

Compliance– Its not Black or White



Warwick Isemonger



Compliance Officer
FRNSW

OVERVIEW


- ▶ Compliance:
- ▶ what does it really mean to us?
- ▶ What it means to occupants?
- ▶ What it means to Regulators and Government
- ▶ How has compliance changed
- ▶ What has prompted the changes
- ▶ How do we deal with non compliances
- ▶ Where will compliance sit in the future
- ▶ How do we hope to survive the changes



What does compliance mean?

Compliance to us and those in industry means that an item or measure has been assessed against a standard of performance and when assessed is capable of meeting that standard of performance and will function to the required standard.

To the public, that something has been assessed by a competent person who can ascertain that the item assessed is compliant to a registered standard of quality or performance and that they be assured of a level of safety and protection based on that standard




What does compliance mean?

- ▶ To Regulators or Government that a suitable competent person has certified that an item or measure has been assessed and found to meet the requirements of a Standard of performance commensurate to that item or measure.
- ▶ This has the implied implication of making the person providing compliance legally responsible his assessment performs and is capable of meeting that standard and could, where the measures performance fails or someone is injured be liable for compensation or legal prosecution



Changes to compliance


- ▶ So what has changed, well as building and fire safety measures improve, the Standard of Performance also changes and so assessing for compliance has now become more difficult. A far greater knowledge of building and legislative specifications and the relative standards of performance that differ slightly mean that compliance assessments have now become very technical.
 - ▶ Additionally, the introduction of new building materials and furnishings has changed the performance requirements of measures to ensure they are able to cope with the changes
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What has prompted the changes

- ▶ In buildings built under old building codes compliance to those codes was reasonably simple to follow and provided each measure or item was assessed correctly then generally compliance to Legislated standards was achieved.
- ▶ Now, buildings are built under many different guises from DTS requirements to alternative or performance measures where building elements and systems are designed to meet certain performance standards not necessarily listed in building regulations

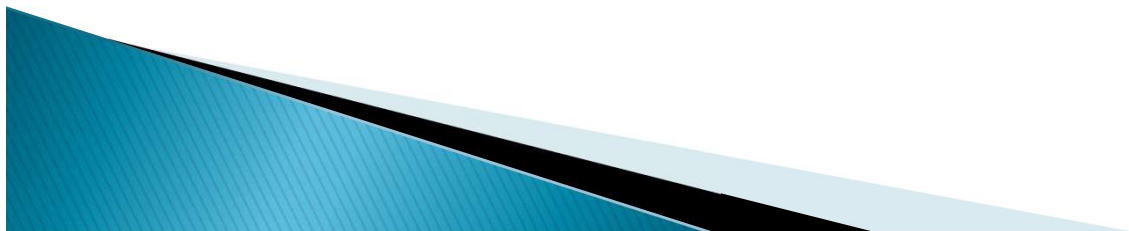


What has Prompted changes


- ▶ Similarly, the introduction of Fire Engineering and Alternative Solutions which have their own verification and performance criteria mean that compliance to a relative standard is not able to be assessed unless access to the engineering ideology used to build the building is available.
 - ▶ This is compounded by a requirement to have a in depth knowledge of the Fire Engineering concepts that went towards developing such systems and elements used in construction.
 - ▶ *I am not sure we as compliance officers we are able to keep pace with these changes in compliance requirements*
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NON Compliances


- ▶ It is interesting that this slide prompts what we probably should be called – Non Compliance Assessments– who cares if a measure, system or item is compliant they only want to know if is NON COMPLIANT ! Yes!
- ▶ Of course compliance is perfect world,– non compliant is where the fun starts :–
- ▶ to what degree is the non compliance likely to affect someone something or a building
- ▶ Minor non compliance is no real issue how many?
- ▶ At what point do we say non compliance is serious?




