



# ACTIVE –v– PASSIVE SYSTEMS

Which have more impact upon fire safety

Ian Childs  
Principal, FIREASSESS.AU



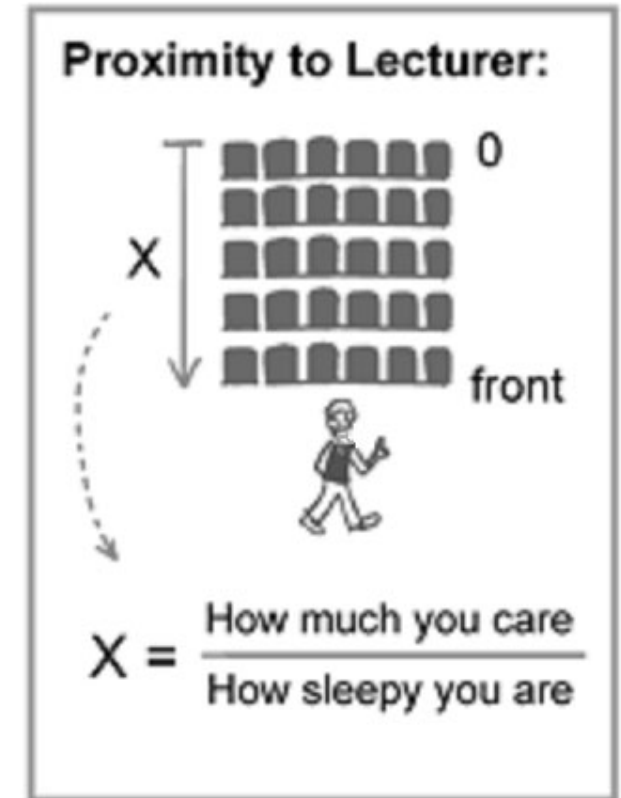
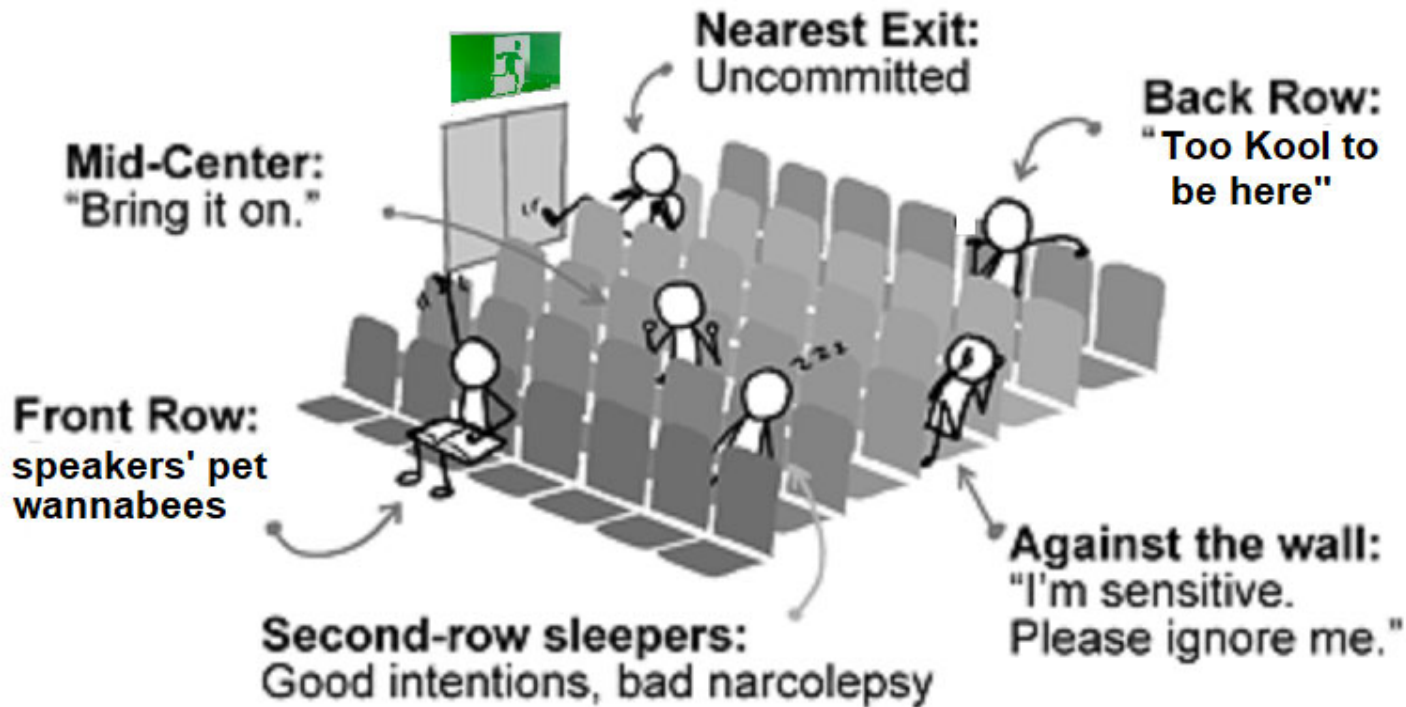
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# Where you sit...

