Smoke Management Systems Testing.

The National Construction Code [NCC] in (previously called the Building Code of Australia [BCA]) requires the installation of smoke management systems and this varies with the age of the building , its effective height as well as interconnection with differing classes of building and the class of the building itself.

There are also specific conditions associated with buildings having an atrium, and other conditions requirements for large industrial or storage buildings.

Ventilation Requirements are referred by the NCC/BCA to Australian Standard AS/NZS1668.1 reflecting the version in force at the time of development approval. Care must be taken that **service personnel** are sufficiently knowledgeable about the differences of these versions and allow for this in their performance testing.

Those providing **endorsement of performance** [APFS] of these systems, should have sufficient knowledge of these installation requirements for the buildings to which they are endorsing these measures for, to provide the owner with advice that the systems conform to requirements, or advice when deficient which may preclude endorsement.
The performance requirement primary reference is identified on the "**Fire Safety Schedule**" of record 9this is usually issued to the building owner as an attachment to the reminder letter for the **Annual Fire Safety Statement**" submission. It is imperative that this be provided to those servicing the building as well as to the assessor prior to the assessment.

Where a building has a **performance solution** applied, those providing servicing or performance endorsement must have read and understood the final FER such that they can appropriate fulfill all pertinent requirements.

For **servicing requirements** (maintenance) of these systems in NSW this is mandated by that specified in AS1851-2012 Section 13 must be followed and full function interface testing must occur not less than annually and within 90-calendar days of the due date of the Annual Fire Safety Statement submitted by the building owner.

Why do we need pressurised stairs?

In a fire event, we need the pressurisation system to keep smoke out of the non-fire affected floors or compartments. This allows for the safe evacuation of occupants from these non-fire effected floors as well as providing safe operation for NSW Fire + Rescue to assemble prior to attacking the fire at its source.

You **must** follow AS1851-2012 Sect.13 Table 13.4.2.3 for annual testing

What are common faults or failures for stairwell pressurisation systems?

1. Top of the list is **component failure**: either the fan, motor, or vsd, or result of other works such as cutting through the cabling supplying the fan (yes it happens and far too often).
   This is why AS1851 Sect.13 13.4.1.2 requires that these fans be test run every 3-months and I would suggest that if you know the annual assessment is coming up, give it a run and ensure it works – ***this is called being diligent!***
2. Poor **pressurisation control**. The force required to open the door to a fire stair is 110N *(this relates to the original specifier equivalency to a 9 year old with a broken arm must be able to operate the opening mechanism and open the door [**yes**, that was the criteria])*. Too much pressure and the door will be too hard to open.
   Note: a typical fully open door with a stairwell pressure of 50pA at 1m/s will pass nearly 2,000L/s of air (most designers allow a fan capacity of between 6,000L/s and 9,000L/s/ stairwell and the 6,000L/s would become insufficient for a multi level single compartment – say with an internal staircase, as all doors for all of the interconnecting levels would have to be open during the testing and the interconnection of levels is usually a post-development/ tenancy fitout provision).
   Note that stairwell performance testing should be part of the commissioning process prior to occupation approval of that tenancy *(this is on the Building Owner/Managing Agent to manage).*
3. **Obstructed relief air path** such that the 1m/s average minimum velocity of air from the stairwell onto the floor with the door fully open (plus final exit door and an adjacent level door also open). This is usually found to be fitout related such as full height partitioning without grills in the circulation space (core area) or wave bars for sound attenuation being installed in the ceiling plenum
4. **Noise** – it is required that the noise within the stairwell cannot exceed 80dB(A) and the noise level on the floor at 1m from the stairwell door must not exceed 65dB(A) [it was found that evacuees were hesitant to enter an excessively noisy stairwell and the on floor sound level allows for hearing instructions via the SSEP.]
5. **Security alarms** – many escape doors in retail or libraries etc are fitted with door screechers and these must be interfaced such that in a fire event, their sound will not exceed that of 65dB(A) so that SSEP instructions may be heard.
6. Remember that for newer buildings, the stair pressurisation control system for the stairwells must be ***fire separated from other equipment***. This means that the VSD can be located within the stairwell itself, but not in a plantroom unless fire separated from the rest of the plant.

Smoke Exhaust Fans including atrium exhaust and where multiple exhaust zones.
Smoke exhaust fans are specifically for exhausting smoke from their designated specific compartment. If a fire alarm occurs in the fire zone served by the smoke exhaust fan then it activates, if the alarm is from a different compartment, then it stays off -
If the smoke exhaust were to operate from an adjoining compartment alarm, its operation would draw air and smoke from the fire affected zone into the fire zone with the smoke exhaust fan.
Again servicing requirements (maintenance) of these systems in NSW this is mandated by that specified in AS1851-2012 Section 13 must be followed and full function interface testing must occur not less than annually and within 90-calendar days of the due date of the Annual Fire Safety Statement submitted by the building owner.
AS1851-2012 Sect.13

It is good that the NCC F6D12 finally got around to linking **Kitchen Exhaust** Fans to AS/NZS1668.1 and thereby defining that they are an Essential Service Measure, this is backed up by AS1851-2012 Sect.13.4.1.16 & Sect.13.4.1.17 and this is mandated in NSW requiring Monthly and Annual servicing.

Purge Systems – refer to O&M Manual – usually these are associated with quite old buildings associated with Ordinance 71 or Ordinance 70 and Sydney Vent Code, or AS1668-1974. To service and maintain such systems, there will usually be a specification in a performance solution which will identify anything specific in testing.

Zone Pressurisation Systems (or sandwich systems)

The strategy behind these systems is to extract air from the fire affected floor whist pressurising the levels or compartments surrounding it.

Usually this entails opening and closing operable dampers on the floors such that the pressure differential is established. Nominally this is 20pA between the levels with all doors shut and is tested floor by floor using manometers.
I cannot understand why owners don't install test tubes for this down a designated fire hose reel cupboard riser – the tester would then simply plug the manometer into the tube to the floor below and then to the floor above from the tested (fire test effected)floor [just think haw much time this would save the testing crew operating at OT rates, each year > so very quick return on investment).

Have a look at our other guides http://www.ndibs.au/html/guides.html , and presentations http://www.ndibs.au/html/presentations.html including the requirements for fire & smoke damper workshop (5 modules).

Contact me should you wish such a presentation for your team as a workshop (see the website)