault or condition alarms, or even be without notification to the operator if required.

Notification Devices

Addressable Sounders

1. The sounders shall have a red or white, compact and shock resistant polycarbonate housing with a surface mount base.

2. The sounders shall communicate with the panel using the same communications loop and using the same protocol as all the other addressable elements. The loop communication module will be built into the sounder and form an integral part of the sounder housing together with all other sounder electronics. 3. The sounder shall not require any additional or external power supply. It will receive its power from the CIE communications loop.

4. It shall be possible to synchronize the sounders on command from the CIE.

5. All sounders will be supplied with a common base. The sounder base shall have a separate terminal connector to ensure the continuity of any shielded loop cable used. 6. The sounder shall allow for configurable operating modes and tone selection in accordance with local standards. 32 selectable tones will be available on every sounder, set using DIP switches on every sounder.

7. The sounder shall be capable of supplying a sounder level output of up to 97 dB with very low power consumption. Because of the low power consumption, it shall be possible to connect to 45 sounders on a single communications loop of up to 2 km.

8. The sounder's sound level shall be adjustable during installation using DIP switches situated on every sounder. The functionality of every sounder, the activation and operating mode shall be fully controlled and programmable from the CIE. 9. Every sounder shall have a unique address on the detection loop that shall be set on every sounder using DIP Switches.

10. The standard ingress protection class will be a minimum of IP21, with options available in the same sounder format to allow for IP65 protection.

11. The sounder will be certified to work in temperatures varying from

–25 °C to +70 °C

with relative humidity from 5 to 95%.

Addressable Sounders with Beacons

1. Sounders with beacons shall be offered in the same format, color and form factor variants as the standard sounders. The sounder/beacons will share a common mounting base with the standard sounders and shall have the same features and configuration options as the standard sounders.

2. The sounders beacons shall be powered of the same 2-wire communications bus used to communicate with other detectors and modules.

3. The beacons of the sounder/beacons will be available in RED, WHITE or AMBER and will flash at a frequency of 1 Hz. It shall not consume more than 3 mA current from the communications loop when in alarm.

4. It shall be possible to connect to 30 sounder/beacons on a 2 km communications loop.

5. It shall be possible to synchronize the sounders and sounder/beacons on command from the CIE.

6. Every sounder/beacon shall have only one unique address on the loop and will be configured using the DIP switches located on the sounder/beacon. The sounder and beacon will share the same address.

7. The standard ingress protection class will be a minimum of IP21, with options available in the same sounder/beacon format to allow for IP65 protection.

8. The sounder will be certified to work in temperatures varying from

–25 °C to +70 °C with relative humidity from 5 to 95%.

Smoke Control

Smoke control systems shall be installed, inspected, tested, and maintained in accordance with NFPA 92, Standard for Smoke Control Systems; NFPA 204, Standard for Smoke and Heat Venting; or nationally recognized standards, engineering guides, or recommended practices, as approved by the authority having jurisdiction.

The engineer of record shall clearly identify the intent of the system, the design method used, the appropriateness of the method used, and the required means of inspecting, testing, and maintaining the system.

Since the hotel building is not a high-rise building, smoke control system shall include;

1. Staircase pressurization shall be permitted but not mandatorily
2. Corridor mechanical ventilation

Staircase Pressurization	
Design Standard	EN 12101, NFPA 92A, NFPA 92
System Type	Mechanical Pressurization System
	Stairs and other spaces by closed door min. 50 Pa
Pressure Difference	By open Doors min. 12 Pa (min.2 interior, 1 final exit for stairs)
	Hoist ways: Closed Doors: min. 50 Pa
Air Velocity	min. 1 m/sec (on open door)
Door Opening Force	max. 110 N (11.2 kg)
	Automatic - Fire Alarm Panel
Fan Motor Control	variable speed frequency converter + pressure transmitter
Start/Stop	Manuel - Power Control Panel
	Remote Control - Control Room
Supply	Stairs with fixed duct (injection from each floor)
	Hoist ways with fixed duct (injection with 30m interval)
Fan Material	Non-Fire Rated

Air Duct Material	Non-Fire Rated (in a dedicated shaft)
Duration of Power Supply	min. 60 minutes
Stand by Power Source	Diesel Generator
Cable Resistance Rating	FE180 PH 120.

Pressurization Level

(a) When in operation, the pressurization system shall maintain a pressure differential of not less than 50 Pa between the pressurized exit staircase and the occupied area when all doors are closed.

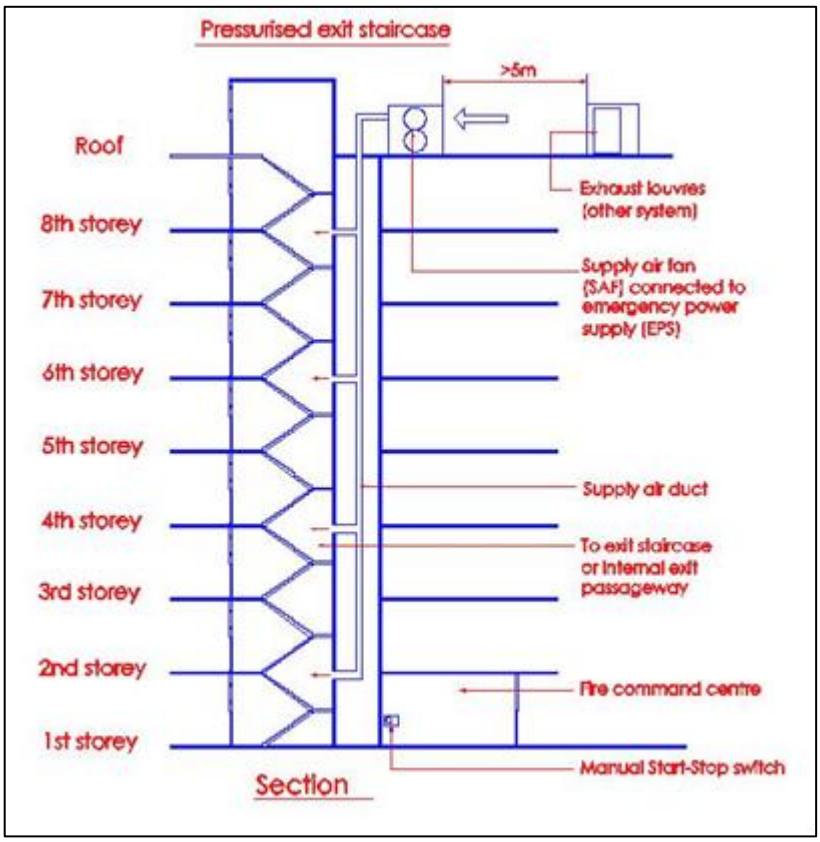
(b) Where a pressurization system is extended to the smoke stop lobby, the pressure gradient shall be such that the pressure at the exit staircase shall always be higher.

(c) The force required to open any door against the combined resistance of the pressurizing air and the automatic door-closing mechanism shall not exceed 110 N at the door handle.

