Fire Protection Systems
(Inspection & Testing)
SCOPE OF PRESENTATION

• Present System for FC
• FC Application
• Systems to be checked by FSM/Owner
• Systems to be checked by PE
• Four Categories of Fire Safety Inspections
• Fire Protection Systems
• Sequence of Tests
PRESENT SYSTEM FOR FC

- Effective date of first (1st) FC:
  - 12 months after TFP/FSC whichever is first obtained

- When should the owner or occupier apply for a Fire Certificate?
  - 10 months after TFP/FSC
  - 2 months before expiry of FC
FIRE CERTIFICATE APPLICATION

• Submission for application for FC
  – Form (FSSD FC01) Application
  – Form (FSSD FC02) Certificate of Maintenance
  – Form (FSSD FC03) Inspection report by the Fire Safety Manager (FSM) / Building Owner
  – Application fee

• Introduction of Form FSSD FC 03 (Inspection report by the FSM/Owner)

• Additional System to be tested and certified by Professional Engineer (PE)
FLOW CHART FOR APPLICATION OF FIRE CERTIFICATE

START

APPLICATION

Documents* submitted
Form FSSD FC 01
Form FSSD FC 02
Form FSSD FC 03
Prescribed Fee

Enforcement Action

Yes

Check document

In Order

Audit Check

Issue FC

Recommend for Fire Certificate

Yes

Inspection

Not In Order

WD to owner to rectify irregularities

Not In Order

Re-inspection

Enforcement Action

In Order

WD to owner

Documents *
FC 01 – Application form for FC
FC 02 – Certificate of Maintenance
FC 03 – Fire Safety Manager’s inspection report.
SYSTEMS TO BE CHECKED BY FSM/OWNER

- Hosereel system (without pump)
- Portable fire extinguisher
- Manual fire alarm system
- Emergency lighting (self-contained battery type)
- Illuminated exit sign (self-contained battery type)
- Fire door and exit door
- Riser ducts
- Staircase and passageway
- Standard stairway signage
SYSTEMS TO BE CHECKED BY PROFESSIONAL ENGINEERS

- Dry riser system
- Lift system
- Emergency lighting (linked to standby generator)
- Illuminated exit sign (linked to standby generator)
- Voice communication system (1 way or 2 way)
- Wet riser system
- Automatic sprinkler system
- Automatic fire alarm system
- Standby generator power supply
SYSTEMS TO BE CHECKED BY PROFESSIONAL ENGINEERS

• Atrium smoke control system
• Engineered smoke control system
• Pressurisation staircase
• Carpark smoke exhaust system
• Air-conditioning system
• Fire damper
• Hosereel system (with pump)
CODE OF PRACTICE
SINGAPORE STANDARD

- SS550 - Lifts
- CP 10 - Fire alarm system
- CP 13 - MV & A/C conditioning
- SS 563 - Emergency lighting
- SS 546 - Voice communication system
- SS 575 - Fire hydrant/dry riser/wet riser system
- CP 52 - Automatic sprinkler system
- SS 578 - Portable fire extinguisher
- SS 532 - Storage of flammable materials
- SS 333 - Fire damper
- SS 332 - Fire door
FOUR CATEGORIES OF FIRE SAFETY INSPECTIONS

1. General building works
2. Building services check and operational tests
3. MV/AC system check & operational tests
4. Fire protection check and tests
GENERAL BUILDING WORKS

• Corridors/lobbies/staircases
• Escape routes
• Fire doors
• Exit doors
• Duct risers
• Miscellaneous
BUILDING SERVICES

• Lifts
• Emergency exit sign and lighting
• Voice communication system
MV/AIR-CONDITIONING SYSTEM

- Basement carpark
- Pressurisation system
- Atrium smoke control system
- Air handling unit
FIRE PROTECTION SYSTEMS

• Wet riser
• Dry riser
• Sprinkler
• Fire alarm
• Hosereel
• Fire extinguisher
• Fire hydrant
RISING MAINS

- Dry riser (>10m TO 60m)
- Wet riser (>60M)
WET RISER SYSTEM
PHYSICAL CHECKS

• Breeching inlet
  – Clear of obstruction
  – Housed in protective enclosure
  – Labelled “Wet Riser Breeching Inlet”
  – About 0.76m above surrounding road/pavement level
  – Rigidly supported
  – Blank caps provided
  – Painted red
WET RISER SYSTEM
PHYSICAL CHECKS

- Riser
  - Direction of water flow indicated
  - Pipe size in order (min 150mm dia.)
  - Earthing provided
  - Not passing through unprotected area (fire rated)
  - Air release valve provided
WET RISER SYSTEM
PHYSICAL CHECKS

• Landing valves
  – Labelled “Wet Riser Outlet” (red)
  – Numbering tallies with actual inlet
  – Pressure reducing valve provided
  – Clear of obstruction
  – Blank cap provided
  – 0.76m to 1m above finished floor level
  – Strapped and padlocked in closed in position
  – Condition of handwheel
FIRE PUMPS

- Auto start of duty pump
- Auto changeover from PUB to secondary power supply
- Auto changeover from duty to standby pump
- All pumps can start manually
FIRE PUMPS

