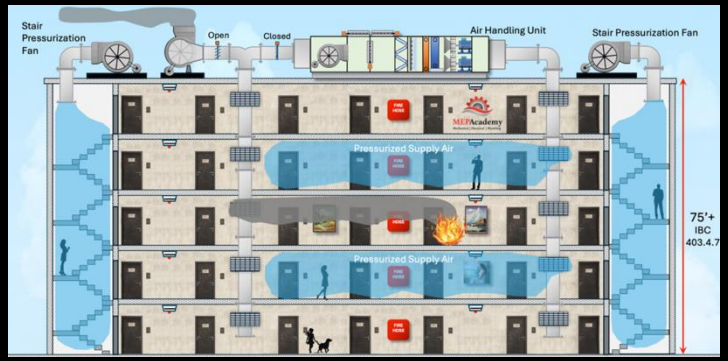
# Maintaining Smoke Control Systems: Mechanical Fire Safety in Buildings

# Fire Dampers – Smoke Dampers – Air Dampers


Dedicated System




Multi-Purpose System

- All components of an overall system
- Identification of the dampers function is critical

# Damper Types – Mechanical Curtain Type

Typical operation @ 71º c

- Fire operational position - closed
- Installed to manufacturer’s installation instructions and / or AS1682.2 – 2015
- Maintenance to AS1851 -2012 table 13.4.1.4 for maintenance tasks
- AS1851 – Appendix H – information relating to: - documentation, records reports and skill associated with servicing

# Damper Types – Intumescent Type

Typical operation 180° c

- Fire operational position closed
- Installed to manufacturer's installation instructions and / or AS1682.2 – 2015
- Maintenance to AS1851 -2012 table 13.4.1.4 for maintenance tasks
- AS1851 – Appendix H – information relating to: - documentation, records, reports and skill associated with servicing

# Damper Types – Mechanical Motorized

Typical operation @ 71º c

- Fire operational position - closed
- Installed to manufacturer’s installation instructions and / or AS1682.2 – 2015
- Maintenance to AS1851 -2012 table 13.4.1.4 for maintenance tasks
- AS1851 – Appendix H – information relating to: - documentation, records, reports and skill associated with servicing

# Damper Types – Smoke Damper

Smoke Damper Steel

Smoke Damper Aluminium

- Fire / smoke operational position - closed
- Installed to manufacturer's installation instructions and / or AS1682.2 – 2015
- Maintenance to AS1851 -2012 table 13.4.1.4 for maintenance tasks
- AS1851 – Appendix H – information relating to: - documentation, records, reports and skill associated with servicing

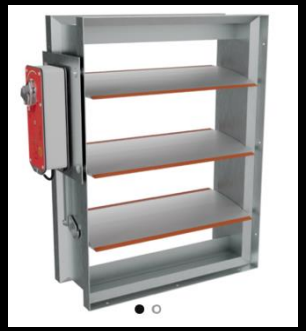
# Damper Types – Mechanical Combination Fire / Smoke

Combined Single unit

Curtain Type with aluminium smoke damper

- Fire operational position - closed
- Installed to manufacturer’s installation instructions and / or AS1682.2 – 2015
- Maintenance to AS1851 -2012 table 13.4.1.4 for maintenance tasks
- AS1851 – Appendix H – information relating to: - documentation, records, reports and skill associated with servicing

# Damper Types – Air Damper



- Fire operational position – Open or closed
- Installed to manufacturer's installation instructions and / or AS1682.2 – 2015
- Maintenance to AS1851 -2012 tables 13.4.1.5, 13.4.1.6, 13.4.1.7 & 13.4.1.8 for maintenance tasks
- AS1851 – Appendix H – information relating to: - documentation, records, reports and skill associated with servicing

# Damper certification and testing -

| Fire | Smoke | Fire / Smoke | Air Damper / Smoke exhaust |
|---|---|---|---|
|  |  |  |  |
| AS1530.4-2014 | AS1530.7-2007 | AS1530.4 / AS1530.7 | AS1682.1-2015 table 2.5 |
| Section 11 for ducted connections and section 10 for air transfer assemblies<br>Performance as per AS1682.1-2015 tables 2.1 & 2.2 | Performance as per AS1682.1-2015 Table 2.4 | Performance as per AS1682.1-2015 Table 2.3 | Performance as per AS1682.1-2015 table 2.5 |

