

ASEAN ENGINEERING INSPECTOR (AEI) Building Fire Safety Inspection
(Version: BFSIC_V4.0) update 25 March 2021
Prepared by EIT (Thailand)

PURPOSE:

The purpose of this guideline is to provide minimum key requirements and best practice for building fire safety evaluation to encourage the building owner maintaining functions and fire and life safety features of the buildings, to achieve goal for safety to life, property, business interruption and environment.

SCOPE:

The guideline addresses those construction, protection, management and common occupancy features necessary based upon recognized standards, which may be different from each country requirement to minimize danger to life from the effects of fire, including smoke, heat, and toxic gases created during a fire. This is to minimize the fire and smoke spread as the result of deteriorating tenable life conditions and fireman operation, as well as property losses and its business interruption. The guideline includes the following common features; Fire safety management, Material control, Exterior planning, Exit stair, Exit way, Fire resisting wall/floor, Fire alarm system, Fire extinguishing system, and Smoke control system. In order to harmonize the inspection's best practice among countries in ASEAN, which may be difference. Therefore, the specified features or requirement of individual occupancy, may be required by some countries are not included in this scope. The specified values such as fire rating, distance, flow rating, pressure rating; are advised to follow local requirements.

METHODOLOGY:

The visual inspection will be conducted by an independent third party using all of raw human senses such as vision, hearing, touch and smelling and/or any non-specialized inspection equipment as well as reviewing operation and maintenance logbooks, including routine inspection and testing, fire drill records and implemented pre-fire plan.

LIMITATION:

To conduct inspection, analyses, evaluate, and summary the results of inspection, only qualified professional engineer(s)

COMPLIANCE:

Local building regulation that the building being inspected must be complied to. (1) Fire safety management (2) Material control (3) Exterior planning (4) Exit stair (5) Exit way (6) Fire wall/floor (7) Fire alarm system (8) Fire extinguishing system (9) Smoke control system

DEFINITIONS:

Atrium. A large-volume space created by a floor opening or series of floor openings connecting two or more stories that is covered at the top of the series of openings and is used for purposes other than an enclosed stairway; an elevator hoistway; an escalator opening; or as a utility shaft used for plumbing, electrical, air-conditioning, or communications facilities.

Combustible Material. A material that, in the form in which it is used and under the conditions anticipated, will ignite and burn; a material that does not meet the definition of noncombustible or limited-combustible.

Common Path of Travel. The portion of exit access that must be traversed before two separate and distinct paths of travel to two exits are available.

Fire Compartment. A space within a building that is enclosed by fire barriers on all sides, including the top and bottom.

Exit. That portion of a means of egress that is separated from all other spaces of the building or structure by construction, location, or equipment as required to provide a protected way of travel to the exit discharge.

Exit Way. That portion of a means of egress that leads to an exit.

Exit Discharge. That portion of a means of egress between the termination of an exit and a public way.

Fire Barrier. A continuous membrane or a membrane with discontinuities created by protected openings with a specified fire protection rating, where such membrane is designed and constructed with a specified fire resistance rating to limit the spread of fire.

Fire Barrier Wall. A wall, other than a fire wall, that has a fire resistance rating.

Fire Resistance Rating. The time, in minutes or hours, that materials or assemblies have withstood a fire exposure as determined by the tests, or methods based on tests, prescribed by this Code.

Guardrail. A vertical protective barrier erected along exposed edges of stairways, balconies, and similar areas.

Handrail. A bar, pipe, or similar member designed to furnish persons with a handhold.

High-Rise Building. A building where the floor of an occupy able story is greater than 75 ft (23 m) above the lowest level of fire department vehicle access.

Means of Egress. A continuous and unobstructed way of travel from any point in a building or structure to a public way consisting of three separate and distinct parts: (1) the exit way, (2) the exit, and (3) the exit discharge

Professional Engineer. A person registered or licensed to practice engineering in a jurisdiction, subject to all laws and limitations imposed by the jurisdiction.

Public Way. A street, alley, or other similar parcel of land essentially open to the outside air deeded, dedicated, or otherwise permanently appropriated to the public for public use and having a clear width and height of not less than 10 ft (3050 mm).

Travel Distance. Distance from a most remote point in any usable spaces where has one or more ways to pass toward outside or exit enclosures

HOW TO USE:

Print this checklist and take it with you when you're taking an visual inspection at a building for fire safety evaluation. Use it to record your observations and note defects. This checklist is for informational purposes only and is not a replacement for the comments of a local Authority having jurisdiction.

Due to different economy is expected different safety criteria, standard and code of practices. Hence, the first year (Phase I) the difference should be respected each other. The second year (Phase II) each economy will learn and share the difference and harmonize them by cross country visit the awarded buildings. Due to every building is changed from time to time, such as layout, material, change of use or occupancy. Therefore, this checklist still remain design, construction for regular inspection with reasonable weighting factors.

SCORE:

0	1	2	3
No evident	Poor	Fair	Very good

To give a score (1, 2, 3), recorded documents or some evident should be provided by the building representatives for review.

No any evident or no document shown, give..... "0", tick "No"

Documented but unaccepted, give..... "1"

Documented and accepted, give..... "2"

Documented and accepted with over expectation, give... "3"

SECTION 2: BUILDING FIRE SAFETY INSPECTION GUIDELINE & CHECKLIST

Building name		Address			
Building phone number					
Building email address					
Construction type		Business type		No. of people/rooms	
Land size (sq.m)		Land dimensions		Building size (m)	
No. of floors		No. of basement		Building height (m)	
Law enforcement			Comments		
Building use permit		<input type="checkbox"/> Yes <input type="checkbox"/> No			
Regularly inspection		<input type="checkbox"/> Yes <input type="checkbox"/> No			
Hazardous contents		<input type="checkbox"/> Yes <input type="checkbox"/> No			

SECTION 2.1 FIRE SAFETY MANAGEMENT

A fire safety management details your arrangements to implement, control, monitor and review fire safety measures and functions, to ensure those are maintained. The effectiveness of managing fire safety is to prevent fire occurring and in the event of fire to protect people and property. The following information may give you guidance.

The management should specify the policy, planning, organization, control, monitoring and review of the fire safety measures and fire safety provisions in the premises. An emergency plan for dealing with a fire situation shall be well prepared and recorded. The purpose of an emergency plan is to ensure that the people in your premises know what to do if there is a fire and that the premises can be safely evacuated.