## WHERE YOU SIT IN A SEMINAR

And what it says about you:



# ACTIVE –v- PASSIVE SYSTEMS

Which have more impact upon fire safety

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ROSELANDS 13 JUN

# Compromised Systems

- **Roselands 1969**
- Largest Shopping Centre in the Southern Hemisphere at the time. Built 1965.

In May 1969 the sprinkler system was **isolated** at the installation valve because of unresolved sprinkler leak (later thought to be kitchen hood).

So when a fire broke out on the fourth level of this shopping centre at 4:30pm on 13<sup>th</sup> June 1969, there was no active fire suppression, and it was only the **fire barriers** which contained this fire until it was finally extinguished / controlled by NSW FIRE BRIGADES.



## Starting point of fire regulations



Great Fire of London started on 2<sup>nd</sup> September 1666 was the catalyst for the provision of formal fire prevention and introduction of building codes.

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Andreas Reisch

# Starting point of fire regulations 1666 (UK)

**GREAT FIRE OF LONDON**  
spread of fire zone

- Sunday 2 September 1666
- Monday 3 September
- Tuesday 4 & Wednesday 5th



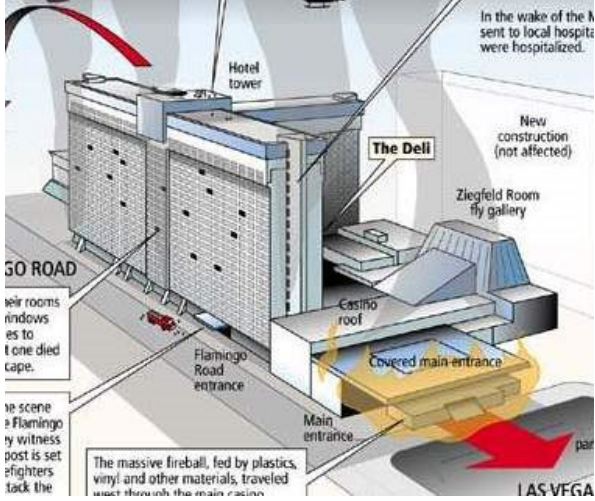
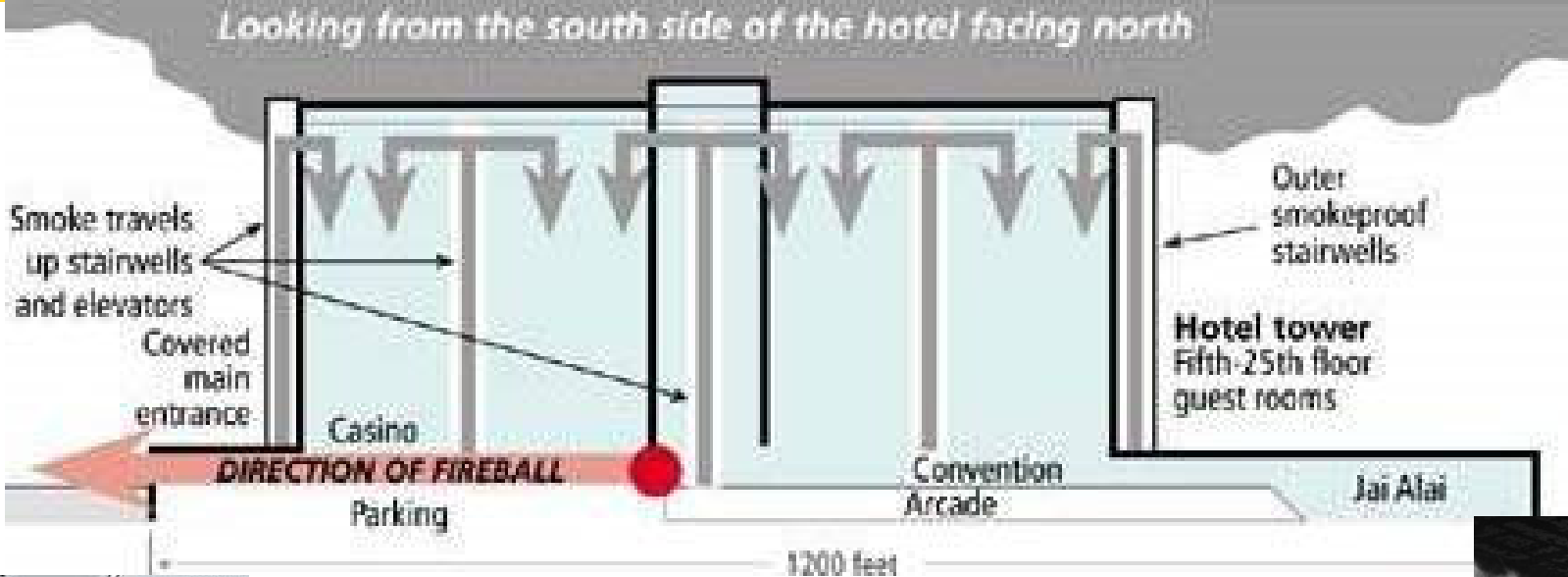
## Starting point of fire regulations 1980 (USA)

**MGM Grand Nevada 21<sup>st</sup> November 1980 – 85 died  
78 guests, 7 staff – injured 588 guests & 25 staff**



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# Starting point of fire regulations 1980 (USA)