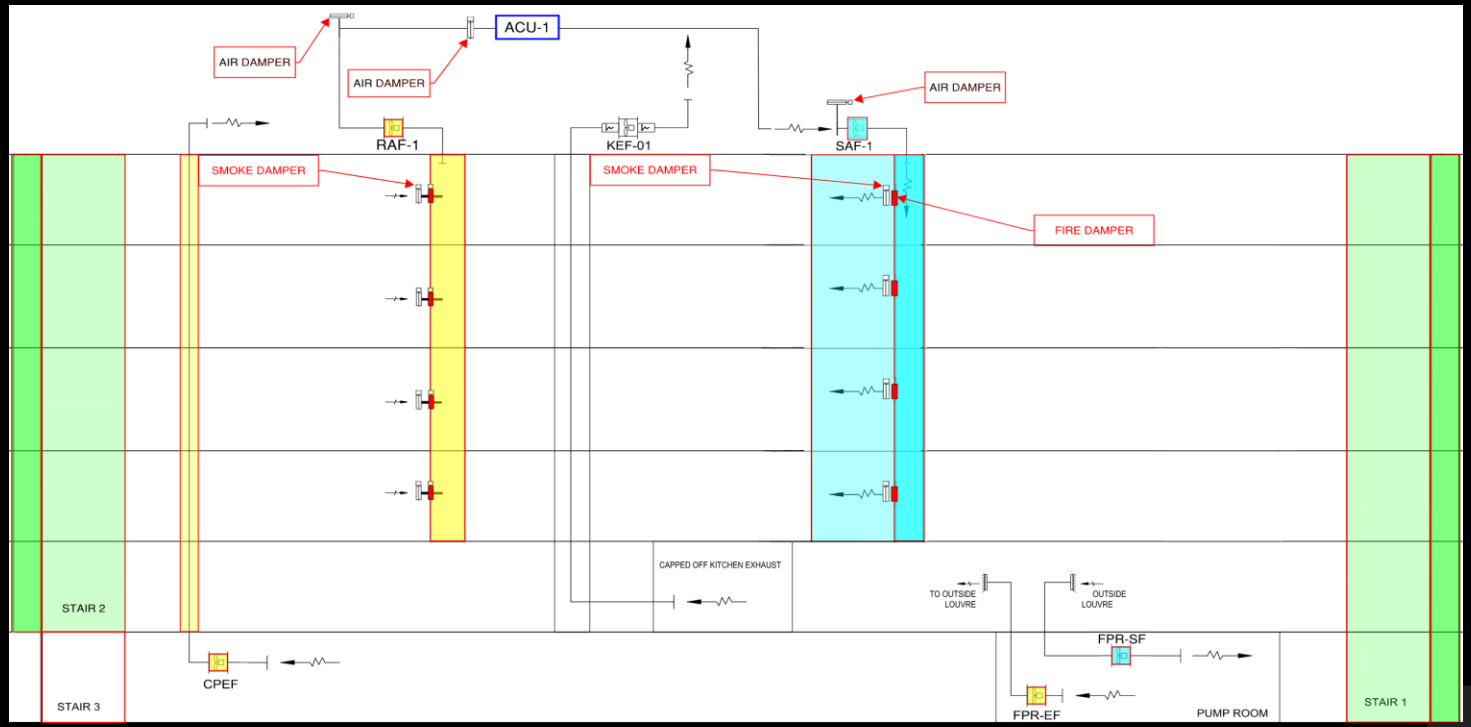
# Common Damper points

- Understand the function of the damper and its function within the system.
- Some air dampers will remain open to create effective smoke clearance.
- Always refer to manufacturer’s data and designers' intent for the system operation.
- When assessing a damper under AS1851-2015 Section 13 it is for a future 5 year period.
- Accurate baseline data is critical.
- Dampers may look the same but perform entirely different functions.

