

# Fire Protection Systems (Inspection & Testing)



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# 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

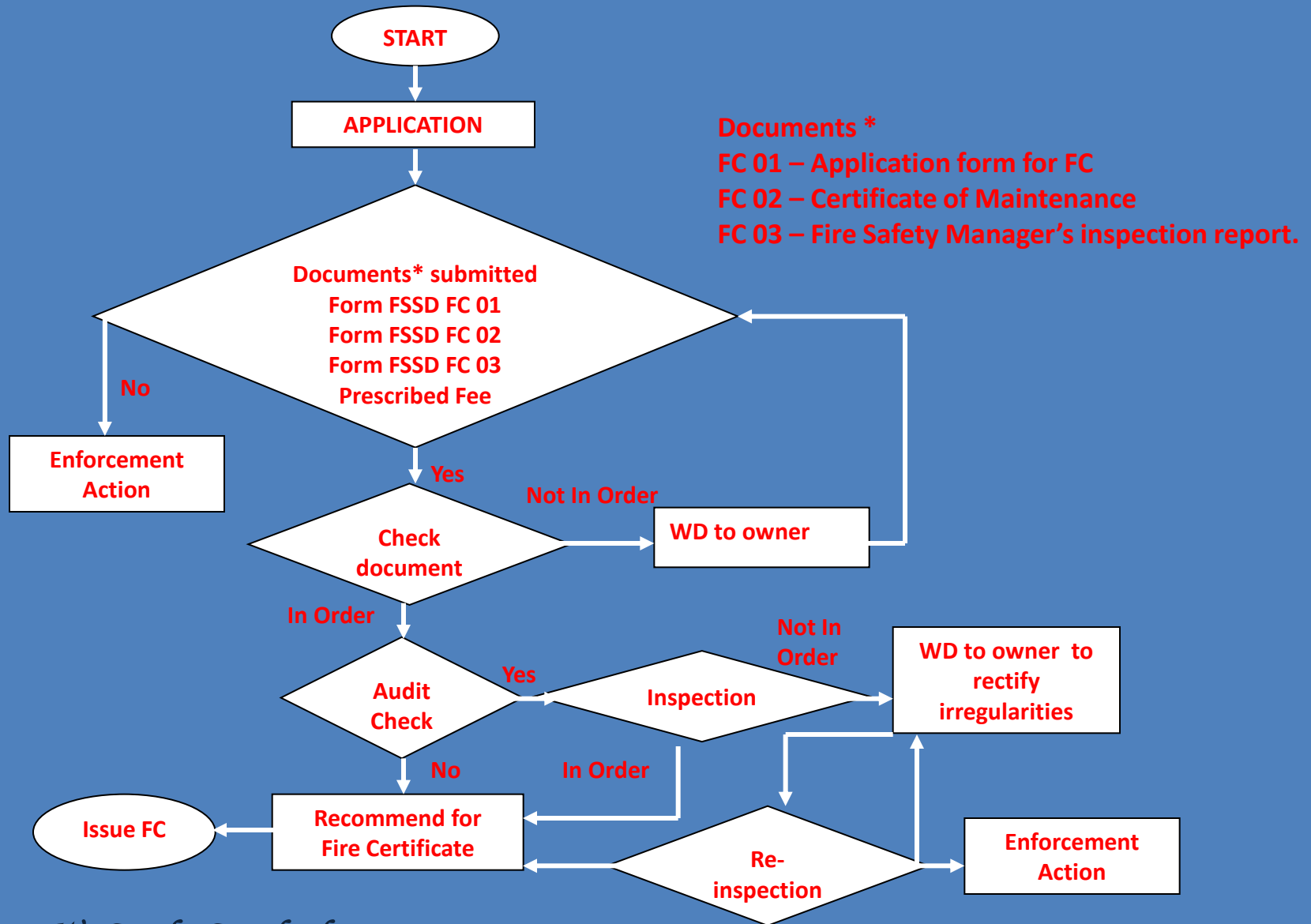
- ❑ Effective date of first (1<sup>st</sup>) FC :
  - 12 months after TFP/FSC whichever is first obtained
  