All the equipment and the relevant controls associated with the pressurization system shall be so designed and installed to ensure satisfactory operation in the event of and during a fire.

Supply air for pressurization system shall be drawn directly from the external and its intake shall not be less than 5m from any exhaust discharge openings.

The pressurization system shall be automatically activated by the building fire alarm system. In addition, a remote manual start-stop switch shall be made available to firemen at the fire command center, or at the fire indicating board where there is no fire command center. Visual indication of the operation status of the pressurization system shall be provided.



MECHANICAL VENTILATION AND SMOKE CONTROL SYSTEMS

Where air-conditioning system is provided in lieu of mechanical ventilation system during emergency, all the requirements specified in this Code for the mechanical ventilation system shall apply to the air-conditioning system.

The use of air conditioning and mechanical ventilation systems will invariably, except for self-contained units, involve some use of pipe works for refrigerant/water circulation and ducts for air distribution and extraction.

The use of ducts presents the inherent possibility of spreading fire, heat, gases and smoke throughout the building or the floors/areas served.

Where air conditioning system is designed to operate during fire emergency, it is to be emphasized that the system shall comply with all the relevant requirements for the mechanical ventilation system.

Construction of ductwork

Ducts for air-conditioning and mechanical ventilation systems shall be constructed in compliance with the following requirements:

(i) All air-conditioning or other ventilation ducts including framing thereof, shall be constructed of steel, aluminum, glass-fiber batt or mineral-wool batt or other approved material.

(ii) All air-conditioning or other ventilation ducts shall be adequately supported.

(iii) Duct lining & coverings

Duct covering and lining should be non-combustible.

However, if it is necessary to use combustible material, it shall: -

*when tested in accordance with methods specified in this Code, have a surface flame spread rating of not lower than Class 1, but in areas of building where Class 0 flame spreading rating is required for the ceiling construction under this Code, a Class 0 rating for the covering and lining materials shall be required;

*when involved in fire generate a minimum amount of smoke and toxic gases; and

*be at least 1.0m away from a fire damper.

(iv)Flexible joint and connection

Minimum Class 1 for insulation material/barrier lining and adhesives. Where ceiling construction requires class 0, covering and lining insulation material shall also be class 0. Where combustible material is used for the insulation of the duct, it shall be kept at least1000mm away from a fire damper in order to prevent premature closing of the damper arising from a fire from the combustible insulation material. For flexible joints and connections, which are combustible, there is a need to limit the length of the joints and connection to max. 250mm and 400mm respectively.

Pipework insulation

Insulation for pipework associated with the air-conditioning and mechanical ventilation systems shall comply with the following requirements:

(i) Insulation material for pipework together with vapour barrier lining and adhesives shall when tested in accordance with the methods specified in this Code, have a surface flame spread of not lower than Class 1 but in areas of buildings where Class 0 flame spread is required for the ceiling construction under this Code, a Class 0 rating for the insulation material shall be required.

(ii) Plastic and foam rubber insulation

Notwithstanding the requirements of sub-clause (c)(i), the use of plastic and foam rubber insulation materials of a lower classification may be permissible if:

*the material is the self-extinguishing type to the satisfaction of the Relevant Authority;

*the insulation material is covered by or encased in a metal sheath or hybrid plaster or other non-combustible cladding materials acceptable to the Relevant Authority.

provided that any opening in the element of structure or other part of a building penetrated by the pipework shall be effectively fire-stopped by replacement of the insulation material at the junction of penetration with fire resistant material having equal fire rating. Fire rated proprietary pipework system may be used if it is tested in the manner acceptable to the Relevant Authority.

Minimum class 1 for insulation material/barrier lining and adhesives. Where ceiling construction requires class 0, insulation material shall also be class 0. However, the use of 10mm to 15mm maximum diameter pipe works for split unit system would be considered as acceptable.

The use of fire collar shall be appropriate for the diameter of the PVC/UPVC pipe and shall be duly secured to the surface of the wall or floor with steel anchor bolts. See Table

3.9A of the fire code for the maximum nominal internal diameter of pipes.

Duct enclosure

A protected shaft used for the enclosure of services shall comply with the following:

The protecting structure for protected shaft containing kitchen exhaust duct and mechanical ventilation ducts serving areas specified which pass through one or more floor slabs shall be constructed masonry. Such shaft shall be completely compartmented from the rest of the shaft space containing other ducts or any other services installations:

(i) exit staircases and exit passageway
(ii) smoke-stop lobby and firefighting lobby
(iii) areas of refuge within the same building

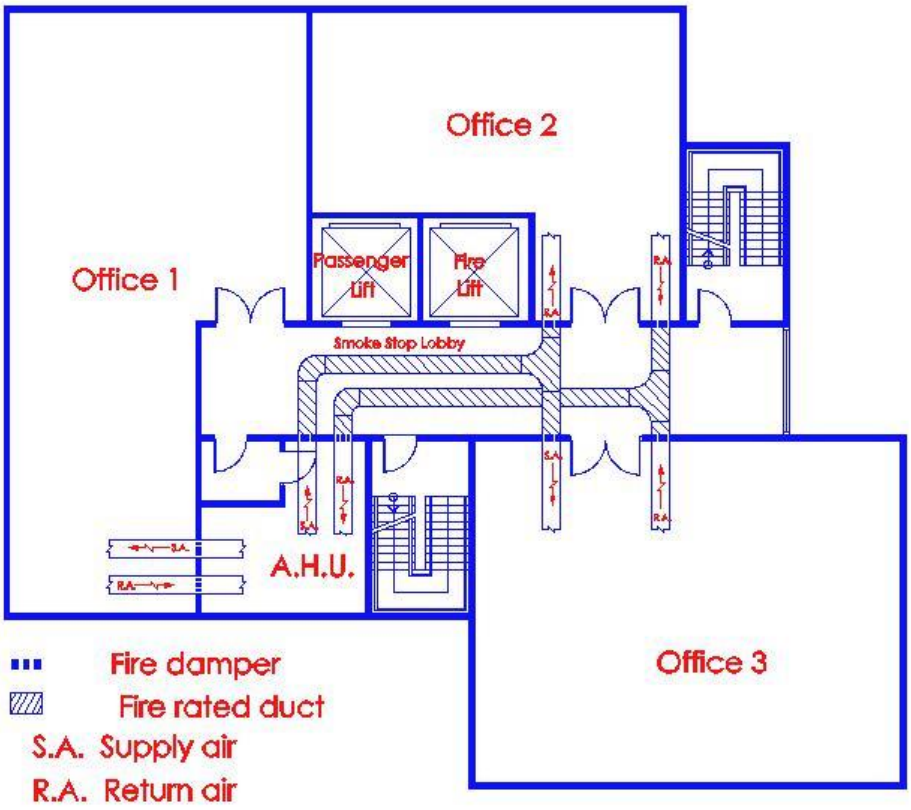
Provision of Fire Dampers

(i)Ventilation ducts which pass directly through a compartment wall or compartment floor shall comply with the following -

*where the ventilation duct does not form a protected shaft or is not contained within a protecting structure, the duct shall be fitted with a fire damper where it passes through the compartment wall or compartment floor;

*where the ventilation duct forms a protected shaft or is contained within a protecting structure, the duct shall be fitted with fire dampers at the inlets to the shaft and outlets from it. Duct work through smoke-stop or firefighting lobbies

Ventilation ducts should not pass through smoke-stop or firefighting lobby. Where unavoidable, the part of the ventilation duct within the lobby shall be enclosed in construction with fire resistance rating at least equal to that of the elements of structure. Such construction shall be in masonry. If other form of fire resisting construction is used, fire damper shall be fitted where the duct penetrates the lobby enclosure.