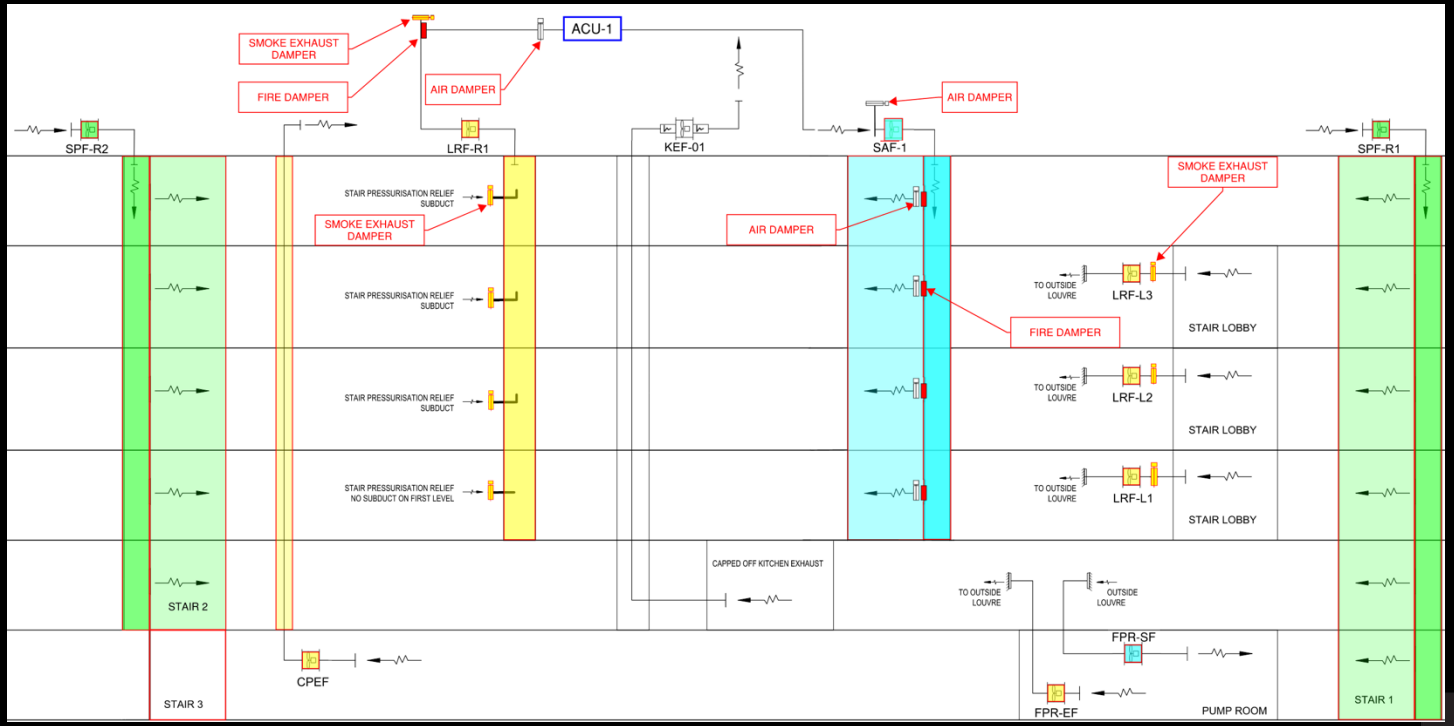
# Fire Dampers – Smoke Dampers – Air Dampers

Questions?