The emergency plan must be clear and relevant information and appropriate instructions to staffs and the other people working in the premises, such as contractors, about how to prevent fires and what they should do if there is a fire. The emergency plan should be based on the outcome of your fire safety risk assessment and be available for all employees, their representatives (where appointed) and the enforcing authority.

SECTION 2.1 FIRE SAFETY MANAGEMENT					
Topic	FEATURES	Yes	No	comments	Score
FM-01	Dedicated person(S)				
	1.1 The building has at least a dedicated person to be responsible for fire and life safety management.				
	1.2 Incident commander and emergency responders are well defined and clearly assigned in the emergency response plans (ERPs).				
	1.3 The fire safety systems and related equipment are maintained and readily available as required by the ERPs and design intent.				
FM-02	Fire safety policy and emergency plan				
	2.1 Fire safety policy is officially written and posted by management board.				
	2.2 Employees, visitors and fire responders are protected from any fire hazards based on minimum requirements in building and safety regulations stated.				
	2.3 Emergency response plans are well understood and readily available.				
	2.4 The fire safety policy and ERPs are improved continuously and updated as necessary, at least once a year.				

	2.5 In any high-rise buildings or hospitals, there should have specified evacuation and emergency response procedure, e.g. orderly evacuation, lift evacuation, fireman lift.				
FM-03	Test method and schedule				
	3.1 Test methods are described for each fire life safety system with appropriate checklists.				
	3.2 Testing equipment are calibrated regularly with certificates.				
	3.3 Test history was recorded, evaluated and approved by managers.				
FM-04	Inspection schedule				
	4.1 Inspection methods are described for each fire life safety system with appropriate checklists.				
	4.2 Inspection history was recorded, evaluated and approved by managers.				
	4.3 There is an annual external building fire safety inspection by a third-party registered company.				
	4.4 Thermal scan is regularly conducted for main electrical equipment including transformers, distribution boards and main electrical connections.				
	Maintenance program				
	5.1 Maintenance methods are described for each fire life safety system with appropriate checklists.				
	5.2 Maintenance history was recorded, evaluated and approved by managers.				
FM-06	Performance fire pump and sprinkler testing				
	6.1 Fire pump factory test certificate was issued by the manufacturer.				
	6.2 Fire pump performance testing is annually conducted to ensure that pressure and flow rate are appropriate.				
FM-07	Performance fire alarm and detection testing				
	7.1 Fire alarm system test report is annually recorded, evaluated and approved by manager				
	7.2 Fire alarm input output matrix and alarm sequence are setup in accordance with emergency plan including initiating devices, notification devices, and interfacing to AHU shutdown, lift recall to ground, unlock doors, etc.				
FM-08	Performance smoke control testing				
	8.1 Smoke control system test report is annually recorded, evaluated and approved by managers.				
	8.2 Smoke control fan's activation and sequence are set up in accordance to ERPs, with automatic and manual operation control based at the building control room or fire command center.				

FM-09	Certify the testing by professional engineer				
	9.1 An electrical/fire professional engineer with active license has reviewed and signed off the integrated system performance testing of fire alarm system.				
	9.2 A mechanical/fire professional engineer with active license has reviewed and signed off the fire pump performance testing including high flow, zero flow and rated flow.				
	9.3 A mechanical/fire professional engineer with active license has reviewed and signed off the automatic fire sprinkler system testing, including water flow switches, supervisory switches, inspector's test station.				
	9.4 A mechanical/fire professional engineer with active license has reviewed and signed off the automatic fire suppression system testing, including wet chemical hood fire suppression system, clean agent fire suppression system, etc.				
	9.5 A mechanical/fire professional engineer with active license has reviewed and signed off the smoke control system testing, including pressurization system, extraction system, etc.				
FM-10	House-keeping enforcement				
	10.1 There is housekeeping procedure which is regularly implemented and audited.				
	10.2 There are safety instructions and placarding templates.				
	10.3 Corridors, exit stairs and public spaces are clear of any movable obstructions and combustible materials that can create fire hazards.				
	10.4 Wood, cartons, cloth, plastic, rubber, alcohol gel or solvent and chemical substances are properly stored and handled.				
	10.5 Electrical rooms, LPG station or similar rooms are clear of combustible materials.				
FM-11	Contractor management				
	11.1 There is a dedicated fire safety design and construction instruction, that is always attached to terms of reference (TOR) when the designers and construction contractors are called for tender by engineering and procurement department.				
	11.2 Interim life safety measures (ILSMs) are well understood and readily available. (ILSM = policy that contractors must follow in order to ensure equivalent FLS systems during impairment such that the level of safety is not compromised during work.)				
	11.3 There is a procedure for hot work permit with appropriate controls such as combustible material free zone, fire watch policy, and date of validation policy, etc.				

	11.4 The fire watch is always implemented during hot work and maintenance of fire alarm and fire protection system, such as last round of fire watch inspection is usually 2 hours after work completion.				
	11.5 There is a procedure for fire alarm/fire protection (FA/FP) work permit with appropriate controls such as tagged in/out fire protection system, isolation or disabling of fire alarm and fire protection systems, responsible person and records.				
	11.6 Deficiency in fire alarm and fire protection systems, there is a policy that deficiency is immediately fixed in the same shift as when they were found.				
FM-12	Regularly fire drill				
	12.1 Fire drill histories are recorded with appropriate results including evacuation time, evacuation behavior and extinguisher and fire hose usage etc.				
	12.2 Occupants' participation of the fire drills is recorded.				
FM-13	Regularly staff training				
	13.1 There are training programs for emergency response in various fire scenarios				
	13.2 All staffs are provided a safety training or orientation before working at a new workplace.				
	13.3 Outside contractors are competent in both technical and safety aspects.				
	13.4 Training records are kept in each worker's personal folder and readily accessible.				
	13.5 Evacuation drills are conducted annually.				
	13.6 Occupants' participation of the training is recorded.				
	13.7 History of results are recorded, evaluated and implemented in continual improvement plans.				
	13.8 Building technicians are regularly trained the fire protection systems operation & maintenance.				
	13.9 There are records of new staff orientation.				
	13.10 New staffs, a safety training or orientation before working are always conducted.				
FM-14	Regularly fire risk assessment				
	14.1 Risks are analyzed using appropriate tools; such as checklist, event tree analysis, etc.				
	14.2 Records or findings of risks assessment and analysis can be readily accessed.				