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# Caracas Venezuela Oct.2004 34 storey Parque Centrale Building



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# Caracas Venezuela Oct.2004 34 storey Parque Centrale Building



Duct collapsed due to hanger failure

17 12:33

# Sydney Sep.1994 95 York Street



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## Sydney Sep.1994 95 York Street



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## Sydney Sep.1994 95 York Street



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# Heat stratification



Image courtesy of FireAssess®

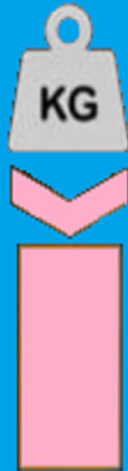
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# FRL

## Fire Resistance Level

# FRL 90/90/90

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### Structural Adequacy

The ability of the building element to support the weight of adjacent building elements

i.e A masonry wall supporting a concrete floor slab above

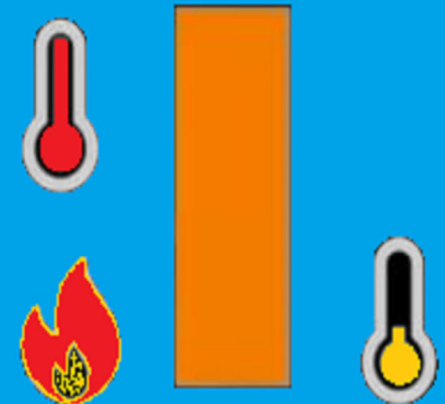
**Not a Fire Damper**



### Integrity

The ability of an element or device which prevents the passage of flames and hot gasses

i.e. A Damper which shall close on fire and stop the passage of all products of combustion

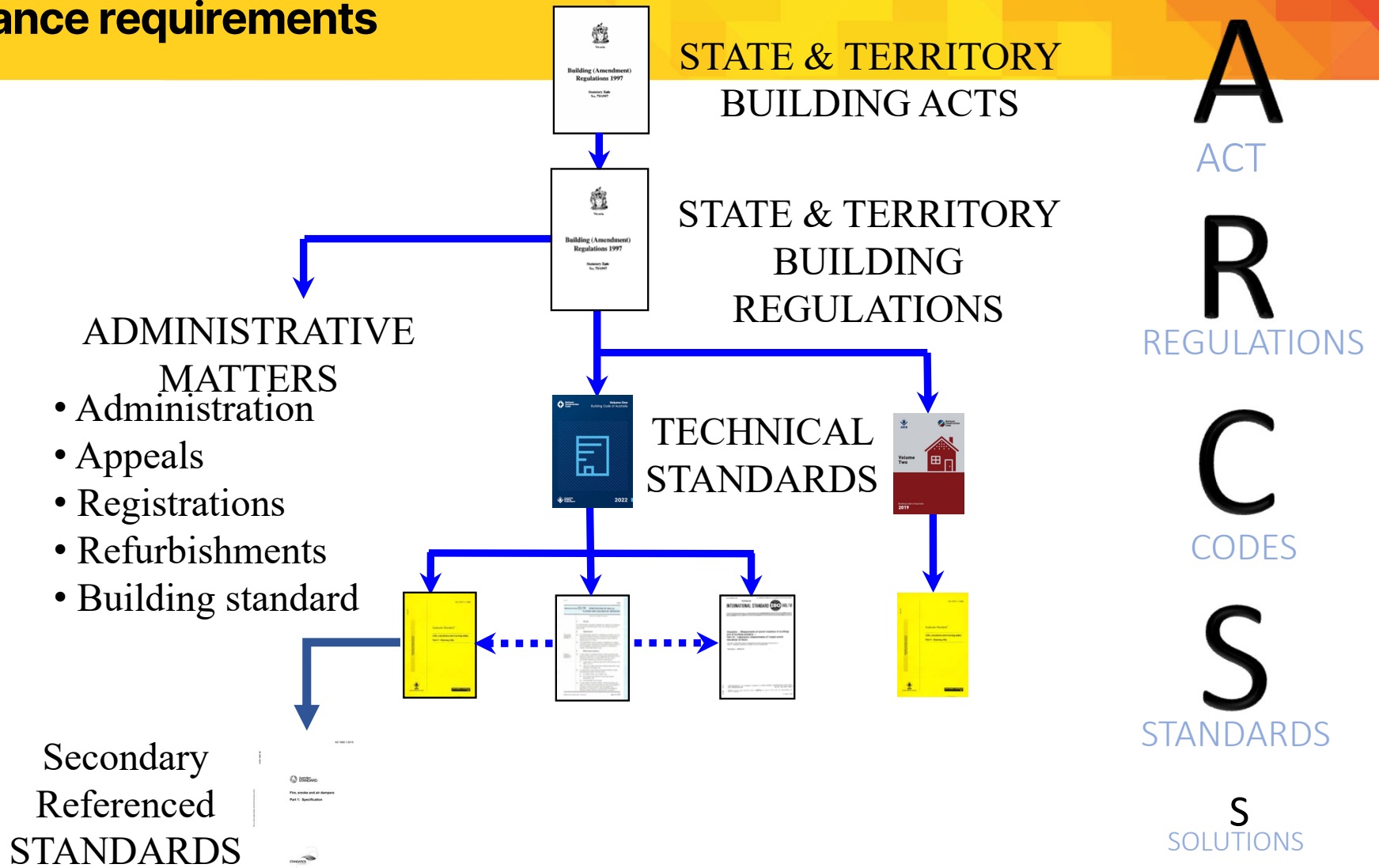


### Insulation

The ability of an element to resist heat transfer from the exposed face to the unexposed face

