AS/NZS 1668.1:2015

The use of ventilation and air conditioning in buildings

Fire and smoke control in buildings

Presented by:
BRETT FAIRWEATHER

INTEGRITY  INFORMED  INNOVATION
Presentation Content

• PURPOSE OF REVISION

• BRIEF SCOPE OF EACH SECTION

• IMPORTANT CHANGES IN EACH SECTION
PURPOSE OF REVISION

- Clarification for known misinterpretations
- Black holes between NCC & 1998 edition
- New technology
- Better supporting information
- Improved diagrams
- 17 year old Standard
SECTION 1
GENERAL

• Scope:
  – **Minimum** requirements for the design, construction, installation and commissioning of mechanical smoke control systems in **Class 2 to Class 9 buildings**.
  – Now includes **multi-compartment & large, single-compartment** buildings
  – Requirements for the **maintenance** of smoke control systems are **not included**.
SECTION 2
AIR-HANDLING SYSTEMS

• Scope:
  – General requirements for **air-handling** systems and **pressurization** systems
  – Properties & installation requirements for components
SECTION 2
AIR-HANDLING SYSTEMS

• Changes:
  – Interaction between smoke control systems
  – Damper definitions
  – Concessions for combustibility & temp of fusion
  – Electrical reference to AS/NZS 3000
  – Reminder about seismic conditions
SECTION 3
FIRE PROTECTION OF OPENINGS

• Scope:
  – To maintain the fire integrity of building elements compromised by mechanical ventilation
  – Protection of ducts, openings & equipment
SECTION 3
FIRE PROTECTION OF OPENINGS

• Changes:
  – Clarification around FRL components
  – Openings in Walls & Floors now “Method of Protection”
  – Exemptions & Exclusions
  – Fire-resistant enclosing construction
  – “Smoke-spill” is now “Smoke exhaust”
  – Subduct clarifications
SECTION 4
SMOKE CONTROL SYSTEMS

• Scope:
  – general requirements for air-handling systems used for smoke control
  – Location of inlets, outlets & direction of airflow
  – Noise & door force limits
  – Fan construction
  – Electrical requirements
  – Control & Indication
  – T&C requirements and Records
SECTION 4
SMOKE CONTROL SYSTEMS

• Changes:
  – Transfer of content to AS1670.1 Smoke Control
  – Wiring exceptions:
    • within fire rated plantroom (previous clash with authorities)
    • no adverse affect on operation
  – VSD Labelling
  – Can’t use BMS
  – Table 4.1
<table>
<thead>
<tr>
<th>Item</th>
<th>Power wiring</th>
<th>Automatic control*</th>
<th>Override control*</th>
<th>Indication*</th>
<th>Labelling</th>
</tr>
</thead>
</table>
| 3    | Smoke exhaust fans [see Figure 4.3(c), Section 8, Figures 8.1, 8.2, 8.3, 8.4 and 8.5] | Where loss of voltage cannot adversely affect the operation of the smoke-control system, fan power wiring systems shall comply with the following:  
(a) Fan power wiring systems shall originate at a motor control centre that is supplied from the essential electrical power supply, and which is fire-isolated from all spaces apart from the stair served with construction having an FRL not less than \( \frac{1}{2} \times 120/120 \).  
(b) Fan power wiring systems shall meet the fire rating and mechanical protection requirements of AS/NZS 3013 and Appendix D.  
(c) Isolation switches at each fan shall be lockable.  
(d) Variable speed drives associated with smoke exhaust fans shall—  
(i) where the fan is installed to comply with the requirements of Sections 8 or 11, be fire-isolated from other equipment and the occupied space with construction having an FRL of not less than \( \frac{1}{2} \times 120/120 \), or shall be designed or arranged to ensure continuous operation of the fan throughout the duration required in Clause 4.8; or  
| Automatic control shall be initiated in accordance with Clause 4.9.  
Operation shall be in accordance with—  
(a) Clause 8.7 for zone smoke control systems;  
(b) Clause 9.11 for hot layer smoke control systems; or  
(c) Clause 11.8 for air purge systems. | A switch shall be provided for each fan or group of fans controlled at FFPC.  
Switches shall provide the following functionality:  
ON ‘AUTO’ OFF’.  
‘AUTO’ shall be located between ‘ON’ and ‘OFF’. Where fans are grouped they shall serve the same SCZ. | One red (fan running) indicator shall be provided for each fan.  
One green (fan stopped) indicator shall be provided for each fan.  
One amber (fault) indicator shall be provided.  
Where multiple fans operate in unison and a single fault indicator is provided, the system designer shall assess the number of fans whose incorrect operation constitutes a fault condition.  
Where separate indicators are not provided for ‘run’ and ‘stepped’ conditions, a dual coloured indicator shall be provided.  
There shall be a logical grouping of indicators adjacent to each control switch.  
Sensing device(s) shall be integrated with the smoke control system logic for the monitoring of each fan by—  
(a) a pressure differential switch arranged to sense airflow; or | Clear, appropriate, durable and indelible identification of the function and operation of each fan switch and indicator shall be secured permanently and firmly below each switch on the FFPC.  
Switches shall be labelled to complement the required functionally ON ‘AUTO’ OFF’. ‘AUTO’ shall be located between ‘ON’ and ‘OFF’.  
A red label with white lettering that states ‘WARNING: THIS ISOLATING SWITCH SHALL BE LOCKED IN THE ‘ON’ POSITION AS THE FAN IS REQUIRED TO OPERATE DURING A FIRE’ shall be located adjacent to each fan isolation switch. |
SECTION 4
SMOKE CONTROL SYSTEMS