- Duty pump and standby pump
- All valves to pumps kept strapped & padlocked in appropriate position
- Pumps are differentiated
- Pump numbering on panel tallies with actual pump
- Pump selector switch on auto position
WET RISER TESTING

• Static pressure shall not exceed 7 bars

• Running pressure 3.5 to 5.5 bars

• Flow rate :
  – 27 l/s (residential)
  – 38 l/s (non-residential)
We Set the Standards

DRY RISER SYSTEM

• Breeching inlet – painted yellow
• Riser Landing valves – painted yellow
• Hydrostatic pressure test:
  – 13.8 bars (200psi) for 2 hrs
• Air release valve functioning
SPRINKLER SYSTEM

• Breeching Inlet
  – Similar check as detailed for wet/dry riser
  – Labelled “Sprinkler Breeching Inlet”

• Control valves
  – Labelled to indicate storey served
  – Enclosure labelled
  – Strapped & padlocked in open position
SPRINKLER SYSTEM

• Sprinkler head not obstructed or painted over.
• Protecting guard is not damage.
SPRINKLER PUMP

• Similar check/test as detailed for wet riser

• Water proving test
  – Flowrate/running pressure
ACTIVATION TEST (Sprinkler Bursting)

• 2 or more sprinkler heads at the most remote or next convenient point is burst to ensure
• Sprinkler head is operational
• Water spray pattern acceptable
• Overlapping of sprinkler discharge
• Sprinkler water gong activated
• General sounding of alarm system
• Alarm signal correctly received at sub/main panels
• Alarm signal sent to Decam
SPRINKLER

• Drain Test
  – Cut-in pressure not less than 80% of running pressure

• Flow switch test
  – Signal received at fire alarm panel
  – Gong activated
  – General sounding
FIRE ALARM SYSTEM

• Manual fire alarm

• Automatic fire alarm
MANUAL FIRE ALARM

• General
  – Call point – not obstructed
  – Call point located 1.4m
  – Zoning diagram next to fire panel
  – Break-glass call-point provided with activation mode
MANUAL FIRE ALARM

• Test on call-point
  – Alarm bells in operational condition
  – General sounding throughout the building
  – Zone testing correctly indicated on sub/main panels
  – Fire alarm sounding is distinguishable

• Test on electrical fault supervision
  – Zone tested correctly registered on sub/main panel
  – Audible fault alarm & fault indication light on sub/main panel

We Set the Standards
AUTOMATIC FIRE ALARM
(HEAT/SMOKE DETECTOR)

• General
  – Sufficient coverage especially with regard to new partition works
  – Detector points are not obstructed & free from painting

• Test on detector point (by heat induction/smoke injection)

• Test on electrical supervision (simulation of fault in detector point)
HOSE REEL

• General
  – Nozzle condition satisfactory
  – Stopcock condition satisfactory
  – Clear of obstruction
  – Labelling provided for cabinet
  – Length of hose not more than 30m
We Set the Standards

HOSE REEL

• Test on hosereel
  – 6m horizontal throw
  – No leakage

• Test on hosereel booster pump
  – Auto cut-in/cut-off of pumps when hosereel is operating/pressure is re-established
  – Auto changeover from duty to standby pump
PORTABLE FIRE EXTINGUISHER

- Properly hung on bracket
- Date of service
- Clear of obstruction
- Bear PSB/SISIR label
FIRE HYDRANT

• Clear of obstruction
• Cover for spindle chamber visible
• Blank caps provided to outlets
• Test for sufficient water supply
• 100mm thick yellow band around private fire hydrant
SEQUENCE OF TESTS
PHASE I - FIRE ALARM ACTIVATION

Inform fire alarm monitoring company (DECAM)

Ensure all lighting, mechanical ventilation systems & building services to be operating under normal condition

Activated fire alarm

Check
a. Signal to FIB
b. Signal to Decam

test/witness
a. Lift homing
b. Auto-sliding door
c. Smoke extract system
d. Atrium system
e. Pressurisation system
f. Magnetic door
We Set the Standards

PHASE II - POWER FAILURE CONDITION DURING FIRE ALARM ACTIVATION

Reset fire alarm system, lift, auto-sliding and magnetic door

By-pass alarm signal to lift

Activate all fire pumps (wet riser, ring main, sprinkler, fire hosereel systems)

Activate fire alarm

Trip normal power supply

Test/witness
a. Lift homing
b. Auto-sliding & magnetic door
c. Exit sign & lighting
d. Atrium system
e. Ring main system

f. Smoke extract system
g. Pressurisation system
h. Sprinkler pump
i. Mechanical ventilation to smoke stop lobby and corridor

38
PHASE III - INDIVIDUAL SYSTEM

Restore normal power

Reset all systems

By-pass lifts

Check
a. Fire alarm main & sub panel
b. Exit & directional sign

test
a. Detectors
b. Manual call points
c. Fire hosereel
d. Smoke cut-off switch in AHU
e. Fire pump (sprinkler/ring main system)
f. Diesel pump (fire)
g. Sprinkler control valves (water proving test)
h. Pressurisation staircase (air velocity test)
i. Private fire hydrant
Thank you!