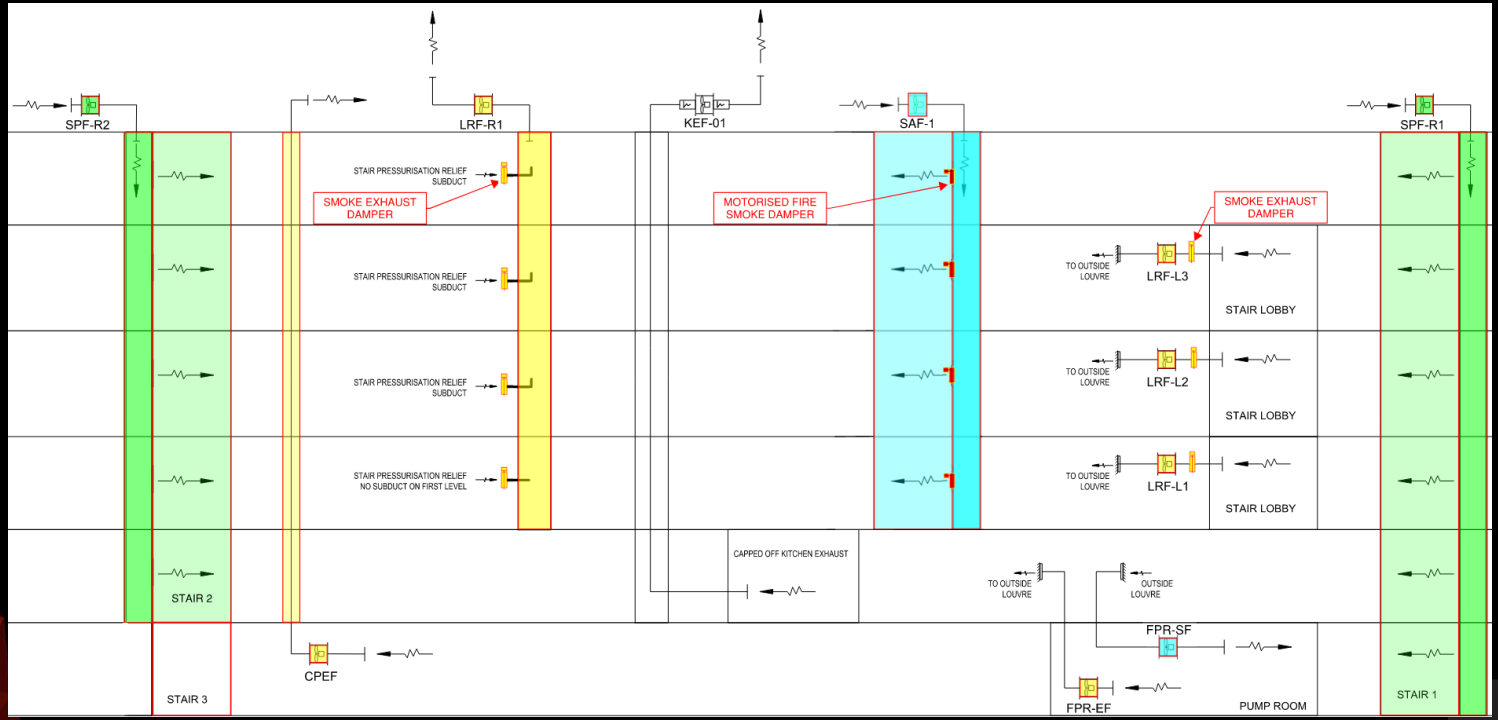
# Typical Damper Locations – Shutdown Systems



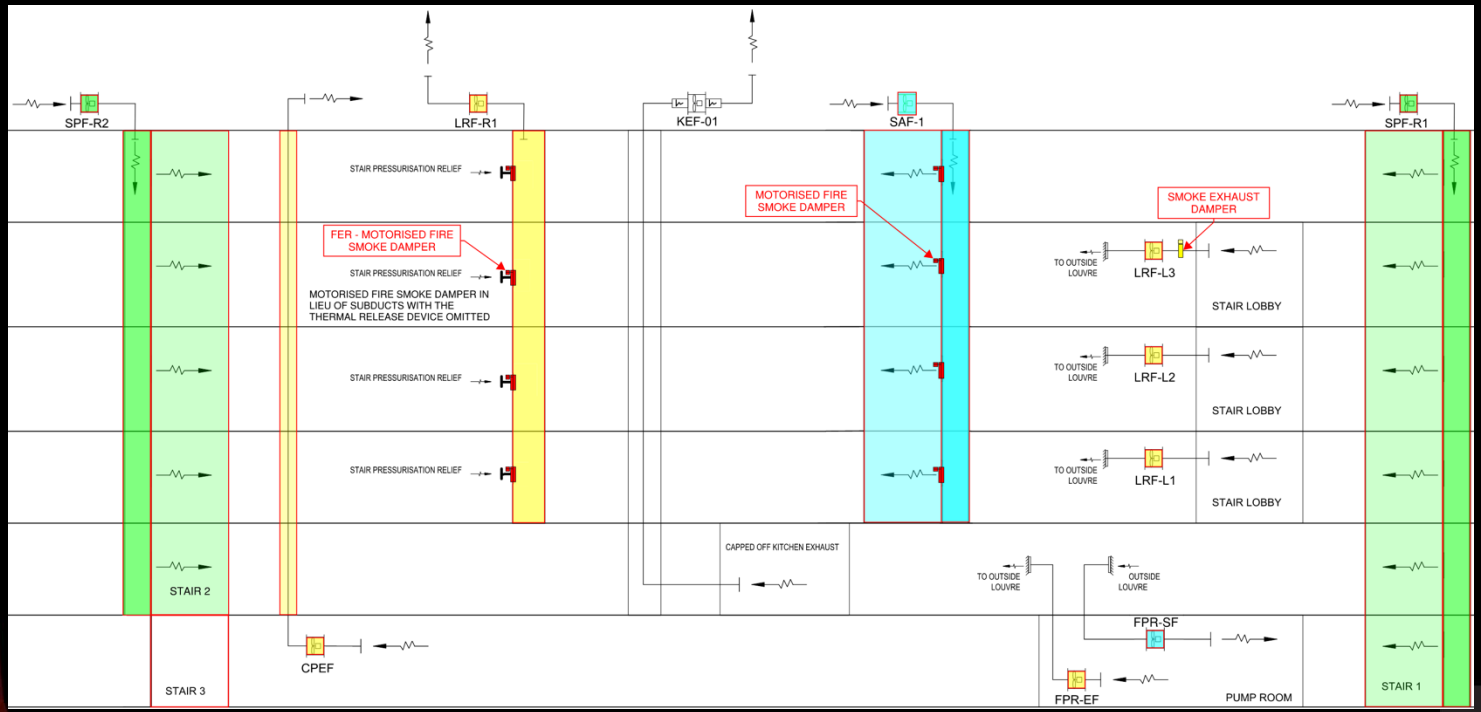
# Typical Damper Locations – DtS Zoned Smoke Control Systems