Fire dampers shall not be fitted in the following locations:

*openings in walls of a smoke extract shaft or return air shaft which also serves as a smoke extract shaft;

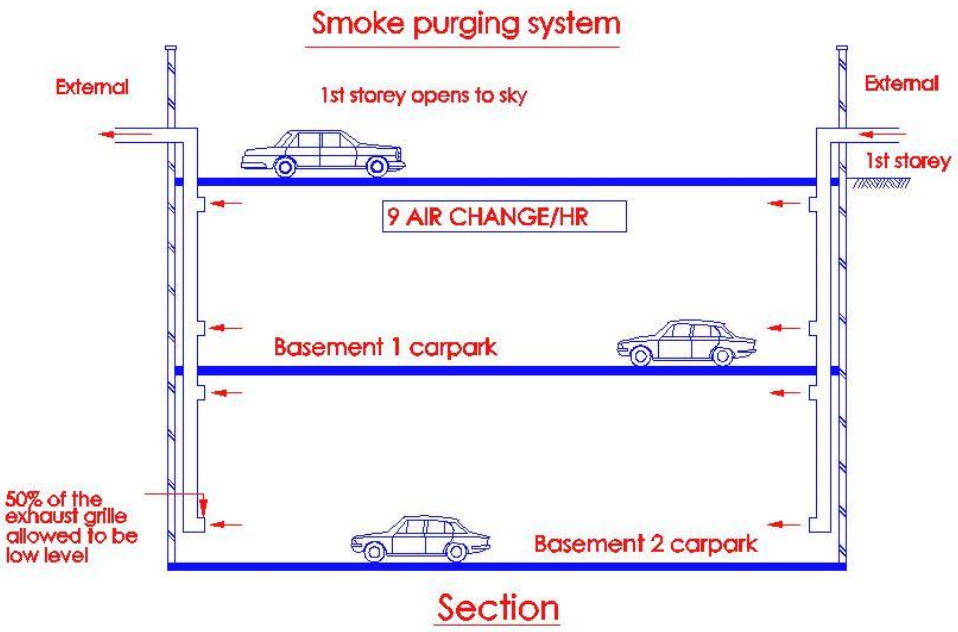
*openings in walls of a protected shaft when the openings have a kitchen exhaust duct passing through it; or

*anywhere in an air pressurizing system;

*where explicitly prohibited.

Smoke Purging System in Basement

Approx 2. Basement Area: 2500 m2; 2500 * 9 = 22.500 m3/h



Fire dampers shall not be fitted in any of the smoke extract shaft. The smoke purging system would not be able to function effectively as the fire dampers when subjected to high temperature would close.

Smoke purging system is not intended for escape purposes but for dilution of smoke. Hence, there is no need to fire rate the duct works.

Fire dampers shall not be provided in the following locations:

a) openings in walls of a protected shaft if such openings have a kitchen exhaust duct passing through them;
b) anywhere in the supply duct work of air pressurizing system to exit staircase; and
c) anywhere in the supply and exhaust ducts serving fire pump room, generator room, fire command center and flammable store.

Fire Rated Duct

(i) Where proprietary fire rated materials are used to construct the fire rated duct, the fire rating of the fire rated shall have the same period of fire resistance as the wall or floor it penetrates.

(ii) Proprietary fire rated duct shall be listed, and its usage be approved by the Relevant Authority.

(iii) Running of non-fire rated duct and/or other building services above the proprietary fire rated duct should be avoided.

Mechanical ventilated smoke-stop lobby and firefighting lobby

Mechanical ventilation system for smoke-stop lobbies and firefighting lobbies shall be a system exclusive to these lobbies, and it shall comply with the following requirements:

(a) The ventilation system shall be of supply mode only of not less than 10 air changes per hour.

(b) Supply air shall be drawn directly from the external with intake point not less than 5m from any exhaust discharge or openings for natural ventilation.

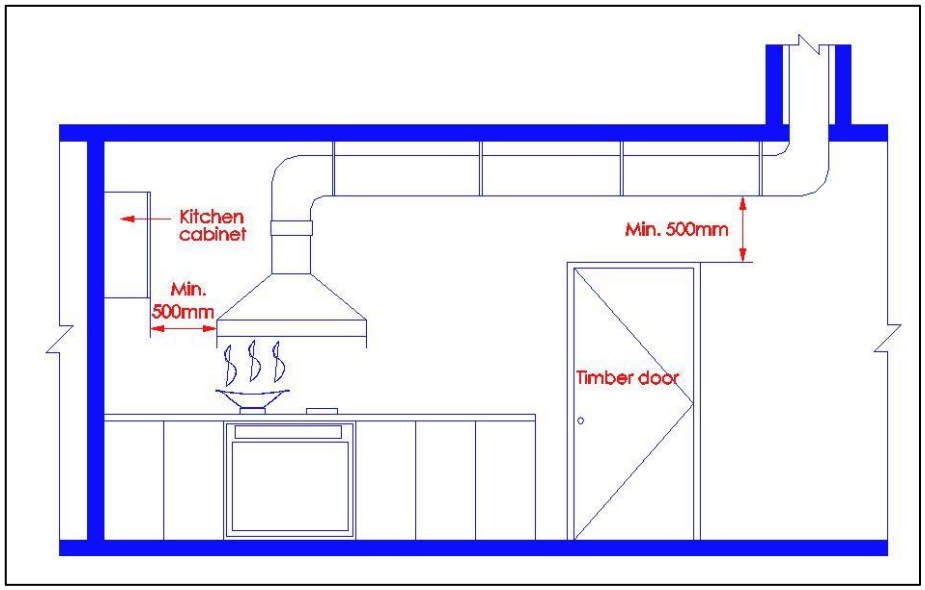
Any part of the supply duct running outside the smoke-stop or firefighting lobby which it serves shall either be enclosed or constructed to give a fire resistance rating of at least 1 hr. The Relevant Authority may at its discretion require a higher fire resistance rating if the duct passes through an area of high fire risk.

The mechanical ventilation system shall be automatically activated by the building fire alarm system. In addition, a remote manual start-stop switch shall be made available to firemen at the fire command center, or at the fire indicating board where there is no fire command center. Visual indication of the operation status of the mechanical ventilation system shall be provided.