	14.3 Risks assessment is conducted annually in each area or room of operation or whenever there is a change in that area or near misses.				
	14.4 Hazards identified are made as safe as possibly by implementing suitable mitigations.				
FM-15	Special Hazard Protection				
	15.1 Compressed gas station; such as LPG, CNG, Oxygen plant are equipped with safety devices including cylinder firmly strapping or supporting, safety valve, gas regulator, gas detector, emergency shut off valve, instruction, warning signs, etc. as required by local code.				
	15.2 Compressed gas station has appropriate ventilation to prevent accumulation of gas leakage as required by local code.				
	15.3 There are appropriate storage arrangement, cylinder handling, gas piping and use procedures as required by local codes.				
	15.4 Gas piping above, underground or concealed spaces are installed in accordance with local code or standard.				
	15.5 At point of uses are shut off valve, gas detector, and instruction.				
	15.6 There are regular staff training, inspection, testing and maintenance as required by local code.				
Total		15	62		0

SECTION 2.2 MATERIAL CONTROL

Construction materials; such as, insulations, facades, interior finishes and furnishing contents are controlled and limited to use. Especially materials like plastics, foam, plywood, wood frame, rubber backing, textile, cotton, flammable liquid, glue, these are classified as high and moderate risk materials. The materials may be selected by architects, interior designers, or owner under the new construction, renovation, replacement or reconstruction.

Deficiencies including the large amount use of plastic or foam and untreated wood contents, highly combustible insulation with large surface are found; inspector should be just noted and comments.

SECTION 2.2 MATERIAL CONTROL AND CONSTRUCTION					
Topic	FEATURES	Yes	No	comments	Score
MC-1	Façade or exterior walls in high-rise building				
	1.1 Façade or exteriors walls are made of noncombustible materials such as plastic or foam polyethylene is not a part of façade.				

	1.2 Gaps between curtain wall and floor slab are properly sealed to prevent fire and smoke vertically spread.				
MC-2	Roof combustible materials in high-rise building				
	2.1 Roofing and insulation are noncombustible material or it must be separated from the inside of the building with a thermal barrier, if it is combustible.				
MC-3	Combustible materials inside high-rise building				
	3.1 Wall, ceiling, floor finishes are made of noncombustible materials or less combustible materials.				
	3.2 Insulation materials in the wall and floor system are made of noncombustible materials or it must be covered with 13 mm-gypsum board or a thermal barrier, if they are combustible.				
	3.3 There is a policy to prevent combustible materials for decoration inside building such as, plastic tree, wood lath, and foam.				
	3.4 Containers for waste or linen are provided with lids constructed of non-combustible materials or steel.				
MC-4	Construction in high-rise building				
	4.1 Floor slabs are constructed with fire resisting material and assemblies, based on local code requirement.				
	4.2 Beams or trusses are constructed with fire resisting material and assemblies, based on local code requirement.				
	4.3 Column are constructed with fire resisting material and assemblies, based on local code requirement.				
	4.4 Roof assemblies are constructed with fire resisting material and assemblies, based on local code requirement.				
Total		4	11		0

SECTION 2.3 EXTERIOR PLANING

In the event of emergency or fire, the building in premises must be well facilitated fire service operation and prevented the fire spread across buildings. Deficiencies including improper fire lane and parking with obstruction, improper fire department connection and fire hydrant, and combustible facade are found; inspector should be just noted and comments.

SECTION 2.3 EXTERIOR PLANING					
Topic	FEATURES	Yes	No	comments	Score
EP-01	Fire lane(s) in high-rise or special large building				
	1.1 During fire incident, fire trucks can access from public road toward hard standing for fire truck parking(s).				
	1.2 Proper signage's are clearly posted along the fire lane from entrance to fire truck parking(s) without obstructing the fire response operation.				
EP-02	1.3 The dedicated fire lane is shown in site layout drawing.				
	Hard standing(s) for fire truck parking in high-rise or special large building				
	2.1 Clear and proper signage's are posted at the fire truck parking.				
EP-03	2.2 The fire truck parkings are shown in site layout drawing and there is at least one fire hydrant nearby.				
	2.3 A safe access must be provided to fire command center or building control room or incident command post.				
	Fire department connection(s) in high-rise or special large building				
EP-04	3.1 Clear and proper signage's are posted at every FDC(s) with maximum system pressure and destination name.				
	3.2 FDC(s) are located close to or not more than 20 m from public road and can be obviously spotted from the public road.				
	3.3 The FDC(s) are shown in site layout drawing.				
EP-05	Outside fire hydrant(s) in high-rise or special large building				
	4.1 At least one fire hydrant is allocated at or in front of property.				
	4.2 Clear and proper signage's are posted at every fire hydrant(s).				
EP-05	4.3 The fire hydrant(s) are shown in site layout drawing.				
	Assembly point(s) in high-rise or special large building				
	5.1 There is at least one assembly point allocated within safe distance from the building.				
EP-05	5.2 Area(s) designated to be assembly point should accommodate all expected number of occupants.				
	5.3 Clear and proper signage's are posted at every assembly point and along pathway leading to the assembly point(s).				

EP-06	Safe separation in high-rise or special large building				
	6.1 Fire spread across the buildings or adjacent property should be protected by means of a safe distance or other means.				
Total		6	16		0

SECTION 2.4 EXIT STAIR

In the event of emergency or fire in multi-story buildings, the exit stairs are crucial as a fundamental requirement of life safety to lead people downward to ground level. Stair enclosures on each level are normally defined as a point of safety. Therefore, fire doors and other opening protective equipment or assembly including fire stop systems or sealants to fill out the gap of utility penetrations must be approved or listed. The proper signages and adequate illumination to lead people to exit discharge must be evaluated.

This inspection checklist assumes the physical dimensions of exit stairs been designed and constructed that comply to building regulation prior to construction and operation. These dimensions are consisting of the width, risers, treads, headroom. If found these deficiencies, inspector should be just noted and comments.

Deficiencies including exit doors locked, obstruction inside exit stair, fire door not properly close and latch, no reentry provision, no emergency lights are found; inspector should be just noted and comments.