# Typical Damper Locations – DtS Motorised Fire Smoke Damper



# Typical Damper Locations – FER Motorised Fire Smoke Damper



# Typical Damper Locations

Questions?

# AS1851-2012 Section 13

| 13.4.2 | | Test & records |
|---|---|---|
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |

| 13.4.1 | Freq | Routine Service Schedules |
|---|---|---|
| 13.4.1.1 | A | Records of Service & Inspection |
| 13.4.1.2 | 3M | Fans & motors |
| 13.4.1.3 | A | |
| 13.4.1.4 | A | Fire & Smoke Dampers |
| 13.4.1.5 | 6M | Air Control Dampers (Recycle, Relief, |
| 13.4.1.6 | A | Outdoor Air & Smoke Spill) |
| 13.4.1.7 | 6M | Air Control Dampers (Zone Pressurisation: |
| 13.4.1.8 | A | Supply, Return, & Exhaust Air) |
| 13.4.1.9 | 6M | Automatic Smoke Vents |
| 13.4.1.10 | A | |
| 13.4.1.11 | 6M | Fire & Smoke Curtains |
| 13.4.1.12 | A | |
| 13.4.1.13 | 6M | Motorised Relief Openings, Windows & |
| 13.4.1.14 | A | Shutters |
| 13.4.1.15 | A | Electric Duct Heaters - biennial |
| 13.4.1.16 | M | Kitchen Exhaust Systems - canopy |
| 13.4.1.17 | A | Kitchen Exhaust Systems - entire |
| 13.4.1.18 | M | Outdoor Intakes |
| 13.4.1.19 | A | |
| 13.4.1.20 | 3M | Variable Frequency Inverters/Speed Drives |
| 13.4.1.21 | 6M | |
| 13.4.1.22 | A | |
| 13.4.1.25 | A | Motor Control Centres |
| 13.4.1.26 | A | Main Switchboards (low voltage) |
| *13.4.1.27* | *A* | *FFCP (refer section 6)* |

- Fire Damper
- Smoke Dampers

# AS1851-2012 Section 13

| 13.4.2 | | Test & records |
|---|---|---|
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