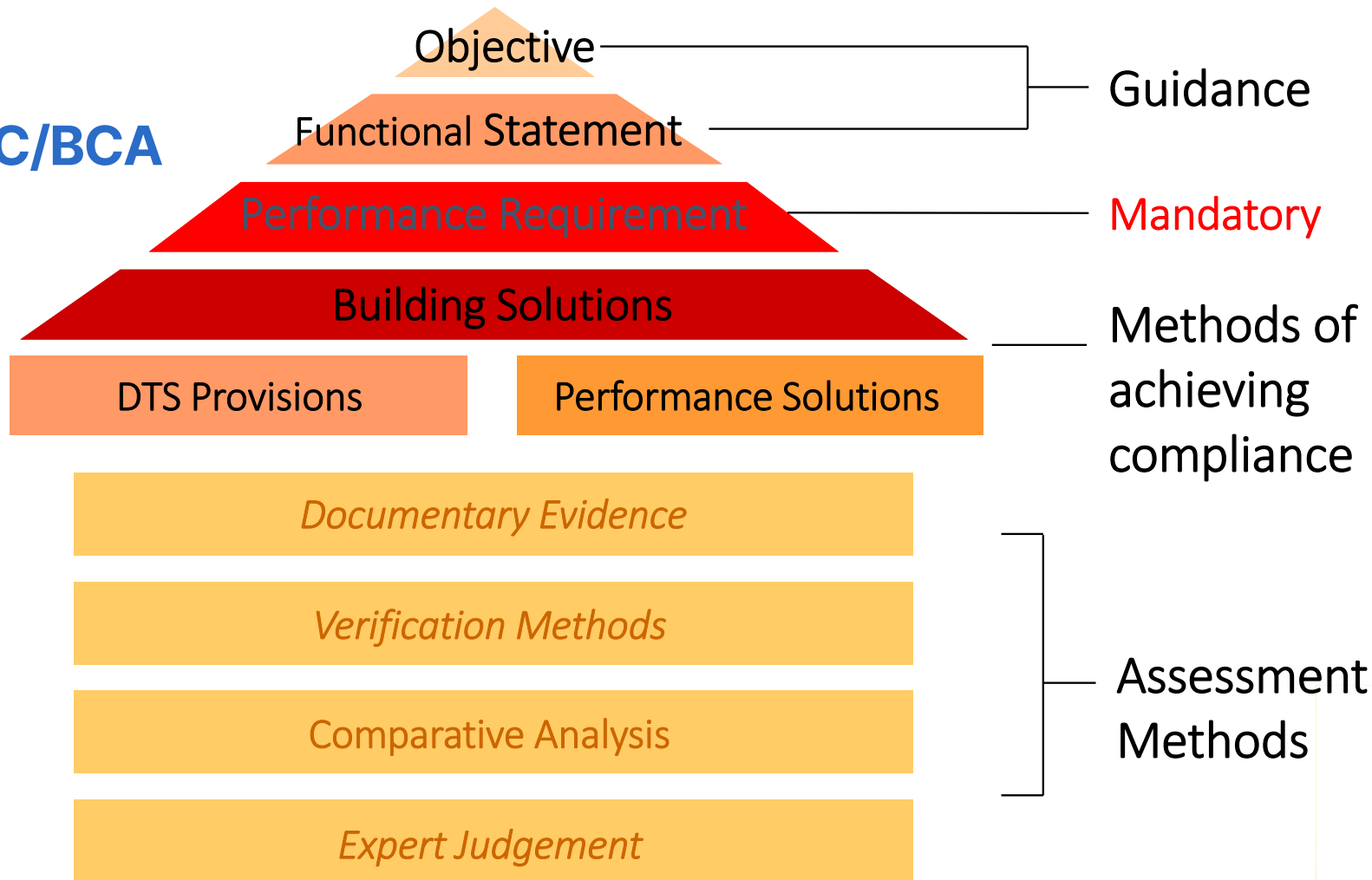
i.e. Some fire dampers may have insulation (intumescent, ceiling, etc.) or the duct shall have fire wrapping or fire rated encapsulation

# Compliance requirements





**NCC/BCA**



## NCC-2022 numbering system

NCC-2022 will be adopting a changed clause reference system called:  
Section-Part-Type-Clause (SPTC)