Kitchen

(a) Mechanical exhaust system for the cooking area of a kitchen in a hotel, restaurant, coffee house or the like shall be independent of those serving other parts of the building. It shall also comply with the following requirements:

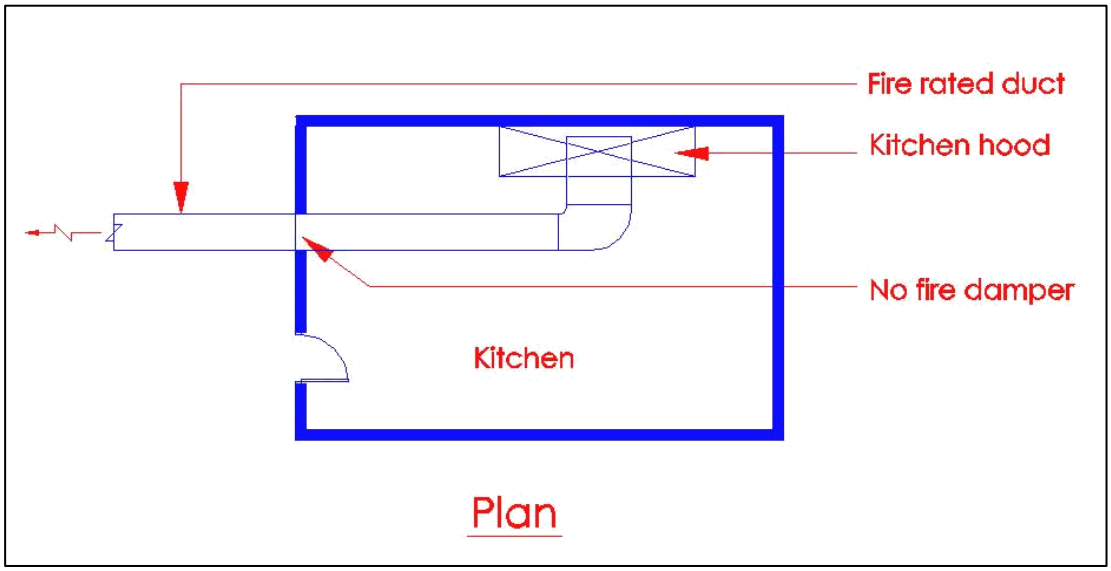
(i) The hood and ducts for the exhaust shall have a clearance of 500mm from unprotected combustible materials;

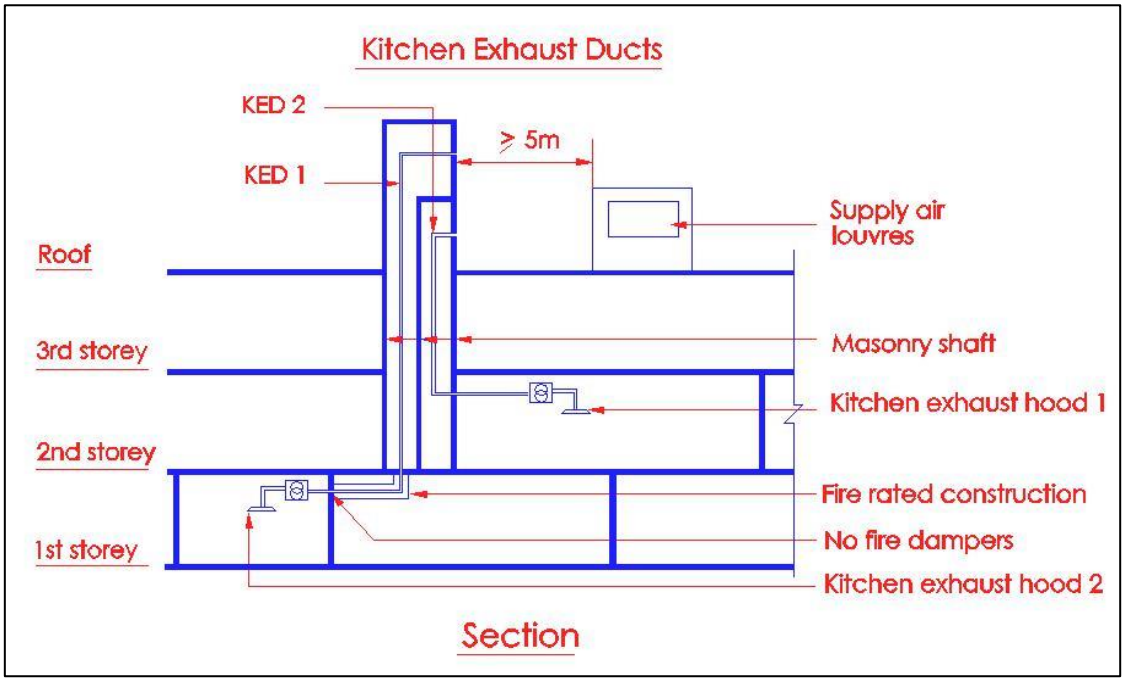


(ii) The exhaust shall be discharged directly to the external and shall not be less than 5m from any air intake openings;

(iii) The exhaust duct where it runs outside the kitchen shall either be enclosed in a structure or be constructed to give at least the same fire rating as the kitchen or that of the room it traverses, whichever is higher. The rating shall apply to fire exposure from both internal and external of the duct or structure. Where the duct riser is required to be enclosed in a protected shaft constructed of masonry or dry wall complying with Cl. 3.8.9(a), it shall be compartmented from the rest of the shaft space containing other ducts or services installations; and

(iv) No fire damper shall be fitted in kitchen exhaust ducts.


Fire rated duct
Kitchen hood
No fire damper
Kitchen
Plan


Kitchen Exhaust Ducts
KED 2
KED 1
≥ 5m
Supply air louvres
Roof
3rd storey
Masonry shaft
Kitchen exhaust hood 1
2nd storey
Fire rated construction
No fire dampers
1st storey
Kitchen exhaust hood 2
Section

Rooms involving use of Flammable and Explosive Substances

(a) Mechanical ventilation system where required for rooms which involve the use of flammable and explosive substances shall be independent from those serving other parts of the building. It shall comply with the following requirements:

(i) Ventilation system shall consist of exhaust and supply part with a rate of 20 air-change per hour or any other rates acceptable to the Relevant Authority. The exhaust shall be direct to the external and shall not be less than 5m from any air intake openings;