| 13.4.1 | Freq | Routine Service Schedules |
|---|---|---|
| 13.4.1.1 | A | Records of Service & Inspection |
| 13.4.1.2 | 3M | Fans & motors |
| 13.4.1.3 | A | |
| 13.4.1.4 | A | Fire & Smoke Dampers |
| 13.4.1.5 | 6M | Air Control Dampers (Recycle, Relief, |
| 13.4.1.6 | A | Outdoor Air & Smoke Spill) |
| 13.4.1.7 | 6M | Air Control Dampers (Zone Pressurisation: |
| 13.4.1.8 | A | Supply, Return, & Exhaust Air) |
| 13.4.1.9 | 6M | Automatic Smoke Vents |
| 13.4.1.10 | A | |
| 13.4.1.11 | 6M | Fire & Smoke Curtains |
| 13.4.1.12 | A | |
| 13.4.1.13 | 6M | Motorised Relief Openings, Windows & |
| 13.4.1.14 | A | Shutters |
| 13.4.1.15 | A | Electric Duct Heaters - biennial |
| 13.4.1.16 | M | Kitchen Exhaust Systems - canopy |
| 13.4.1.17 | A | Kitchen Exhaust Systems - entire |
| 13.4.1.18 | M | Outdoor Intakes |
| 13.4.1.19 | A | |
| 13.4.1.20 | 3M | Variable Frequency Inverters/Speed Drives |
| 13.4.1.21 | 6M | |
| 13.4.1.22 | A | |
| 13.4.1.25 | A | Motor Control Centres |
| 13.4.1.26 | A | Main Switchboards (low voltage) |
| *13.4.1.27* | *A* | *FFCP (refer section 6)* |

- Stair Pressurisation Fans
- Smoke Spill Fans
- Car Park Exhaust & Supply
- Air Handling Unit (Essential)

# AS1851-2012 Section 13

| 13.4.2 | | Test & records |
|---|---|---|
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

| 13.4.1 | Freq | Routine Service Schedules |
|---|---|---|
| 13.4.1.1 | A | Records of Service & Inspection |
| 13.4.1.2 | 3M | Fans & motors |
| 13.4.1.3 | A | |
| 13.4.1.4 | A | Fire & Smoke Dampers |
| 13.4.1.5 | 6M | Air Control Dampers (Recycle, Relief, |
| 13.4.1.6 | A | Outdoor Air & Smoke Spill) |
| 13.4.1.7 | 6M | Air Control Dampers (Zone Pressurisation: |
| 13.4.1.8 | A | Supply, Return, & Exhaust Air) |
| 13.4.1.9 | 6M | Automatic Smoke Vents |
| 13.4.1.10 | A | |
| 13.4.1.11 | 6M | Fire & Smoke Curtains |
| 13.4.1.12 | A | |
| 13.4.1.13 | 6M | Motorised Relief Openings, Windows & |
| 13.4.1.14 | A | Shutters |
| 13.4.1.15 | A | Electric Duct Heaters - biennial |
| 13.4.1.16 | M | Kitchen Exhaust Systems - canopy |
| 13.4.1.17 | A | Kitchen Exhaust Systems - entire |
| 13.4.1.18 | M | Outdoor Intakes |
| 13.4.1.19 | A | |
| 13.4.1.20 | 3M | Variable Frequency Inverters/Speed Drives |
| 13.4.1.21 | 6M | |
| 13.4.1.22 | A | |
| 13.4.1.25 | A | Motor Control Centres |
| 13.4.1.26 | A | Main Switchboards (low voltage) |
| *13.4.1.27* | *A* | *FFCP (refer section 6)* |

- Stair Pressurisation Fans
- Smoke Spill Fans
- Car Park Exhaust & Supply
- Air Handling Unit (Essential)

# AS1851-2012 Section 13 ... Fans and Motors

| | | |
|---|---|---|
| **13.4.2** | | **Test & records** |
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

TABLE 13.4.1.2

THREE-MONTHLY ROUTINE SERVICE SCHEDULE
FIRE AND SMOKE CONTROL FEATURES OF
MECHANICAL SERVICE - FANS AND MOTORS

| ITEM No. | ITEM | Action required and pass/fail requirement | Records | | |
|---|---|---|---|---|---|
| | | | Result | Pass/Fail | Comments |
| 1.1 | Obstructions | CHECK there are no physical obstructions likely to impede performance. | | | |
| 1.2 | Noise, overheating and vibrations | CHECK motor and all bearings for noise, overheating and excessive vibration. | | | |
| 1.3 | Flexible connections | CHECK flexible connections, where fitted, for leaks, tearing or fraying. | | | |
| 1.4 | Fan belts (wear) | CHECK fan belts for wear. | | | |
| 1.5 | Guards and other | CHECK for satisfactory condition. | | | |
| 1.6 | Bearings | CHECK lubrication of bearings | | | |
| 1.7 | Fan belts (tensio | CHECK for correct tension | | | |