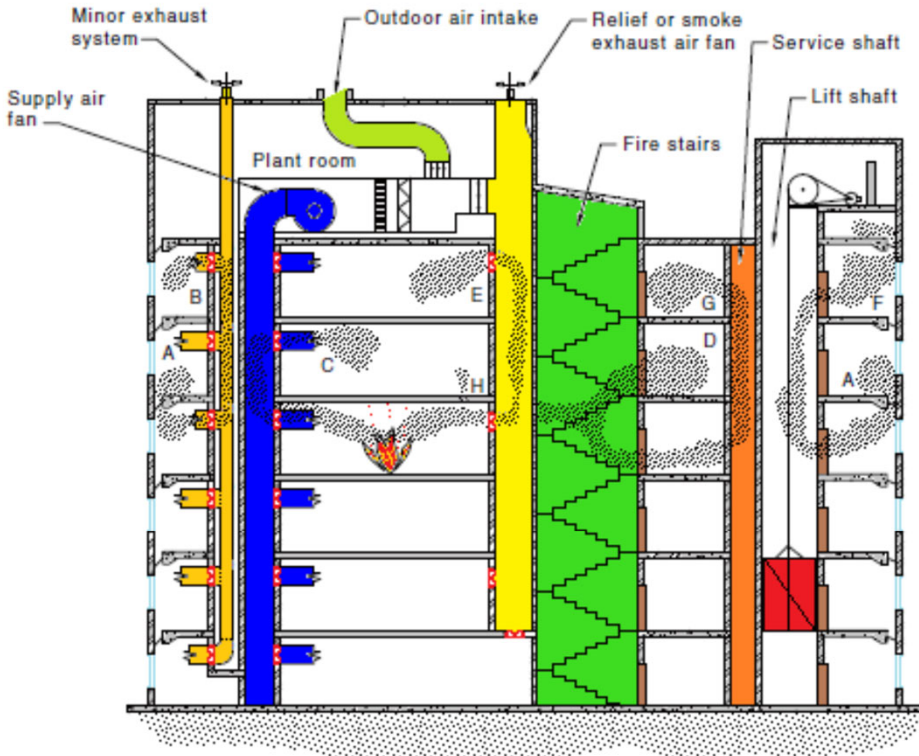
The first letter indicates which NCC section sits within, or if the letter “S” is used, that the clause is part of a “Specification”

The second letter indicates the clause Type and may be G,O, F, P, V, D or C with:  
G=Governing requirement, O=Objective, F=Functional Statement,  
P=Performance requirement, V=Verification method, D=Deemed to Satisfy  
C=Clause in a specification.

*Suggest you get familiar and convergent with it..  
As an interim both reference methods shall be in the document*

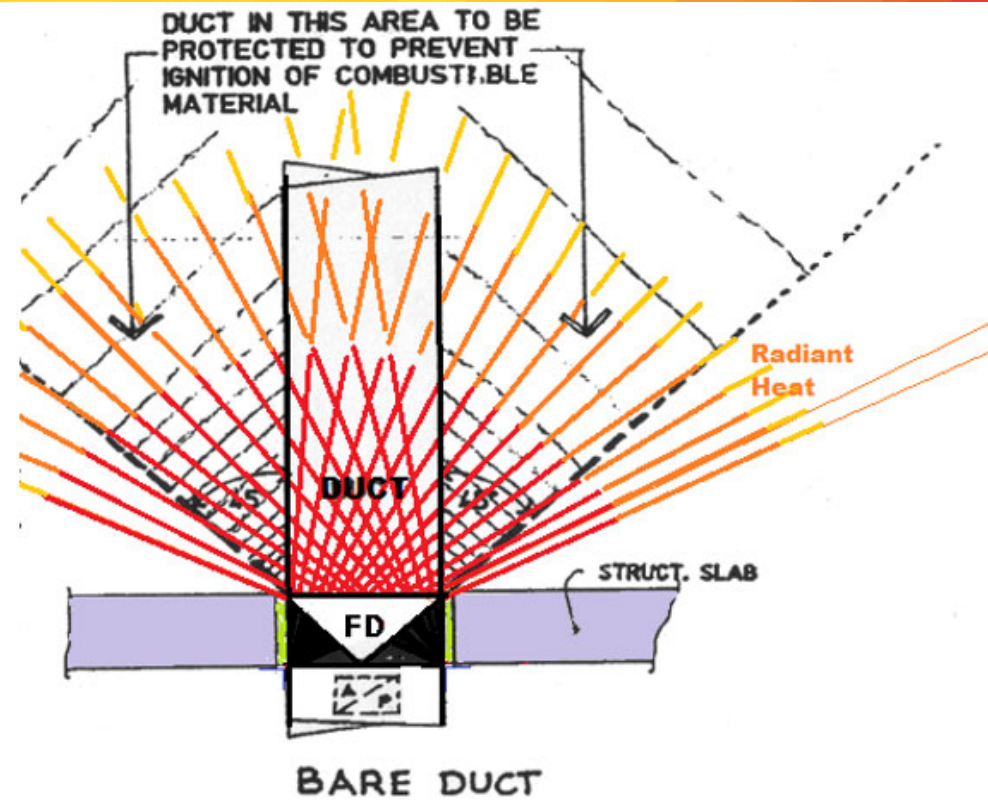
Unnumbered clauses are informative and have no regulatory requirement

# Fire / Smoke Pathways and radiant heat



LEAKAGE PATHS SHOWN ABOVE:

- |   |  |
|---|--|
| A Leakage between floors via poorly sealed or return air path               | E Leakage between floors via relief spandrel             |
| B Leakage between floors via ductwork of minor exhaust, e.g. toilet exhaust | F Leakage between floors via lift shaft                  |
| C Leakage between floors via supply air ductwork                            | G Leakage between floors via service duct or riser shaft |
| D Leakage into fire stairs and then on to typical floors from fire stairs   | H Leakage between floors via gaps or cracks in structure |