SECTION 2.4 EXIT STAIR					
Topic	FEATURES	Yes	No	comments	Score
ES-01	Have adequate numbers of stair and egress capacity				
	1.1 There are at least 2 exit-stairs in the building higher than 4 stories.				
	1.2 Required numbers of exit stair must be proportional to number of occupants as required by local code.				
	1.3 Required stair and ramp width(s) are not less than local requirement and adequate egress capacity without any obstructions.				
	1.4 Exit stair width for assembly use (ballroom, conference room) allocated above or below ground level should be proven by calculation to accommodate all occupant loads from each level or any specific requirement by local code.				
	1.5 Stairs' thread and riser dimension should be uniform in dimension and slip resistant. The required riser height and thread depth are met the local code requirement.				

	1.6 Change in level exceeding 15 mm must be ramp and/or stair with appropriate slope or thread and riser. Others must be beveled with appropriate slope.				
	1.7 Guardrails must have at the open side exceeding 750 mm from floor below or required by local code.				
	1.8 Handrails must have at least one side of stairs and ramps				
	1.9 Maximum slope of exit ramp should not be more than 1:12 in ratio or required by local code.				
ES-02	Fire resisting wall and door for exit stairs in high-rise or special large building				
	2.1 The exit stair wall must have fire resistance rating of at least 2 hours or required by local code.				
	2.2 Penetrations must be sealed by proper fire stop system.				
	2.3 The fire exit doors must have fire resistance rating of at least 1.5 hours or required by local code.				
	2.4 Outside stairs are separated and protected with fire resistance rating of at least 2 hours from the building or required by local code.				
ES-03	Fire door components				
	3.1 Fire door latching and self-closing devices are able to shut the fire door and latch in properly.				
	3.2 The gaps on top and on either side of the door frame are not more than 3 mm or required by local code.				
	3.3 The fire doors on exit stairs are swung in direction of egress.				
	3.4 Fire doors must be kept closed and latched during normal operation, except using an approved hold open device.				
	3.5 Fire doors are not blocked or mechanically locked.				
	3.6 Force required to open the fire door is not too heavy with the maximum force not more than 133 Newton or required by local code.				
ES-04	Electric lock, hold open and power operated doors				
	4.1 The doors are automatically unlocked or released once fire alarm or sprinkler flow switch is activated.				
	4.2 The doors are automatically unlocked, released or door close-to-open once power supply is shut down.				
	4.3 The doors must be equipped with a manual door release and instruction on the egress side.				

ES-05	Locking and reentry provision				
	5.1 Locks on the egress doors do not require the use of keys, a tool, special knowledge or effort to operate from the egress side/direction.				
	5.2 Locks or latches on the fire door of exit stairs are always capable to retract from both sides.				
ES-06	Proper guardrails				
	6.1 Open sides exceeding 750 mm from floor below in any required stairwells or ramps or corridors, the guardrail or barrier must be provided with at least 1.07 m in height or required by local code.				
	6.2 Outside stairs are higher than 11 m, the guardrail or barrier of high floors must be opaque.				
ES-07	Proper handrails				
	7.1 Exit stairs must have handrails at least one side or required by local code.				
	7.2 Height of handrails are between 0.85 – 0.95 m.				
ES-08	No combustible materials inside exit stair enclosure				
	8.1 Free of obstruction and combustible storage in exit stair enclosure.				
	8.2 No combustible interior finishes inside exit stair enclosure.				
	8.3 No electrical panel board inside exit stair enclosure.				
ES-09	Exit stair terminated at ground outside building				
	9.1 At least half of the number of exit stairs are terminated outside.				
	9.2 The exit stair(s) terminated in a public lobby inside the building shall have a protected pathway or minimize risk leading to outside without any obstructions.				
	9.3 All exit fire doors at discharge level are readily accessible and open without requiring a special tool or key.				
	9.4 At discharge door inside stairwells must have clearly signage to avoid passing the discharge level.				

ES-10	Stair and floor level identification in high-rise or special large building				
	10.1 Stair name, floor number and discharge floors are clearly shown at the stair landing inside the stair enclosure in every floor.				
	10.2 On each level at exit stair entrance (outside stair), stair name and floor number are provided and readable clearly at door leaf.				
ES-11	Proper exit signs				
	11.1 At exit stair entrance on each level, an exit sign is provided and readily seen from egress pathways.				
	11.2 On exit discharge level inside exit stairs, at least one exit sign is provided and at the exit discharge outside the stair must have directional signage's leading evacuees to assembly point.				
	11.3 The exit sign is internally lit with battery backup or as required by local code.				
	11.4 The exit sign at the exit stair entrance is allocated with distance not more than the width and height of the fire exit door or required by local code.				
ES-12	Proper illumination in emergency				
	12.1 Inside exit stairs, an average illumination is at least 100 lux at floor surface or required by local code.				
	12.2 Illumination is backed up by an emergency power for at least 1.5 hours or required by local code.				
	12.3 When normal electricity is shut down, emergency lighting will be illuminated automatically.				
Total		12	48		0

SECTION 2.5 EXIT WAY

In the event of emergency or fire, the way out is crucial as a fundamental requirement of life safety to lead people toward to exit stair safely with 2 independent ways. The exits or exit stairs are not be arranged with exceeding maximum distance required by local code; such as travel distance, dead end corridor, and common path of travel (or one way out distance). The egress capacity is also sufficient for maximum possible occupants on their egress route. The exit and exit stair arrangement on each room or space are appropriate locations. The obstructions must be evaluated along the way-out including door locking and latching. The proper signs and adequate illumination to lead people to exits must be evaluated.

Deficiencies including exit doors locked, obstruction along egress route, fire door not properly close and latch are found; inspector should be just noted and comments.