# AS1851-2012 Section 13

# ... Fans and Motors

| | | |
|---|---|---|
| **13.4.2** | | **Test & records** |
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

TABLE 13.4.1.3

YEARLY ROUTINE SERVICE SCHEDULE
FIRE AND SMOKE CONTROL FEATURES OF
MECHANICAL SERVICE - FANS AND MOTORS

| ITEM No. | ITEM | Action required and pass/fail requirement | Records | | |
|---|---|---|---|---|---|
| | | | Result | Pass/Fail | Comments |
| 2.1 | Three-monthly service | COMPLETE all three-monthly service activities (see Table 13.4.1.2) | | | |
| 2.2 | Pulley wheels and coupling | CHECK pulley wheels for alignment and couplings for | | | |
| 2.3 | Casing guards and impeller | CHECK casing, guards and impeller for corrosion | | | |
| 2.4 | Electrical | CHECK electrical connections, isolators and terminal | | | |

# AS1851-2012 Section 13

# ... Outdoor Intakes

| | | |
|---|---|---|
| **13.4.2** | | **Test & records** |
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

TABLE 13.4.1.18

MONTHLY ROUTINE SERVICE SCHEDULE
FIRE AND SMOKE CONTROL FEATURES OF MECHANICAL SERVICES
OUTDOOR INTAKES

| ITEM No. | ITEM | Action required and pass/fail requirement | Records | | |
|---|---|---|---|---|---|
| | | | Result | Pass/Fail | Comments |
| 17.1 | Fire hazards | REMOVE any combustible material from the vicinity of the intakes | | | |

# AS1851-2012 Section 13

# ... Outdoor Intakes

| | | |
|---|---|---|
| **13.4.2** | | **Test & records** |
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

TABLE 13.4.1.19

YEARLY ROUTINE SERVICE SCHEDULE
FIRE AND SMOKE CONTROL FEATURES OF MECHANICAL SERVICES
OUTDOOR INTAKES

| ITEM No. | ITEM | Action required and pass/fail requirement | Records | | |
|---|---|---|---|---|---|
| | | | Result | Pass/Fail | Comments |
| 18.1 | Monthly service | COMPLETE all monthly service activities as listed in Table 13.4.1.18 | | | |
| 18.2 | Corrosion | CHECK intake louvres for corrosion and damage. | | | |
| 18.3 | Insect screens | CHECK and clean insect screens, replace if damaged. | | | |
| 18.4 | Oil bath filters | CHECK to ensure that the oil bath or adhesive coating is as specified by the manufacturer. | | | |

# AS1851-2012 Section 13 ... Variable Frequency Inverters

| | | |
|---|---|---|
| **13.4.2** | | **Test & records** |
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

TABLE 13.4.1.20

THREE-MONTHLY ROUTINE SERVICE SCHEDULE
FIRE AND SMOKE CONTROL FEATURES OF MECHANICAL SERVICES
VARIABLE FREQUENCY INVERTERS (VFI's)

| ITEM No. | ITEM | Action required and pass/fail requirement | Records | | |
|---|---|---|---|---|---|
| | | | Result | Pass/Fail | Comments |
| 19.1 | Dust and dirt | CHECK for dust and accumulated dirt on vents and circuit boards and clean where necessary.<br><br>Where there is evidence of moisture, inspect on a monthly basis or replace enclosure with one having an appropriate IP rating | | | |
| 19.3 | Electrical | CHECK electrical; connections and tighten where necessary. | | | |
| 19.4 | Cooling fans | CHECK the operation of all cooling fans. | | | |

# AS1851-2012 Section 13 ... Variable Frequency Inverters

| | | |
|---|---|---|
| **13.4.2** | | **Test & records** |
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

TABLE 13.4.1.21

SIX-MONTHLY ROUTINE SERVICE SCHEDULE
FIRE AND SMOKE CONTROL FEATURES OF MECHANICAL SERVICES
VARIABLE FREQUENCY INVERTERS (VFI's)

| ITEM No. | ITEM | Action required and pass/fail requirement | Records | | |
|---|---|---|---|---|---|
| | | | Result | Pass/Fail | Comments |
| 20.1 | Three-monthly service | COMPLETE all three-monthly service activities as listed in Table 13.4.1.20 | | | |
| 20.2 | Damage and overheating | CHECK for evidence of damage or overheating and | | | |