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**HORIZONTAL (SLAB MOUNTED)  
FIRE DAMPER INSTALLATION**

# Radiant Heat



*Fire Damper  
Installation  
non-conforming to  
AS/NZS1668.1-2015 &  
AS1682.2-2015*

FIRE ASSESS

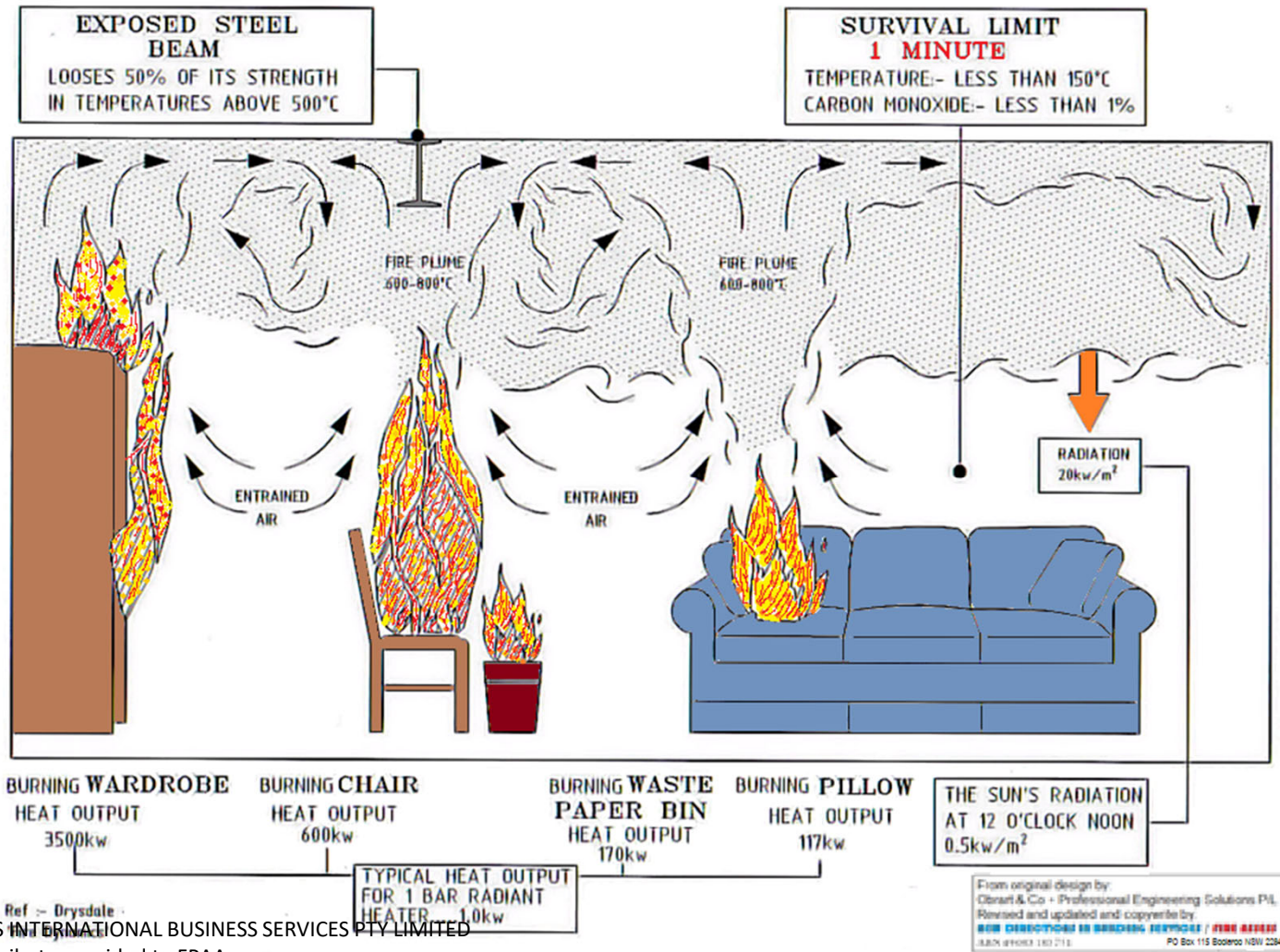


[www.fireassess.com.au](http://www.fireassess.com.au)