- ❑ When should the owner or occupier apply for a Fire Certificate?
  - 10 months after TFP/FSC
  - 2 months before expiry of FC

# 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



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# 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

- Breaching inlet
  - Clear of obstruction
  - Housed in protective enclosure
  - Labelled “Wet Riser Breaching Inlet”
  - About 0.76m above surrounding road/pavement level
  - Rigidly supported
  - Blank caps provided
  - Painted red





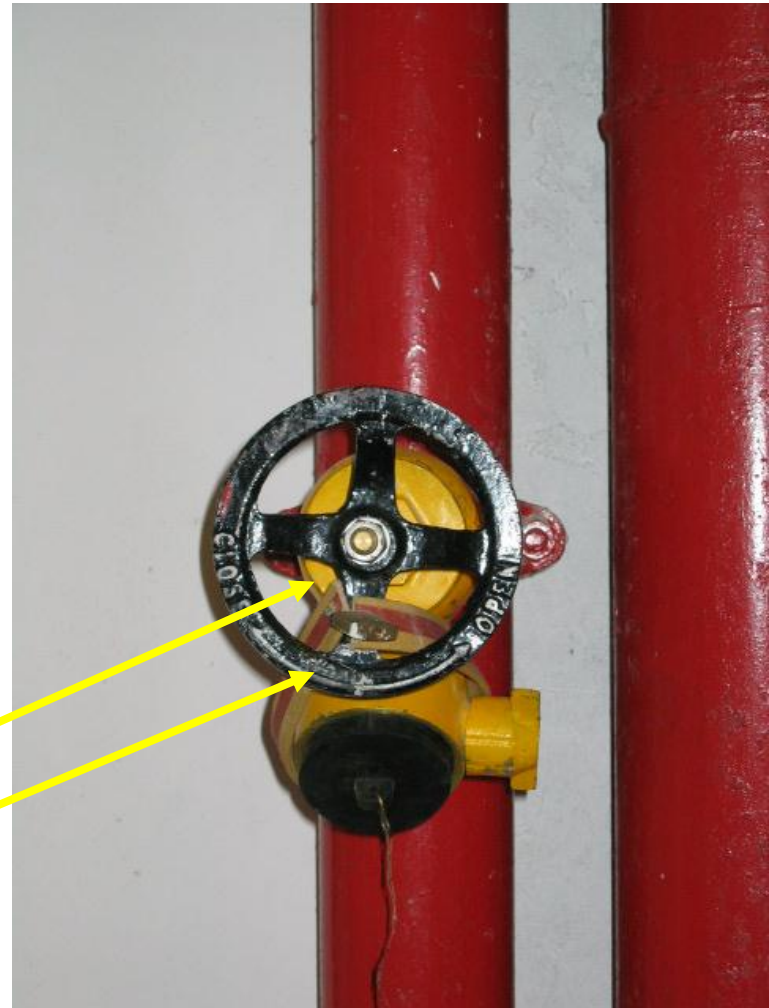
# WET RISER SYSTEM PHYSICAL CHECKS

- 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



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# 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)



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# 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



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# 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)



# HOSEREEL

- General
  - Nozzle condition satisfactory
  - Stopcock condition satisfactory
  - Clear of obstruction
  - Labelling provided for cabinet
  - Length of hose not more than 30m