# AS1851-2012 Section 13 ... Variable Frequency Inverters

| | | |
|---|---|---|
| **13.4.2** | | **Test & records** |
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

TABLE 13.4.1.22

YEARLY ROUTINE SERVICE SCHEDULE
FIRE AND SMOKE CONTROL FEATURES OF MECHANICAL SERVICES
VARIABLE FREQUENCY INVERTERS (VFI's)

| ITEM No. | ITEM | Action required and pass/fail requirement | Records | | |
|---|---|---|---|---|---|
| | | | Result | Pass/Fail | Comments |
| 21.1 | Six-monthly service | COMPLETE all six-monthly service activities, (see Table 13.4.1.21) listed in Table 13.4.1.20 | | | |
| 21.2 | Calibration | CHECK calibration and set point of all adjustable components, including customer settings and correct | | | |
| 21.3 | Fire mode override | CHECK operation of fire-mode override functions and correct if necessary. | | | |

# AS1851-2012 Section 13

| | | |
|---|---|---|
| **13.4.2** | | **Test & records** |
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

TABLE 13.4.2.2

THREE-MONTHLY ROUTINE SERVICE SCHEDULE
FIRE AND SMOKE CONTROL FEATURES OF MECHANICAL SERVICES
FIRE ISOLATED EXIT PRESSURISATION SYSTEMS

| ITEM No. | ITEM | Action required and pass/fail requirement | Records | | |
|---|---|---|---|---|---|
| | | | Result | Pass/Fail | Comments |
| I.1 | Simulation (from FIP) | SIMULATE by activation from FIP, the fire/smoke situation required to effect operation of the pressurisation system. Check fans, dampers and indicator lamps operate in fire mode as documented. Check for excessive noise, ease of opening doors and correct movement of air from each pressurised area through a selected open door (see Appendices H and I). | | | |
| | | (a) Fan operation. | | | |
| | | (b) Damper operation. | | | |
| | | (c) Indicator lamps. | | | |
| | | (d) Noise. | | | |
| | | (e) Ease of door opening | | | |
| | | (f) Air movement | | | |
| | | See notes 1 to 5 | | | |
| 1.2 | Non-fire mode | SWITCH all systems back to 'normal' and check that all equipment and indicator lamps are in the correct non-fire mode (see Appendices H and I). | | | |

# AS1851-2012 Section 13

| | | |
|---|---|---|
| **13.4.2** | | **Test & records** |
| 13.4.2.1 | | Testing completed & records kept |
| 13.4.2.2 | 3M | Fire Isolated Exit Pressurisation Systems |
| 13.4.2.3 | A | |
| 13.4.2.4 | 3M | System Changeover Under Fire Condition |
| 13.4.2.5 | A | |
| 13.4.2.6 | 3M | Smoke Exhaust Systems |
| 13.4.2.7 | A | |

**SMOKE HAZARD MANAGEMENT SYSTEMS - ADDITIONAL ACTIVITIES**

**CAUTION: TAKE PRECAUTIONS TO PREVENT UNACCEPTABLE VENTILATION SYSTEM CHANGES**

| | | | | | |
|---|---|---|---|---|---|
| 3.19 | FFCP latching and reset | CHECK that after initiation by a signal from the FIP, the FFCP remains operating in the fire mode until reset by the reset switch on the FFCP. | | | |
| 3.20. | Manual override controls | CHECK that manual override ON-AUTO-OFF control operates.<br>NOTE: Manual override should function in normal mode and fire mode. | | | |
| 3.21 | Airflow fault indicator | CHECK the operation of the airflow fault indicator. | | | |
| 3.22 | Open-circuit fault indicator | CHECK the operation of the air-handling equipment interconnecting cable open-circuit fault indicator. | | | |
| 3.23 | Closed-circuit fault indicator | CHECK the operation of the air-handling equipment interconnecting cable closed-circuit fault indicator. | | | |
| 3.24 | Electrical | CHECK the operation of the electricity phase-fail fault indicator. | | | |
| 3.25 | Fan-running indicator | CHECK the operation of the fan-running indicator. | | | |
| 3.26 | Fan-stopped indicator. | CHECK the operation of the fan-stopped indicator. | | | |
| 3.27 | Fan fault indicator | CHECK the operation of the fan-fault indicator. | | | |

# AS1851-2012 Section 13

Questions?