SECTION 2.5 EXIT WAY					
Topic	FEATURES	Yes	No	comments	Score
EW-01	Numbers of exit or way out and egress capacity				
	1.1 In large spaces or rooms, at least 2 way out are provided or required by local code.				
	1.2 In assembly rooms occupying 50 persons or more, two way out or exit stairs are provided or required by local code.				
	1.3 In spaces occupying 500 - 1,000 persons, three way out or exit stairs are provided or required by local code.				
	1.4 In space occupying 1,000 persons or more, four way out or exit stairs are provided or required by local code.				
	1.5 Egress routes have adequate aisle or corridor width to serve their maximum possible occupants.				
EW-02	Remoteness between the required two exits or ways out				
	2.1 Distance between exit doors is remote from each other, to prevent a fire blocking both exit doors at the same time.				
	2.2 Distance between exit doors should not be less than 1/3 of the longest diagonal distance length of the room in sprinklered building or 1/2 of the longest diagonal distance length of the room in non-sprinklered building or required by local code.				
EW-03	Dead end corridor and common path of travel				
	3.1 Any corridors with dead end, the distance is not more than 10 m in general or 6 m in assembly use or required by local code.				
	3.2 Any rooms with one exit or way out leading to the nearest fire exit stair, the distance is not more than 30 m in general or 6 m in assembly use or required by local code.				

EW-04	Travel distance to an exit				
	4.1 At the most remote points, travel distance to a required exit or exit stair is not more than 60 m in general or required by local code.				
EW-05	Door locks or hold open				
	5.1 Door lock(s) are always capable to retract on the direction of egress side.				
	5.2 Electromagnetic lock(s) are unlocked or released automatically when a fire alarm is initiated, a sprinkler flow switch is activated, or there is a loss of power.				
	5.3 Electromagnetic lock(s) can be unlocked manually by manual release devices, clearly located on the direction of egress with proper instructions.				
EW-06	Door swing and components				
	6.1 Door(s) always swing in the direction of egress for rooms occupying 50 persons or more or rooms containing high hazardous contents.				
	6.2 For corridors having a fire exit on both sides, door swing can be swung in both directions.				
	6.3 Exit stair at entrance(s) or any final exit(s) always swing in the direction of egress or toward outside.				
	6.4 Door(s) open into corridor must be capable to swing up to 180 degree or nearly and not open exceeding one-half of the corridor width.				
	6.5 Door(s) are capable to swing for not less than 90 degree of full required width of the opening.				
	6.6 Double door(s) that both swing in the same direction, a door sequential coordinator is provided.				
EW-07	Proper guardrail along open sides				
	7.1 Open sides along exit way exceeding 750 mm from floor below, the guardrail or barriers must be provided on open side with at least 1.07 m in height				
	7.2 Balcony, open exit corridor or roof high than 11 m from floor below, the guardrail must be opaque.				
	7.3 Under the open guards must have intermediate rail or barrier to prevent falling.				
EW-08	Protected corridors in high-rise or special large building				
	8.1 Hotels, apartments, dormitories, flats or condominiums require 1 hour fire resistance between guest rooms and corridor wall with 45 min fire resistance guest room doors or required by local code.				

	8.2 Theaters require 2-hour fire resistance for corridor wall with 1.5 hours fire resistance for doors to separate from other occupancies or required by local code.				
EW-09	Proper exit signs in high-rise or special large building				
	9.1 Fire exit signs are internally lit by battery backup or required by local code.				
	9.2 Fire exit signs are easy to read and perceive at the most remote locations along the corridor, junction, hall or aisle; preferable to be a pictogram as required by local authority, leading to final exit on each floor.				
	9.3 Double sided exit signs are provided for pathway with two directions of egress or narrow corridors.				
	9.4 For assembly occupying more than 100 persons, kitchen, common room, entertainment room, fire exit signs are installed on top of every exit door or required by local code.				
EW-10	Proper illumination in emergency				
	10.1 Corridors, halls, waiting areas have an average illumination of at least 10 lux and along pathways are minimum of 1.0 lux at floor surface or required by local code.				
	10.2 Illumination is backed up by an emergency power for at least 1.5 hours or required by local code.				
	10.3 When normal electricity is shut down, emergency lighting will be illuminated automatically.				
EW-11	Slip resistance surface and obstructions				
	11.1 Exit ways are kept clean without water or debris accumulation.				
	11.2 There is no obstruction stored along corridor or common pathway.				
	11.3 Fire protection equipment such as fire extinguishers and hose cabinets, are readily accessible without visual and physical obstructions.				
Total		11	34		0

SECTION 2.6 FIRE RESISTING WALL AND FLOOR

In the event of emergency or fire, the fire resisting wall and floor are crucial as a fundamental requirement of life safety to prevent the fire and smoke spread beyond fire origin. As results of increasing available time for evacuation before reaching the untenable conditions on the way out and protect people and firemen from fire hazards. This can help firemen reaching the base of fire quickly.

This inspection checklist assumes the structural fire resistance been designed and constructed that comply to building regulation prior to construction and operation. These fire resistance of main structures are consisting of columns, beams, floors, roof structures, and load bearing walls. Deficiencies including barriers discontinuity, improper penetrations with ducting, piping, and cabling are found; inspector should be just noted and comments.

SECTION 2.6 FIRE RESISTING WALL AND FLOOR					
Topic	FEATURES	Yes	No	comments	Score
FR-01	Fire resistance rating wall for separated occupancies				
	1.1 Separation between different functional spaces with fire resistance rating of 2 hours such as between theatre and other spaces, exhibition hall and parking, shopping mall and parking, or required by local code.				
	1.2 Separate between different occupancies with fire resistance rating of 1, 2 or 3 hours based on local code.				
	1.3 For mixed occupancy, the fire resistance rating between occupancies is not required but the most stringent requirements of the occupancies are prevailed.				
	1.4 Column and beam fire resistance rating are not less than the fire rating walls or as required by local code.				
FR-02	Fire resistance rating wall for vertical openings				
	2.1 Vertical openings such as elevator hoist-way, utility shaft, garbage chute, linen chute, stairwell, and similar openings are enclosed with fire resistance rating of not less than 2 hours or required by local code.				
	2.2 Vertical openings connecting 3 stories or less for convenience stair (s) or escalator(s) allow only buildings protected by sprinkler system throughout the building and must be protected by required means of vertically fire and smoke spread; such as fire barriers, smoke barriers with closely spaced sprinkler or required by local code.				
	2.3 Large floor openings connecting 4 stories or more or atriums allow only buildings protected by sprinkler system throughout the building and must be protected by required means of fire and smoke spread; such as smoke extraction system in				