# HOSEREEL

- 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

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# FIRE HYDRANT



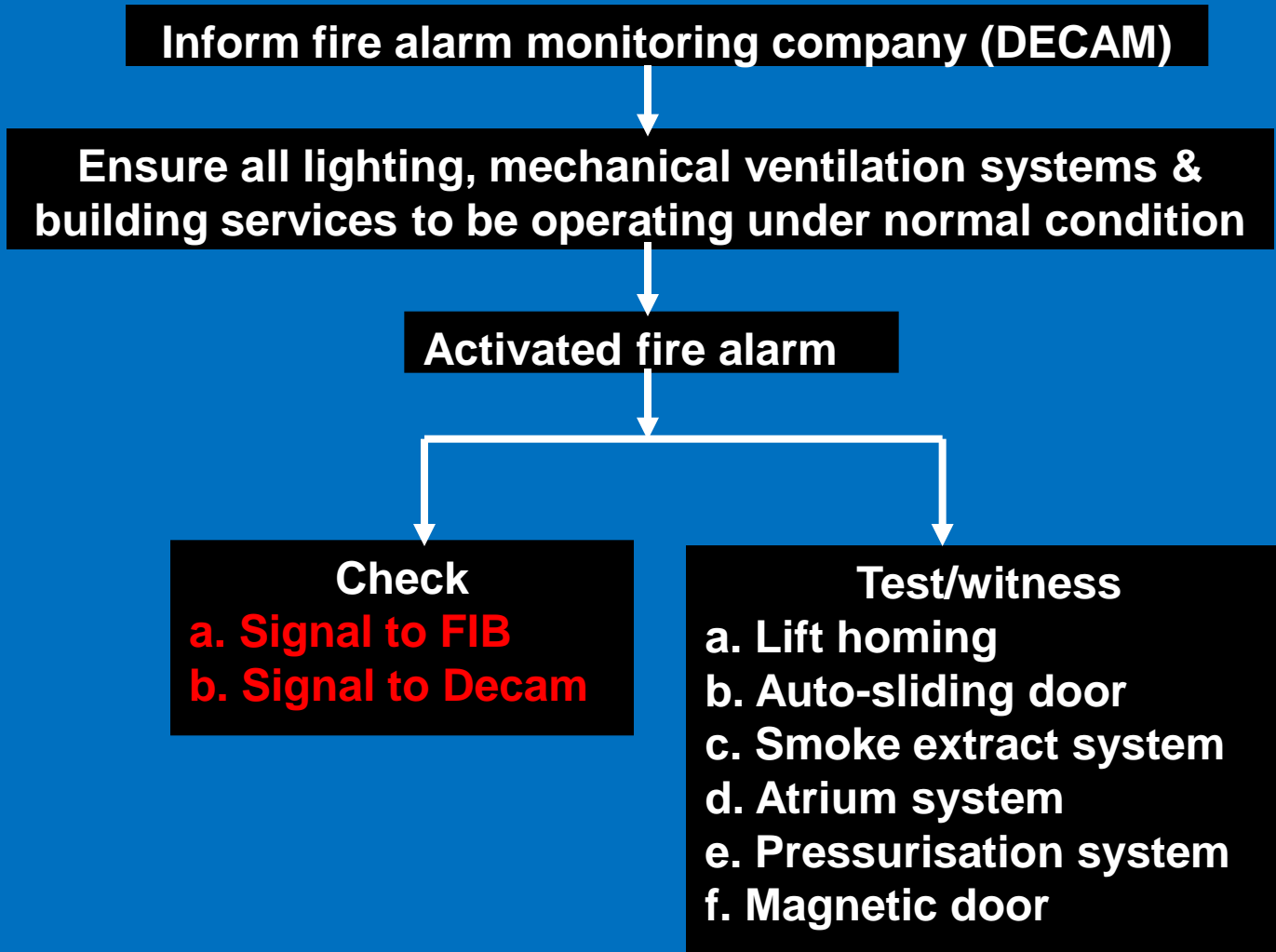
- Clear of obstruction
- Cover for spindle chamber visible
- Blank caps provided to outlets
- Test for sufficient water supply
- 100mm thick yellow band around private fire hydrant

# SEQUENCE OF TESTS



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# PHASE I - FIRE ALARM ACTIVATION