Non Compliances

- ▶ There are 3 main types of non compliances:–
 - ▶ a/ Product non compliance– where the use of a certain product or measure does not comply with the statutory requirement of the system or measure that should be installed
 - ▶ b/Maintenance Non Compliance– where measures or products have not been maintained to a required standard or recommendation
 - ▶ c/Negligent Non Compliance– where a builder or manufacturer uses or endorses a product or measure that does not meet and cannot meet the required standard in the building
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Non Compliances

- ▶ Fortunately, maintenance Non compliances do not affect the performance of a measure or product over a short period as most products have the ability to still operate to a compliant standard even if not properly maintained for a limited time
 - ▶ Negligent non compliances– Bankstown fire Grenfell fire most often have serious consequences for safety of occupants and often lead to loss of life
 - ▶ Product non compliances place greater impact on compliant measures or products to function correctly at expense of faulty measures failing
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Non Compliances

- ▶ Non compliances become an issue when they fail or are not capable of doing their job and reliance is placed on other compliant measures to perform beyond their capability
 - ▶ Often to compensate for non compliant measures other measures are introduced to compensate for the non compliant measures or products
 - ▶ Generally, if there are more than 2 non compliances with equipment then it is likely that all of the measures potentially will be non compliant. This is because once a mistake is made it seems to continue throughout
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Non Compliance

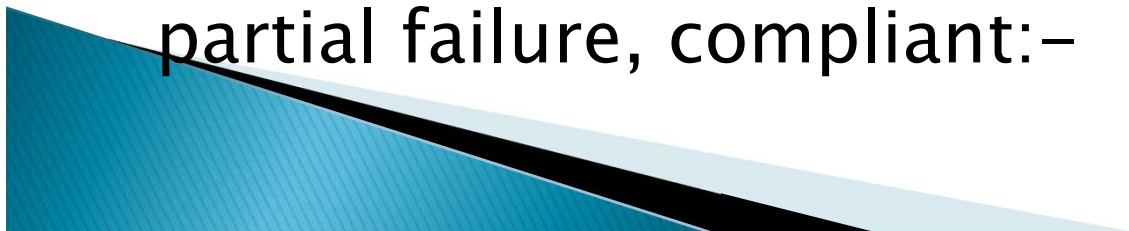
- ▶ So what non compliances are sufficiently bad to say the building is unsafe?
 - ▶ Which non compliances are deemed minor and not likely to have a dramatic impact on use or occupancy
 - ▶ How many constitute a problem or is it more about which ones.
 - ▶ We are all still legally liable no matter which non compliances we have accepted if something goes wrong.
 - ▶ Clearly, the Coroner in a coronial enquiry will hang onto non compliances and why and how you dismissed them as minor
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Non Compliances

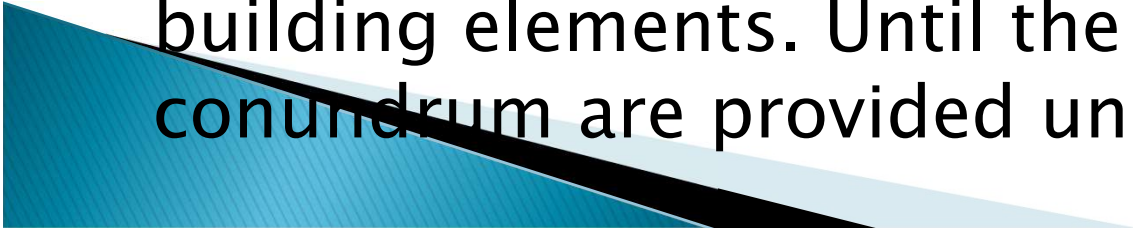
- ▶ And now as new and innovative building materials are introduced and variations to fit outs, construction methods and installed systems occur compliances including minor non compliances can have major consequences in building and occupant safety
 - ▶ In the second part of this presentation failure of compliances and fire systems has proven to have major ramifications to building occupants and compliance officers.
 - ▶ Regulators seek to level blame on inspecting officers regarding non compliances
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Future of Compliance