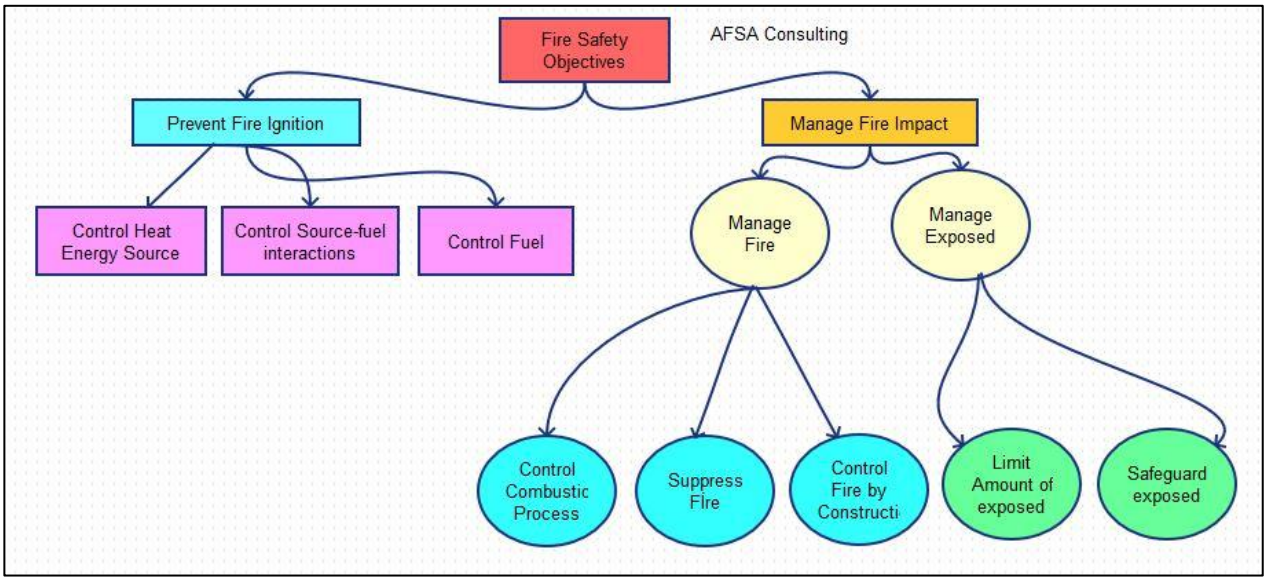
(ii) Where such ducts run outside the room, they shall either be enclosed in a structure or be constructed to give at least the same fire rating as the room which they serve or that of the room through which they traverse, whichever is higher. The rating shall apply to fire exposure from both internal and external of the duct or structure. Where the duct risers are required to be enclosed in a protected shaft, constructed masonry or dry wall, they shall be compartmented from the rest of the shaft space containing other ducts or services installations;

(iii) No fire damper shall be fitted in either supply or exhaust duct

(iv) Duct serving other areas shall not pass through rooms involving use of flammable and explosive substances.

Fire Protection Management

The Fire Safety Concepts Tree (NFPA 550) provides an overall structure with which to analyze the potential impact of fire safety strategies. It can identify gaps and areas of redundancy in fire protection strategies as an aid in making fire safety decisions. The use of the Fire Safety Concepts Tree should be accompanied by the application of sound fire protection engineering principles.



According to Fire Safety Concept;

The “Prevent Fire Ignition” branch of the Fire Safety Concepts Tree includes measures representative of a fire prevention code. Fire safety measures included in this branch of the tree require continuous monitoring to ensure their effectiveness. The responsibility, therefore, is more the owner’s or occupant’s than the designers.

Ignition results from a heat source in contact with, or sufficiently close to, a combustible substance.

Fire Objective shall include;

Preventing of fire ignition sources like hot works, electric installations, transformers, kitchen cooking process, welding, cutting, grilling, combustion and heating. Such temporary activities shall be performed under string written control and permission of the hotel management. Permanent ignition sources shall be well confined, and provision should be taken. Fuels like diesel oil, fuel oil, mechanical oil etc. should be in amount limited, stored not to access to public ways.

This means that the heat source should not be allowed to move too close to the fuel, excessive heat should be prevented from being transferred to the fuel, and the fuel should not be allowed to move too close to the heat source. All these concepts are necessary to achieve control of source–fuel interactions; there is no redundancy.

Never allow hot works & ignition sources in presence of combustible material, unless professional provisions are undertaken that no concern exit!

Manage Fire. The objectives of the “Manage Fire” strategy are to reduce hazards associated with fire growth and spread, and to thereby reduce the impact of the fire. Approaches to fire management are as follows:

(1) Control the rate of production of smoke and heat through alteration of the fuel or the environment

(2) Control the combustion process by manual or automatic suppression

(3) Control fire propagation with venting or containment, or both

“Manage Exposed” means to coordinate measures involving any or all of the items specified in the fire safety objectives (e.g., people, property, activities, or other valuable considerations).

The “Manage Exposed” branch is achieved by either limiting the number of individuals and amount of property that are exposed or safeguarding all persons and property subject to exposure. In the case of property or immobile persons, such as no ambulatory hospital patients, the exposed is safeguarded most often by defending the occupied space from fire exposure.

Fire Impact Management shall include;

- Passive fire protection as compartmentation,
- Protection of the egress routes and exits
- Separation of diverse hazard classifications like kitchen, assembly units and suits
- Detection of Fire and Smoke
- Suppression of fire, manual and automatic
- Purging and venting of heat and smoke

The Fire Safety Concepts Tree can be used to assess fire safety in a building. Inputs to

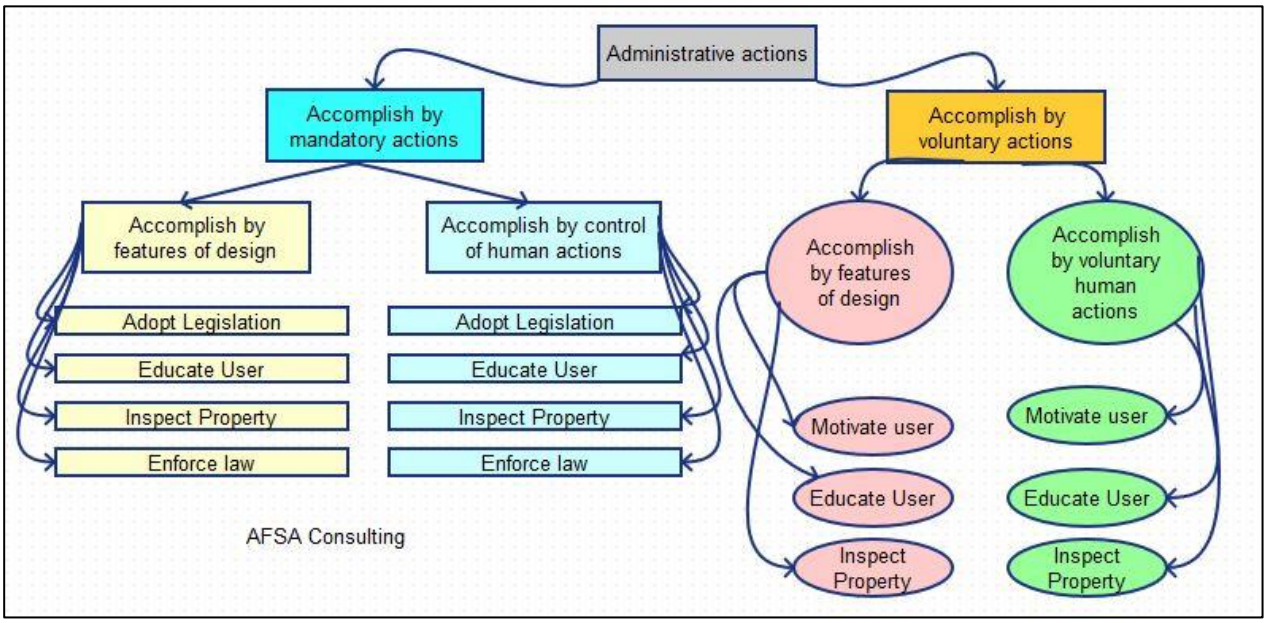
the tree comprises a checklist of required components that should be maintained in order to accomplish their respective strategies. Thus, in a structure for which strategies are identified as necessary to achieve fire safety objectives, appraisal of inputs to those strategies constitutes a fire safety assessment of the structure.