# 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 hose reel systems)

Activate fire alarm

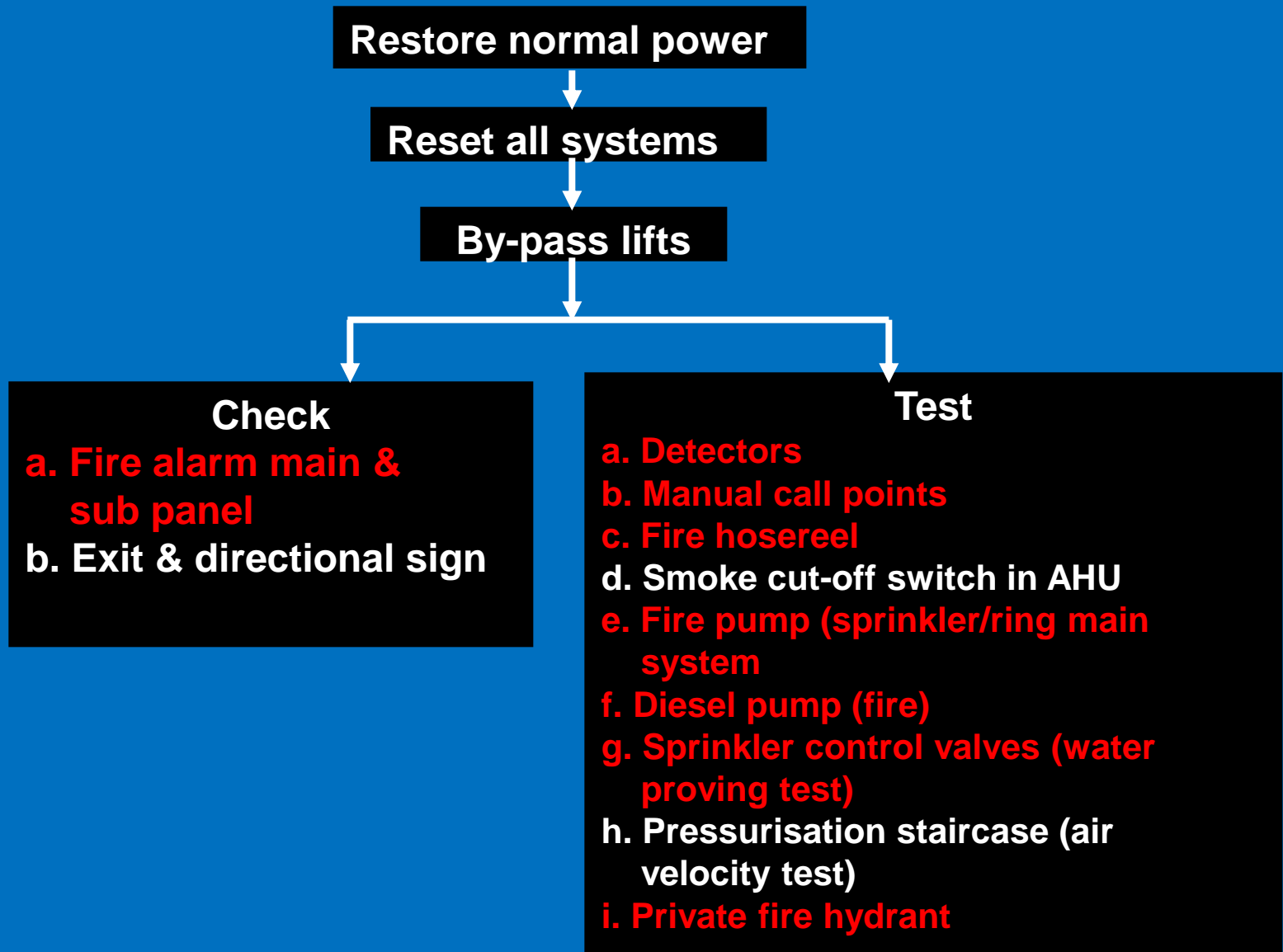
Trip normal power supply

## 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

# PHASE III - INDIVIDUAL SYSTEM



# Thank you!



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