• More changes:
  – Baseline data, test results & documentation shall be readily available at the site
  – Improved documentation requirements:
    • Design documentation
    • O&M instructions & equipment schedules
    • Concise essential instructions
    • Schematic diagram
  – Improved testing requirements
SECTION 5
MISCELLANEOUS SYSTEMS

• Scope:
  – requirements for miscellaneous air-handling systems that do not form part of a smoke control system.
SECTION 5
MISCELLANEOUS SYSTEMS

• Changes:
  – “Small systems” now “Single enclosures”. 1000L/s
  – Improved minor system (<0.1m²) requirements
  – Carparks:
    • NOT A SMOKE EXHAUST SYSTEM
    • Dedicated (non-essential) main switch required
    • Jet fans shut down (and are not in series)
    • Ventilation (incl. supply) operate at FVR
    • Fire dampers often OK
    • Stair pressurisation relief = Smoke exhaust system
SECTION 6
KITCHEN EXHAUST HOOD SYSTEMS

• Scope:
  – requirements for exhaust **systems** serving kitchen hoods and kitchen appliances with proprietary exhaust provisions installed as required by AS 1668.2
SECTION 6
KITCHEN EXHAUST HOOD SYSTEMS

• Changes:
  – “it shall not shut down” (with switch labelling)
  – Other ventilation systems may share the shaft
  – Flame and spark arrestance required
SECTION 7
SHUTDOWN SYSTEMS

• Scope:
  – requirements for the shutdown of air-handling systems that do not form part of a smoke control system.

• Changes:
  – Improved requirements for smoke dampers
SECTION 8
ZONE PRESSURIZATION SYSTEMS

• Scope:
  – requirements for systems that are required to provide zone smoke control utilizing a pressurization system
  – central plant and individual plant air-handling systems
SECTION 8
ZONE PRESSURIZATION SYSTEMS

• Changes:
  – Now 20 to 80 Pa below other compartments
  – Clearer diagrams
SECTION 9
HOT LAYER SMOKE CONTROL SYSTEMS

• Scope:
  – Exhaust smoke from the hot smoke layer to maintain the smoke layer above egress paths.
  – Based on a single axisymmetric plume, which is confined to one reservoir.
  – Smoke plumes spilling across multiple reservoirs are not considered.
SECTION 9
HOT LAYER SMOKE CONTROL SYSTEMS

• Changes:
  – Entirely new section
  – Transfer of content from AS1668.3
  – Omission of “Fire Engineering-ness”
  – Exhaust air capacity (as per BCA)
  – Describes intakes, reservoirs, plenums, curtains, make-up & operation
  – Single fan permitted for multiple compartments
SECTION 10
PROTECTION OF FIRE-ISOLATED EXITS

• Scope:
  – Protection of fire-isolated exits by pressurization
  – Pressurization creates airflow across open doors
  – Relief, relief, relief
SECTION 10
PROTECTION OF FIRE-ISOLATED EXITS

• Changes:
  – More reminders about relief
  – Dedicated vs Zone pressurisation (leakage)
  – VSD’s: encourages location within the exit
  – Vertical & horizontal combined
  – Reworked performance criteria
  – ...and don’t forget about relief
SECTION 11
AIR PURGE SYSTEMS

• Scope:
  – Legacy item
  – Operation of HVAC smoke control to “purge” smoke from building
  – Smoke out. Outdoor air in.
  – Only applies to central plant systems serving multiple compartments

• Changes:
  – Not much.
SECTION 12
LIFT SHAFT PRESSURIZATION SYSTEM

• Scope:
  – lift shaft pressurization system when required to aid in smoke control

• Changes:
  – Not much.
APPENDICES

• A: Health & Aged Care (Informative)
• B: Subduct Principles (NEW) (Informative)
• C: Reliability (Informative)
• D: Wiring Systems Fire Resistance (Normative)
• E: Commissioning Tests (Informative)
• F: Hot Layer Application (NEW) (Informative)
• G: Building Geometry (NEW) (Informative)
• H: Hot Layer Inlet Requirements (NEW) (Normative)
• I: General Design Information (NEW) (Informative)
• J: Open Access Ramps & Balconies (NEW) (Informative)
• K: Exit Pressurization Tips (NEW) (Informative)
Thank you