The Fire Safety Concepts Tree can be used as a design tool. Once basic fire safety objectives for a building are identified, the designer can analyze the alternative tree paths through which these objectives can be met.

The Fire Safety Concepts Tree can be used to evaluate and manage changes in a building's fire safety performance that can result from changes in occupancy, use, or fire protection features. It is particularly important to have a means of evaluating the impact of changes in a building on critical fire safety features and design assumptions that could be affected during the life of the building when designed with a performance-based methodology.

Administrative Action Guide

The Fire Safety Concepts Tree is a branching chain of goal/means relationships. However, beyond the tree, an infrastructure exists in the form of an administrative scheme or social organization that is necessary to achieve the means deemed appropriate by the tree. Such an administrative structure is shown below;



This includes for example;

- Permanent control of the Hotel facility
- At least monthly meetings subject to fire protection provisions represented by hotel manager, technical manager, kitchen, laundry, etc. managers
- External annual check by fire protection engineers
- Maintaining the firefighting systems
- Keeping fire brigade access ways permanent free
- Educating and motivating the staff permanently

- Keeping the essential fire protection units and system room clear from public circulation.

Summary

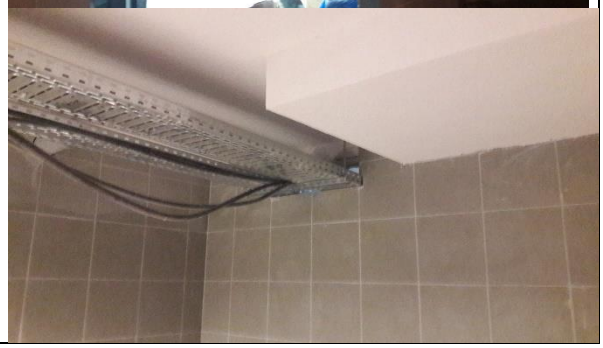
In this report basic fire protection provisions like passive & active protection systems, fire protection management for Hotel A have been reported. It is essential to for all involved parties & companies to design individual part of the systems according to the latest standard's and regulations based on NFPA Regulations, EN Directives, Hotel regulations and AHJ.

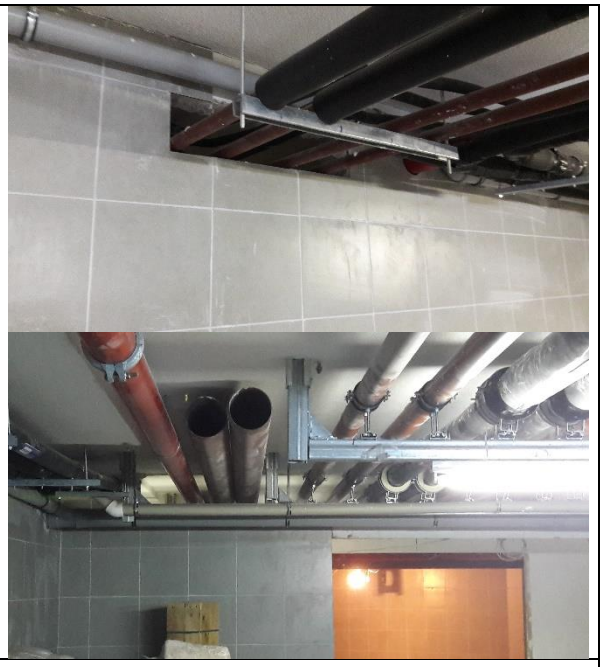
AFSA Consulting International

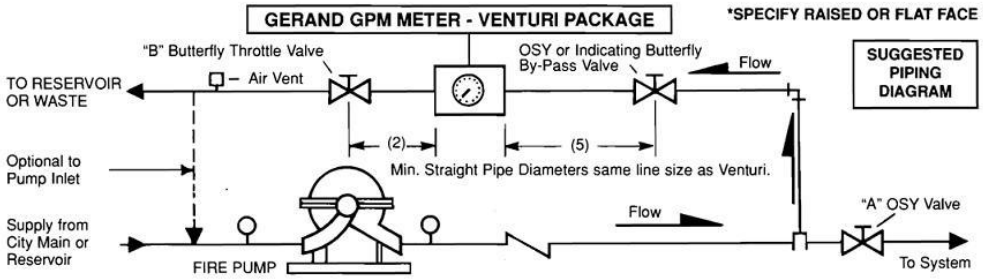
CLIENT	**PROJECT** Yangın Risk Kontrolü	**CONSULTANT** AFSA International FZE
STUDIED SECTION Project A	**SUBJECT** Fire protection / preventation	**PROVIDED SOURCES**
CODE & STANDARDS NFPA & Hotel Regulations	**DATE** 31.05.2018	**MISSING SOURCES**
		PAGES 12

Overview; see following box

In the following there are meeting notes, held on 31.05-01.06.2018 at Hotel A Construction Site. The pictures are taken during the inspection.

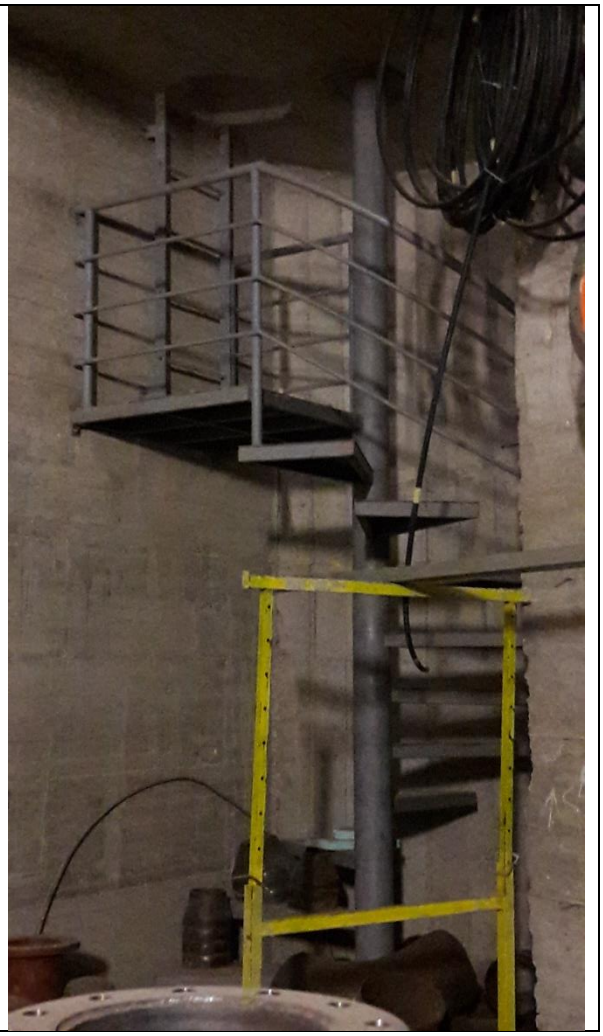
Nr.	Explanation	
1	Holes & openings in the walls around the traversing equipment like ducts, cables etc. must be filled with fire-proof material	 