	cooperation with fire barriers, fire curtains, glasses with listed window sprinklers or required by local code.				
	2.4 MEP vertical shafts are sealed with proper fire stop system or fire damper for duct work.				
	2.5 Top and bottom of vertical shafts are enclosed by the same fire resisting floor.				
FR-03	Fire resistance rating wall for separating fire hazards				
	3.1 Electrical room, fire pump room, generator room, mechanical room are protected by fire resistance rating wall(s) of 1 in general or 2 hours for severe hazard or required by local code.				
	3.2 Store room with high fire loads, kitchen and trash room are protected by fire resistance rating wall(s) of 1 in general or 2 hours for severe hazard or required by local code.				
	3.3 Mechanical room with high fire loads or fuel-fired contents are protected by fire resistance rating wall(s) of 2 hours or required by local code.				
FR-04	Opening protection				
	4.1 If door(s) in fire rating wall is required, the door is required fire protection rating door, equivalent to the fire rating wall or required by local code.				
	4.2 Air duct passing through fire rating wall, an approved fire damper are installed on the fire rating wall with at least the same fire rating or more. For kitchen exhaust ducts or smoke exhaust ducts are wrapped or covered with fire rating material throughout the duct lengths.				
	4.3 Penetrations by ducting, piping, cabling; are protected by fire stop system or fire damper				
Total		4	15		0

SECTION 2.7 FIRE ALARM SYSTEM

In the event of emergency or fire, the fire alarm system both automatic and manual means are crucial as a fundamental requirement of life safety to alert people for evacuation, monitoring and control on-off some building equipment before the fire and smoke spread throughout the exit ways, including call emergency response staffs or occupants nearby to extinguish the fire at initial stage. This is defined as an active fire protection system which is required proper inspection, maintenance and testing regularly as required by local code or recognized standard, to ensure that it can be operated in the event of fire at any times.

Deficiencies including detectors painted, system abnormal at FACP's display, no regularly testing are found; inspector should be just noted and comments.

SECTION 2.7 FIRE ALARM SYSTEM					
Topic	FEATURES	Yes	No	comments	Score
FA-01	Automatic fire detectors				
	1.1 Each fire detector has a dedicated address or conventional detection system and history logs are recorded and viewable on the control panel.				
	1.2 Generally fire detector coverage or spacing is not more than 9.0 m.				
	1.3 Smoke detectors are installed at least 1.0 m away from air outlet.				
	1.4 Smoke detectors are only used where appropriate without dust or smoke prone operational area.				
	1.5 CO detectors are required in rooms with gas fired equipment or inside enclosed parking.				
	1.6 Detectors are working by observing blinking light.				
	1.7 AHU with flow rate of 50 cubic meter per minute or higher is required to shut down as soon as a fire starts.				
1.8 Detectors are labeled with the same address or zone showing on the control panel.					
FA-02	Manual fire alarm boxes				
	2.1 Manual fire alarm boxes are installed at all fire exit doors and in remote locations, not more than 60 m apart or required by local code.				
	2.2 Manual fire alarm boxes are mounted within 1.5 m of exit door opening.				
	2.3 Manual fire alarm boxes are conspicuous, unobstructed, and accessible.				
2.4 The operable part of manual fire alarm boxes is readily access able and obviously visible but not higher than 1.3 m or required by local code.					

FA-03	Audible notifications			
	3.1 There are sufficient audio alarm points such as alarm horn, bells, public announcement. Audibility of public mode in all work places is at least 15 dB above ambient sound level, at least 75 dB at pillow in bedroom or required by local code.			
	3.2 Alarm sounders are distinctive from other sound signals used for other purposes in the building. They should also override other sound systems or background music.			
	3.3 If an average ambient sound level is greater than 95 dB, visible notification is required instead.			
	3.4 Sound pressure level in a space is not more than 110 dBA.			
	3.5 Alarm signal are repeated at least 3 times for a period appropriate for the evacuation purpose, but not less than 60 seconds or required by local code.			
	3.6 There is a coordination or synchronization of the audible signals within notification zones.			
3.7 The announcement or emergency records are addressed in languages understood by all workers/occupants.				
FA-04	Visual notifications			
	4.1 Lights provided as alarm signal for all occupants in various workplaces are visible and clear.			
	4.2 Visible notification devices are located not more than 4.5 m from the end of the corridor and not greater than 30 m between devices in the corridor.			
4.3 Notification devices is working by observing blinking light.				
FA-05	Proper power backup			
	5.1 Battery backup are installed at appropriate location.			
	5.2 Duration for battery backup is not less than 15 minutes in general alarm mode for the whole building.			
5.3 The testing is required by turning off the normal ac power supply to FCP and operating the fire alarm system under battery backup.				
FA-06	Proper time & sequence			
	6.1 Upon activation of manual alarm, heat detector or sprinkler flow switch, notification devices at the fire zone shall immediately activate.			
	6.2 Only smoke detector notification can be delayed for confirmation by a responsible person before activating alarm devices.			
6.3 Fire alarm input and output matrix with time delay and sequence are coincided with the ERPs.				

FA-07	Proper system integrity				
	7.1 Fire control panel shows "system normal" with only green lights.				
	7.2 Displayed zone and/or address at fire alarm control panel is correct.				
	7.3 System testing is required with correct records of the address or zone displayed. and operational of other building systems; such as automatic lift recall, unlock door, shut down AHU, start pressurized fan, etc.				
FA-08	Regular testing				
	8.1 Detector(s), alarm device(s) and manual fire alarm device(s) are annually tested i.e. 100% test or every single device with correct records of the address or zone displayed. and operational of other building systems; such as automatic lift recall, unlock door, shut down AHU, start pressurized fan, etc.				
	8.2 System performance testing is quarterly conducted both under normal power supply and battery backup power.				
	8.3 Battery backup system is monthly tested.				
	8.4 Testing results are acknowledged by the management.				
FA-09	Regular inspection				
	9.1 Visual inspection is monthly conducted throughout the building with results recorded by a responsible person.				
	9.2 Inspection results are acknowledged by the management.				
FA-10	Regular maintenance				
	10.1 No trouble signals shown as result of short circuits, open circuits, control panel fault, missing detectors, battery failure etc. at the fire control panel.				
	10.2 No alarm signals shown as a result of detectors or sprinkler flow switch falsely initiated without an actual fire incident,				
	10.3 Regularly update fire detection and alarm system and equipment drawings/diagrams once something is changed.				
	10.4 The records of maintenance, adjusting, resetting, cleaning and replacement are acknowledged by the management.				
Total		10	41		0

SECTION 2.8 FIRE EXTINGUISHING SYSTEMS

In the event of emergency or fire, the fire extinguishing systems both automatic and manual means are ready to use for extinguish or control the fire spread. This is defined as an active fire protection system which is required proper inspection, maintenance and testing regularly as required by local code or recognized standard, to ensure that it can be operated in the event of fire at any times. The systems and equipment following are included; automatic water sprinkler system, fire hose, fire extinguisher, fire pump, automation fire suppression system, etc.