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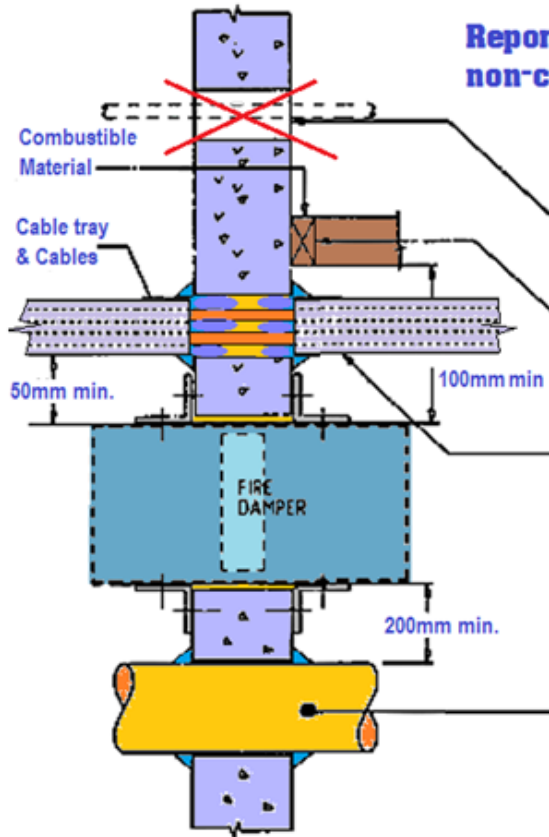
Photograph courtesy of FireAssess®

# FIRE LOAD



# Service segregation / separation

**Report to the Building Owner  
non-conformance with NCC S13 + AS4072.1**

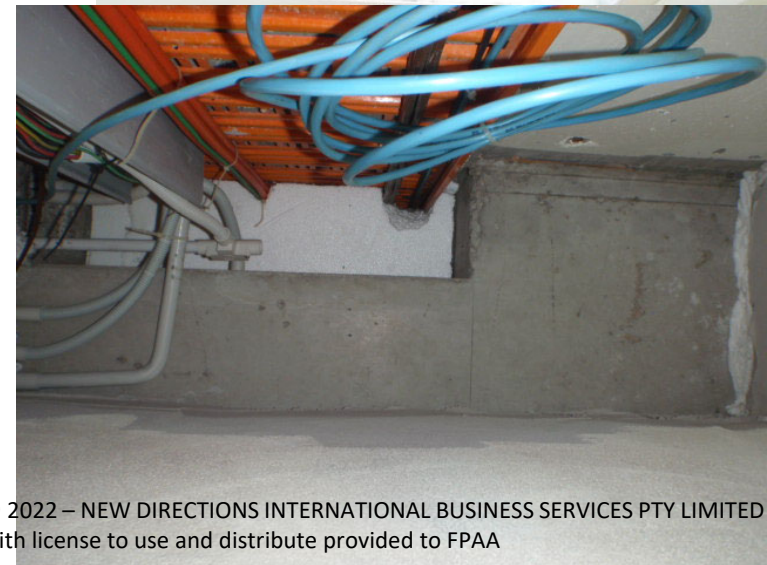


- ① Non-fire sealed penetration, with or without existing services
- ② Combustible material not closer than 100mm to any fire damper
- ③ Cabling not closer than 50mm to any fire damper.  
NOTE: Cable tray must not pass through the fire wall or must be insulation wrapped either side
- ④ Metal pipe (charged)  
NOTE: if uncharged must be insulation wrapped either side
- ⑤ Distance between openings or adjacent fire dampers must be sufficient to maintain the structural adequacy of the wall  
OR  
Where fire dampers must be installed close together, obtain an approved performance solution for the modified wall construction

From original design by:  
Obrant & Co - Professional Engineered Solutions P/L  
Revised, updated & copywrite by:  
**NEW DIRECTIONS IN BUILDING SERVICES / FIRE ASSESS**  
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Photographs courtesy of FireAssess®



# Compromised



## Compromised

**One hour** so called **FR Foam!**  
Fire tested to AS1530.4-2014

**No** capability to stop fire degradation  
nor the products of combustion, not  
provide a thermal insulation barrier.

Manufacture's, wholesalers and any  
Resellers are in clear breach of the  
Trade Practices Act Sect.52

**Installers** also have a **duty of care** which  
they clearly breach when using this or  
similar product *without reading the small print..*  
*(masonry~masonry only for small gaps)*



Photograph courtesy of Trafalgar®





# Compromised



But dispensation **MUST** be applied to really Essential Services?

Beer



# Fire Test



Image AS1530.4 test on CLT wall  
at 74min  
Top=curtain  
Bottom=intumescent

Courtesy of:



[www.rileyair.com.au](http://www.rileyair.com.au)