		
2	Test connection of fire pump shall be accomplished according to NFPA 20.	

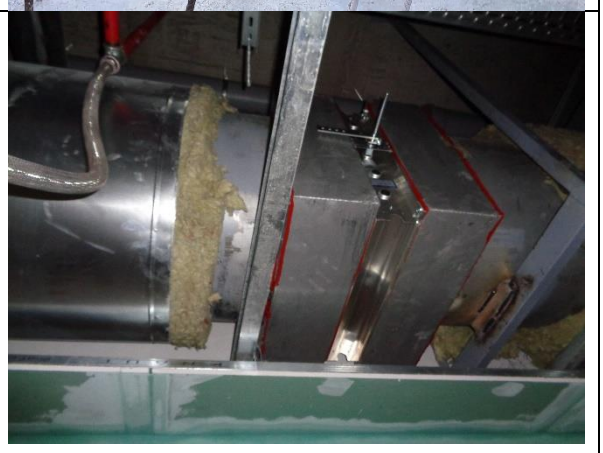


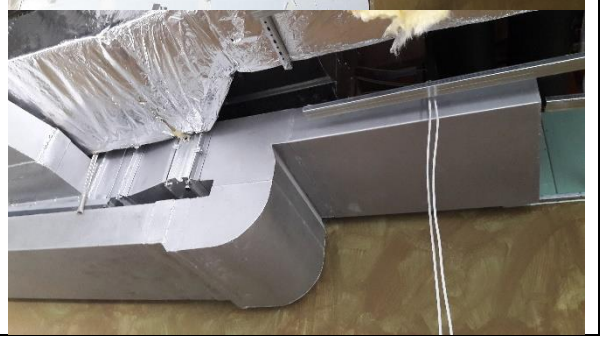
OPERATING INSTRUCTIONS FOR GERAND FIRE PUMP TEST METER

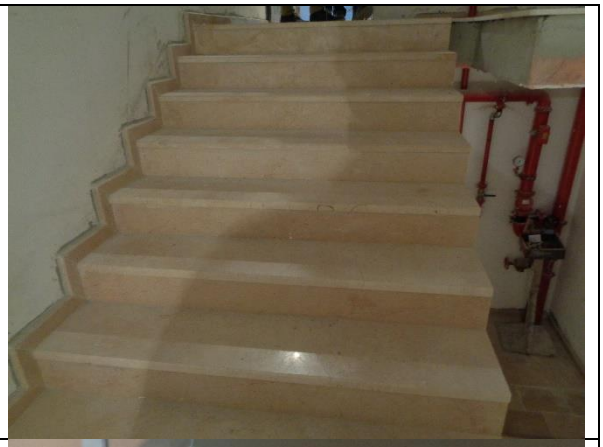
1. Close System OSY Valve "A".
2. Open OSY By-Pass Valve and "B" Butterfly Throttle Valve.
3. Purge meter located on Venturi as follows: Open station shut-off valves (below meter) and vent valves (above meter). When a steady stream of water is passing through each plastic hose, meter is purged of air. Close vent valves after air purging.
4. Start Fire Pump and read meter in GPM.
5. Refer to pump GPM requirement and adjust throttle valve for this requirement.
6. After test, open OSY Valve "A" and close By-Pass and "B" Valves.

3	2. fire exit stair form the main mechanical room must be 80 cm wide and the stair shall be provided with handrails from the beginning to top.	

4	• Exit stair from the mechanical room must be according to dimensions provided in NFPA. • Maximum height of risers 180 cm. • Minimum height of risers 100 cm. • Minimum tread depth 280 cm. • Minimum headroom 2030 cm.	

5	Water draining nipple (as part of frost protection) shall be fitted in gravel to let water easily drain out of the hydrants.	
6	According to NFPA in the exhaust line, especially for kitchens, there shall be no damper be installed to avoid oil adhere on the damper wing. Since dampers were installed and be kept balancing the supply and exhaust air, 3 precautions will be applied from the construction company. • Electro-filters • Intervention shutters within 45 cm to the damper • Permanent watching and cleaning during the operation period. The possible appropriate places for the intervention shutters are been discussed on site.	

7	Handrails shall be provided on both sides of the fire stairs.	
8	Most of the valves on fire cabinets are inoperable due to false installation. Fire hose shall be connectable without any inconvenience.	 

9	The combustible pipes in shaft shall be protected with fire manchettes to stop vertical smoke intrusions. Since the shafts are divided horizontally, the shaft shutters are required to be EI30 quality.	  
10	For smoke controlling in the fire stairs exhaust-ventilation is planned. To avoid the vacuum formation during the extraction, fresh air grids must be provided at the lowest level to maintain effective smoke control in the stairs.	

11	There are 2 semi-open mechanical rooms on the roof. Therefore; 1. The doors between 5. floor and the mechanical rooms must be at least EI90 quality. 2. The roof covering material must be non-combustible. 3. These areas must be provided with detection and automatic fire suppression (sprinkler)	   

12	The holes around the elevators must be filled with fire-clay/mortar to stop heat and smoke intrusion along the shaft during a fire.	 
13	The red color filling material around the pipe traversing hole, as seen in the picture is fire retardant. According to NFPA regulation, these holes must be isolated with EI90 quality material. (Fire mortal)	 

14	Some sprinklers will not work effectively due to obstacles in the ceiling. These sprinklers must be corrected by displacing or bringing them down.	   