Deficiencies including sprinkler painted, deflector damaged, system abnormal at fire pump controller display, no system pressure, valve closed, no regularly testing are found; inspector should be just noted and comments.

SECTION 2.8 FIRE EXTINGUISHING SYSTEMS					
Topic	FEATURES	Yes	No	comments	Score
FS-01	Automatic fire sprinklers (in building height 23 meter or more)				
	1.1 All sprinklers are the correct type for their hazard application or occupancy,				
	1.2 Stockpiles of combustibles are located within occupancy areas limited to appropriate heights in storage warehouse or industrial occupancy.				
	1.3 All dedicated storage areas are protected in accordance with the proper storage configuration and commodity classification in storage warehouse or industrial occupancy.				
	1.4 The storage or use of flammable or combustible liquids, aerosol products in any area properly identified and managed.				
	1.5 Water density per area and required pressure are determined by hydraulic calculation or pipe schedule method.				
	1.6 Temperature-rated sprinklers with 67°C (Red) are installed on the ceiling throughout the entire building (except when ceiling temperature is more than 38°C).				
	1.7 Where ceiling temperature exceeds 38°C (100°F) or special conditions exist, then intermediate or high temperature-rated sprinklers are used.				
	1.8 Sprinkler coverage is appropriate depending on hazard classification, but maximum distance between sprinklers is not more than 4.5 m for light or ordinary hazard. Extra hazard or higher must comply local code and standard requirements.				

	1.9 There is no paint, any spider web, dust, fiber, or other substances on sprinklers.				
	1.10 There are no obstructions to sprinklers such as storage rack, façade, beam or truss.				
	1.11 There is no perceivable sign of corrosions on sprinkler heads and piping.				
	1.12 Sprinklers are installed in concealed spaces where combustible materials are present; such as thermoplastic insulation, wood stud for ceiling or roof structure, etc.				
	1.13 There is a test drain of zone sprinkler systems and test station at the most remote location which are quarterly tested by activating sprinkler flow switch. The signal is monitored and linked to fire alarm control panel at the fire command center or building control room. The test initiates general alarm immediately.				
	1.14 There are flush connection at every cross main end.				
	1.15 There are appropriate system pressure at main supply line and most remote location.				
FS-02	Sprinkler water flow switches (in building height 23 meter or more)				
	2.1 There is one sprinkler water flow switch for each zone which is linked to building fire alarm control panel.				
	2.2 There is a test drain valve used to test the sprinkler water flow switch for each zone				
	2.3 There is a tag to indicate the sprinkler zone number and name.				
	2.4 The water flow switches are quarterly tested.				
FS-03	Valves are open to deliver the fire water				
	3.1 Control valves are always fully open to deliver the fire water from water tank to automatic sprinklers and fire hose.				
	3.2 Control valves are unobstructed and readily accessible without using a ladder.				
	3.3 There is one control valve for each zone or any dedicated sprinkler system.				
	3.4 There is a supervisory switch to monitor the control valve status, indicating close or open and interconnecting to building fire alarm control panel.				
	3.5 There is a tag to indicate the control valve number and zone name.				
	3.6 The supervisory switch is quarterly tested.				

FS-04	System pressure				
	4.1 Pressure gauge reading, the system pressure at fire pump and the system pressure at the most remote location are maintained in accordance with the design.				
	4.2 Normal, cut in and cut off pressure are tagged and shown at pressure gauge.				
	4.3 All pressure gauges are regularly calibrated by certified laboratory.				
FS-05	Manual fire hose				
	5.1 Fire hose cabinets are conspicuous, unobstructed, and accessible.				
	5.2 There is no water leakage found at all connections.				
	5.3 Hose valve can be open and close easily.				
	5.4 There is a tag to indicate the hose number and zone name.				
	5.5 There is an instruction for using the hose.				
	5.6 Fire hoses are inspected every month and hydraulically tested every 5 years.				
FS-06	Fire extinguisher				
	6.1 Fire extinguishers are conspicuous, unobstructed, and accessible.				
	6.2 Fire extinguishers are installed in all area of premises with appropriate class (A/B/C/D/K) depending on fire load in the area.				
	6.3 Fire extinguishers fire rating depends on fire loads or local code, but not less than 6A:20B with at least 4.5 kilogram.				
	6.4 Fire extinguishers are inspected every month and hydraulically tested every 5 years				
FS-07	Fire pump station (in building height 23 meter or more)				
	7.1 fire pump controller indicates normal condition without trouble signals.				
	7.2 Operation mode is switched to automatic mode.				
	7.3 Diesel fire pump is equipped with fuel day tank with at least 3/4 of tank capacity and there is a secondary containment.				
	7.4 Fire water is fully stored in the water storage tank with proper water level indicator indicating a sufficient level of fire water.				
	7.5 Pressure sensing lines do not have valves. If there are valves, they must always be open and ready checked for water pressure change.				
	7.6 Fire pump performance test is annually conducted.				