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# Fire Interface Matrix

System Inputs		System Outputs																																												
		Control Unit Annunciation							Notification							Required Fire Safety Control							Supplementary																							
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG												
1	Manual fire alarm boxes - 1st floor	●	●					●			●			●	●			●								●			●			●			●			1								
2	Manual fire alarm boxes - 2nd floor	●	●							●				●	●												●									●			2							
3	Manual fire alarm boxes - 3rd floor	●	●								●				●	●											●										●			3						
4	Smoke detectors - 1st floor	●	●					●			●				●	●											●											●			4					
5	Smoke detectors - 3rd floor	●	●							●					●	●											●												●			5				
6	Smoke detectors - 1st floor	●	●							●					●	●											●													●			6			
7	Smoke detectors - 1st floor elev. lobby	●	●							●					●	●											●														●			7		
8	2nd floor computer rm. smoke det.-zone 1	●	●							●					●	●											●														●			8		
9	2nd floor computer rm. smoke det.-zone 2	●	●							●					●	●											●															●			9	
10	In-duct smoke detector - supply fan 1	●	●							●					●	●											●															●			10	
11	In-duct smoke detector - supply fan 2	●	●							●					●	●											●																●			11
12	In-duct smoke detector - 1st floor return	●	●							●					●	●											●																●			12
13	In-duct smoke detector - 2nd floor return	●	●							●					●	●											●																●			13
14	In-duct smoke detector - 3rd floor return	●	●							●					●	●											●																●			14
15	Heat detectors - 1st floor mech. rm.	●	●							●					●	●											●																●			15
16	Heat detectors - 2nd floor storage room	●	●							●					●	●											●																●			16
17	Heat detectors - 3rd floor janitor's closet	●	●							●					●	●											●																●			17
18	Waterflow - 1st floor	●	●							●					●	●											●																●			18
19	Waterflow - 2nd floor	●	●							●					●	●											●																●			19
20	Waterflow - 3rd floor	●	●							●					●	●											●																●			20
21	Sprinkler control valve - 1st floor			●	●									●	●												●																●			21
22	Sprinkler control valve - 2nd floor			●	●									●	●												●																●			22
23	Sprinkler control valve - 3rd floor			●	●									●	●												●																●			23
24	Fire pump running	●	●											●	●											●																●			24	
25	Fire pump power failure/phase reversal			●	●									●	●												●																●			25
26	Fire alarm ac power failure			●	●									●	●												●																●			26
27	Fire alarm system low battery					●	●																				●																●			27
28	Open circuit					●	●																				●																●			28
29	Ground fault					●	●																				●																●			29
30	Notification appliance circuit short					●	●																				●																●			30

# ACTIVE WITHOUT PASSIVE

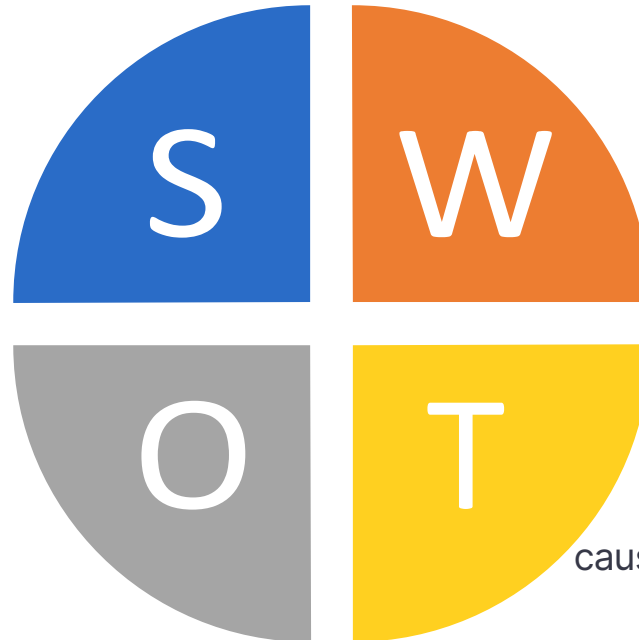


## STRENGTHS

At site fire detection and suppression means that responders work is minimised

Best property structure protection

## OPPORTUNITIES



## WEAKNESSES

Reliant upon standby operation and prompt reaction.  
Unsightly aesthetically

Isolations and misuse causes significant fabric damage

## THREATS



# PASSIVE without ACTIVE

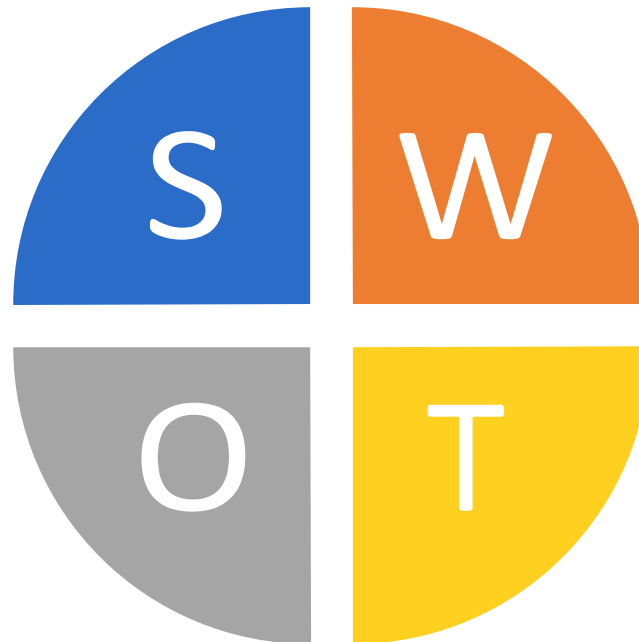


## STRENGTHS

Part of the building fabric, so if installed properly and not misused will simply work!

Older installations unlikely to provide adequate protection

## OPPORTUNITIES



## WEAKNESSES

Reliant upon call to responders

Poor installations and misuse

## THREATS



## Conclusion

Active and passive systems are complementary and back each other up to achieve a holistic level of fire protection which should reflect both the baseline and introduced hazards within and without the space.

Saying that, I would suggest that the fire must be contained – then suppressed and extinguished – so Passive should be the winner here..

It is necessary for all fire safety practitioners, building designers and installers to fully comprehend the design intent and the intended operation of these facilities.

Most of us have war stories galore where these issues are not addressed.



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