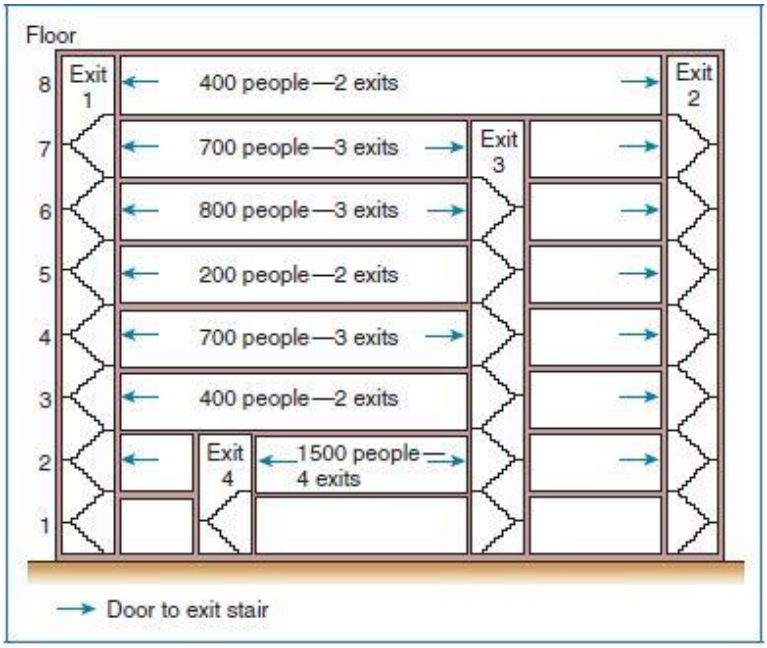
15	The main electro room shall be provided with automatic fire suppression like sprinkler of FM200. The auxiliary electro room can be provided with other listed devices like bonpet or others. For FM200 installation, an integrity test according to NFPA 2001 shall be accomplished.	
16	Since the Hotel project is no high rise building according to NFPA, vestibule provision in front of the fire escape stairs is not mandatorily required.	
17	Kitchen ovens and other electro equipment shall be shut off by circuit breaker buttons. Fire reporting should be done by means of manually actuated alarm-initiating devices	
18	Manually Actuated Alarm-Initiating Devices shall be split in 2 groups. Group 1: In customer circulating areas, only 180 seconds after actuation, alarm shall start. Group 2: In BOH areas where the fire scenario immediately activates.	
19	All doors along the fire egress corridors shall be without exemption EI30.	
20	Open restaurant and other retail rooms can be formed without fire and smoke resistive materials (walls & doors) when these open areas are not in sum, more than 10% of the floor area.	

ARCHITECTURAL FIRE PROTECTION & EVULATION REPORT		
CLIENT	**PROJECT** Hotel A	**CONSULTANT** AFSA INTERNATIONAL FZE
STUDIED SECTION All Floors (8 Floors)	**SUBJECT** Fire protection / preventation	**PROVIDED SOURCES** DWG Drawings
CODE & STANDARDS NFPA 101 & Hotel Regulation	**DATE** 20.04.2016 D-02	**MISSING SOURCES** Accurate area data's in basement areas and ground floor
Action Index: Accepted (**A**) / Rejected (**R**) / To be corrected (**C**)		**PAGES 3**
Status Index: Major (**M**) / Ordinary (**O**) / Minor (**R**)		
Overview; see following box		
The architectural drawing have been studied according to Hotel standards and NFPA 101, thus all inappropriate issues have been listed below.		

Nr.	Attach. Nr.	Explanation	Status	Action Index
1.		Minimum corridor width, exit capacities, nr of exits and occupancy load based on given plans have been studied. The results have been listed below. Except -1 basement provisions in other floors are in appropriate with Hotel regulations and NFPA 101. In -1 basement, due to occupancy load, there must be at least 4 remote exit ways, where 3 are provided and a total exit capacity of 5041 mm, where 2700 mm is provided with 3 stairs. (900 mm x 3) Thus either the meeting rooms have to be displaced or 2 additional exit ways have to be provided, at least between -1 basement and ground floor, as shown as an example in the 2. figure below.	M	C

	Occupancy Load	Aisle Width	Cumulative stair occ. load	Stair Width mm	Provision	Nr. Of Exit	Provision	Exit Width mm	Provision
6 Floor	245	1120 mm	245	1120	OK	2	OK	1225	2700
5 Floor	72	1120 mm	317	1120	OK	2	OK	362	2700
4 Floor	72	1120 mm	390	1120	OK	2	OK	362	2700
3 Floor	72	1120 mm	462	1120	OK	2	OK	362	2700
2 Floor	72	1120 mm	535	1120	OK	2	OK	362	2700
1 Floor	72	1120 mm	607	1120	OK	2	OK	362	2700
Gr Floor	818	1420 mm	-	-	OK	4	OK	13643	13500*
1 Basement	1008	1120 mm	1303	1120	OK	**4**	3	**5041**	2700
2 Basement	295	1120 mm	295	1120	OK	2	OK	1474	2700

*11 exit doors with total 13,5 m capacity



Summary; see following box

In this study, the exit provisions, minimum corridor & stair width, Nr. of exits have been reviewed and reported.

Surveyors	**Signature**
Attila SOYLUOĞLU	

ARCHITECTURAL FIRE PROTECTION & EVULATION REPORT		
CLIENT	**PROJECT** Hotel A	**CONSULTANT** AFSA INTERNATIONAL FZE
STUDIED SECTION All Floors (8 Floors)	**SUBJECT** Fire protection/preventation	**PROVIDED SOURCES** DWG Drawings
CODE & STANDARDS NFPA 101 & Hotel Regulations	**DATE** 13.04.2016 D-01	**MISSING SOURCES** Sprinkler & Alarm Detection Plans
Action Index: Accepted (**A**) / Rejected (**R**) / To be corrected (**C**)		PAGES 2
Status Index: Major (**M**) / Ordinary (**O**) / Minor (**R**)		
Overview; see following box		
The architectural drawing has been studied according to hotel regulations and NFPA 101, thus all inappropriate issues have been listed below. With 20m height, the building is not a high-rise building, having 6 stories and 2 basements, so according to NFPA Type II (222) building.		

Nr.	Attach. Nr.	Explanation	Status	Action Index
1.		Water storage with 60 m3 x 2; 120 m3 could be insufficient and can be determined on the base of a hydraulic calculation of the sprinkler system.	O	C
2.	1	In 5. Floor, the egress stair has been blocked by tables	O	C
3.	2	Presidential suit is 190 m2 and thus require at least 2 exits	R	C
4.	3	One egress stair at G-floor is been planned to be used as service way, shall be used only for emergency purpose	O	C
5.	4	At least 2 egress stairs have to lead directly outside.	M	C
6.	5	At G-floor, exit of the egress stair at kitchen side, meet directly industrial hazard and ware accept area.	M	C
7.	6	At G122 the exit is blocked due to the tables and seating areas	O	C
8.	7	An additional exit from G125 to outside is required	O	C
9.	8	The swing direction of door has to be in direction of egress.	M	C
10.	9	From the terrace, it shall be available to exit at G-floor	O	C
11.	10	In the foyer of ballroom, all the doors have to be of exit door quality	O	C
12.	11	An exit from the space, between kitchen and ballroom, shall be added	O	C

13.	12	Table and seating places shall not impact the egress and maintain at least a corridor or 112 cm to pass through (ball room)	M	C
14.	13	In the lobby through the art work exhibition, the egress width has been narrowed by 45 cm.	O	C
15.	14	In 1. basement, every single room exceeding 50 occupant must have 2 remotely located exits.	M	C
16	15	In -1 basement floor, 2 of 3 exit stairs have their entry at back side and complicated to reach by meeting room users. Is option 16 in the drawing possible?	M	C
17	17	Electrical room shall not be part of exit stairs, it shall be isolated with 2 hours fire rated walls. (-1 basement)	M	C
18	18	No shaft or technical room shall open directly to exit stairs	M	C

Summary; see following box

In this study, the exit provisions, dead end corridors, travel distances, minimum corridor width are been reviewed and reported.

Occupancy load factors will be reviewed as next.

Surveyors	**Signature**
Attila SOYLUOĞLU