	7.7 The record of fire pump test and maintenance are regularly reviewed.				
FS-08	Automatic fire suppression system (in lieu of automatic fire sprinkler system)				
	8.1 Warning signs can be seen at every entrance and all working spaces. The signs are clearly written and posted "Suppression agent by total flooding-danger to life if exposure time is longer than maximum allowable limit".				
	8.2 The suppression smoke detectors with the second cross-zone method are distinguished from building detectors and audible/visible alarm shall be different from building fire alarm.				
	8.3 Manual agent discharge and abort switch are installed near every exit and conspicuous, unobstructed, and accessible.				
	8.4 Access control door locks are automatically unlocked once the first suppression detector activated or manual door release switch. The manual door release(s) are located near every exit on egress side.				
	8.5 Fire suppression control panel are coded, monitored and linked to building fire alarm control panel at fire command center or building control room.				
	8.6 Room fan test is annually conducted for room integrity or air leakage.				
	8.7 System performance test is annually conducted.				
	8.8 The record of fire suppression system test and maintenance are regularly reviewed.				
FS-09	Kitchen hood and duct fire suppression system				
	9.1 Manual agent discharge are installed near every exit, conspicuous, unobstructed, and accessible.				
	9.2 Once agent is discharged, the LPG shut off valve or electric power supply is automatically turned off.				
	9.3 Nozzles are properly equipped with rubber cap and aimed toward kitchen equipment.				
	9.4 Access control door locks are automatically unlocked once the first suppression detector activated or manual door release is broken. The manual door release(s) are located near every exit on egress side.				
	9.5 Fire suppression control panel are coded, monitored and linked to building fire alarm control panel at fire command center or building control room.				
	9.7 System performance test is annually conducted.				

	9.8 The record of fire suppression system test and maintenance are regularly reviewed.				
FS-10	Regular testing				
	10.1 Testing based on guideline of each system are conducted by a qualified and responsible person.				
	10.2 Testing results are acknowledged by the management.				
FS-11	Regular inspection				
	11.1 Visual inspection is monthly conducted throughout the building. The results are recorded by a responsible person.				
	11.2 Inspection results are acknowledged by management				
FS-12	Regular maintenance				
	12.1 No trouble signals shown as a result of overheating, low oil pressure, battery failure at fire pump controller etc.				
	12.2 No trouble signals shown as a result of short circuits, open circuits, control panel fault, missing detector, battery failure at fire suppression control panel.				
	12.3 Regularly update fire protection system & equipment drawings and diagrams once something is changed.				
	12.4 The records of maintenance, adjusting, resetting, cleaning and replacement are acknowledged by the management.				
Total		12	69		0

SECTION 2.9 SMOKE CONTROL SYSTEM

In the event of emergency or fire, the smoke control system both automatic and manual, either natural or mechanical means are able to prevent smoke spread into exit stair enclosure, fireman lift lobby or similar smokeproof enclosure as required by local code. The other feature is to extract the amount of smoke at top of high ceiling spaces or atriums. As results of increasing available time for evacuation before reaching the untenable conditions on the way out. This can help firemen reaching the base of fire quickly. However, the smoke control system has both advantage and disadvantage, which can increase sprinkler actuation time during smoke exhausting at ceiling. In circumstances, they may introduce large amount of oxygen into base of fire. Therefore, manual mean to turn on or off and appropriate emergency response plan with well-trained staffs are always crucial.

This is defined as an active fire protection system which is required proper inspection, maintenance and testing regularly, to ensure that it can be operated in the event of fire at any times.

SECTION 2.9 SMOKE CONTROL SYSTEM					
Topic	FEATURES	Yes	No	comments	Score
SC-01	Smoke control in exit stair: pressurized system or natural venting				
	1.1 The protected area such as stairwell and smoke-proof lobby maintain differential pressure not less than what is required by local code and standard.				
	1.2 During pressurization, there is a means to relief air pressure in order to maintain force to open a door, i.e. not more than 133 N or required by local code.				
	1.3 All doors in enclosure are properly close and latched during pressurization.				
	1.4 Pressurized system can be activated automatically and manually.				
	1.5 Manual switches are allocated at fan control panel and at fire command center or building control room.				
	1.6 System integrity and operation sequence is monthly tested under both normal and emergency power supply.				
	1.7 In case of natural venting option, each floor shall have wall opening at least 1.5 sq.m. or required by local code.				
SC-02	Smoke control in atrium				
	2.1 The protected area such as atrium can maintain smoke interface layer to prevent smoke hazard.				
	2.2 Extraction system can be operated automatically and manually.				

	2.3 Make up air is properly introduced to fire zone at the lowest level of the atrium.				
	2.4 Numbers of smoke inlets and spacing including depth of smoke layer can prevent plug-holing.				
	2.5 Manual switches are allocated at fan control panel and at fire command center or building control room.				
	2.6 System integrity and operation sequence is monthly tested under both normal and emergency power supply.				
SC-03	Electrical power backup <u>for mechanical fans and control devices</u>				
	3.1 Cables for power supply for the fan(s) are fire resistant cables.				
	3.2 Smoke control fan(s) are served with two power sources by connecting to an emergency standby generator.				
SC-04	Regular testing				
	4.1 Testing based on guideline of each system are conducted by a qualified and responsible person.				
	4.2 Testing results are acknowledged by the management.				
SC-05	Regular inspection				
	5.1 Visual inspection is monthly conducted throughout the building. The results are recorded by a responsible person.				
	5.2 Inspection results are acknowledged by the management				
SC-06	Regular maintenance				
	6.1 Regularly update smoke control system & equipment drawings and diagrams once something is changed.				
	6.2 The records of maintenance, adjusting, resetting, cleaning and replacement are acknowledged by the management				
Total		6	21		0

RESULT

In Section 2.2 to Section 2.9, each feature score will be filled in this below result table. If the total score equal to 80 or more, that considered "Pass". Others are "Fail" including any one feature is scored "0". For the features are not found and not required in the building or not applicable for inspection, the full score will be deducted by 3 for each.

FEATURES		FACTOR	NO. OF FEATURES	SUB. FEATURES	SECTION FULL	SECTION SCORE	NET SCORE
FM	FIRE SAFETY MANAGEMENT	25%	15	62	45		
MC	MATERIAL CONTROL	15%	4	11	12		
EP	EXTERIOR PLANING	5%	6	16	18		
ES	EXIT STAIR	15%	12	48	36		
EW	EXIT WAY	10%	11	34	33		
FR	FIRE RESISTING WALL & FLOOR	5%	4	15	12		
FA	FIRE ALARM SYSTEM	10%	10	41	30		
FS	FIRE EXTINGUISHING SYSTEM	10%	12	69	36		
SC	SMOKE CONTROL SYSTEM	5%	6	21	18		
TOTAL SCORE		100%	80	317	240		

Note: Net score results for each feature are multiplied by weighting factor.

Inspector signed: _____

Inspector name: _____

Building signature: _____

Building name: _____

Date: _____