- ▶ As the number of engineering and technical changes occur throughout the building industry so too will changes occur to compliance inspections and reports.
- ▶ Compliancy reporting will need to take on what the measure or item has been compared to and to what level of testing has this measure been through to attain this degree of compliance .
- ▶ Technically, maybe we should call it a Non Compliance Report as it will identify non compliances and to what degree – total failure partial failure, compliant:–



Future of Compliance

- ▶ and to what percentage does this non compliance affect the building or its occupants
 - ▶ Clearly, a critical non compliance or failure may mean that a second or consequent non compliance would mean the building is unsafe
 - ▶ Additionally, does the use of non compliant elements mean that this non compliance places a greater emphasis on the other compliant systems or does it mean that we need to consider additional compliant systems to counteract the use of non compliant building elements. Until the answers to this conundrum are provided uncertainty prevails
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Survival

- ▶ There will always be a reliance placed on compliance assessments. Why?
- ▶ How else can there be some assurances given that the building is safe and can be safe for occupants
- ▶ However, we as compliance inspectors need to be vigilant that we have all the data relating to the fire and building elements used in construction and have a knowledge of how these elements will impact on the building and of course what measures have been employed to address these non compliances.



Survival

- ▶ It is interesting where non compliant building elements have been used and other non compliances not related to these non compliances are also implemented that when compounded have a dramatic effect on fire safety performance, human activity and decision making and the operation of fire crews in combating a fire.
- ▶ It is when building elements and systems fail that non compliances are identified and that blame for these failures inevitably sits with compliance reports and officers



Conclusions

- ▶ The perception of non compliances differs from public and governmental.
- ▶ We will be judged by our non compliances not our successes
- ▶ The science of compliance is getting harder and more technical
- ▶ The number of non compliant elements are getting harder to detect and the \$\$\$ drives non compliant materials
- ▶ Our ability to ensure compliance in buildings and elements is our guarantee of longevity







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Grenfell Tower – compliance nightmare

- ▶ Designed 1967– Brutalist style architecture
- ▶ Built– 1972– first occupied 1974
- ▶ Refurbished 2016 –cost of refurb 8.7 Million
- ▶ Height 67.3 metres – 220 ft
- ▶ Floors 24 127 in total–227 bedrooms in total
- ▶ 120 X 1& 2 bedroom flats @ 6 per floor
- ▶ Ground floor non residential common room
- ▶ Residents –612 of mixed race and age
- ▶ Floor size 22m2 usable space 476 m2
- ▶ Flat size (1) 51.4 m2 (2) 75.5m2





Grenfell Tower Building Data

- ▶ Lift access only from levels 4–24
- ▶ Single stair centrally located non closing non fire rated doors–non fire isolated
- ▶ Doors to stairs wedged open, prams, bikes and childrens toys in and around door and stair treads
- ▶ Household rubbish and disused furniture on some areas of each floor
- ▶ Non fire rated doorsets on flats– doors often wedged open so children and occupants without keys could enter
- ▶ Old non serviceable fire equipment on some floors




Grenfell Tower Building Data

- ▶ No evacuation plans or fire wardens
- ▶ No smoke or fire detection or emergency lighting
- ▶ No floor signs in stairwell, or exit signage
- ▶ Evacuation plans, floor plans not provided
- ▶ Dry riser, fire hose reels ,fire extinguishers or fire sprinklers not considered
- ▶ Smoke alarms and interconnected smoke detection not installed
- ▶ Smoke fans and exhaust fans were not operating at time of fire





Grenfell Tower

- ▶ The critical factor in this fire was the ability of a fire in a refrigerator in a 4th level apartment which was extinguished by responding fire crews but not before it had scorched the external cladding and caused it to ignite by the fire having spread to the window and with flame impingement to the wall cladding.
 - ▶ Once the fire began to rapidly burn upwards it was able to penetrate into an open window of an upper apartment spread through that apartment and because doors had been left open or wedged open allowed to spread to another apartment on other side of building
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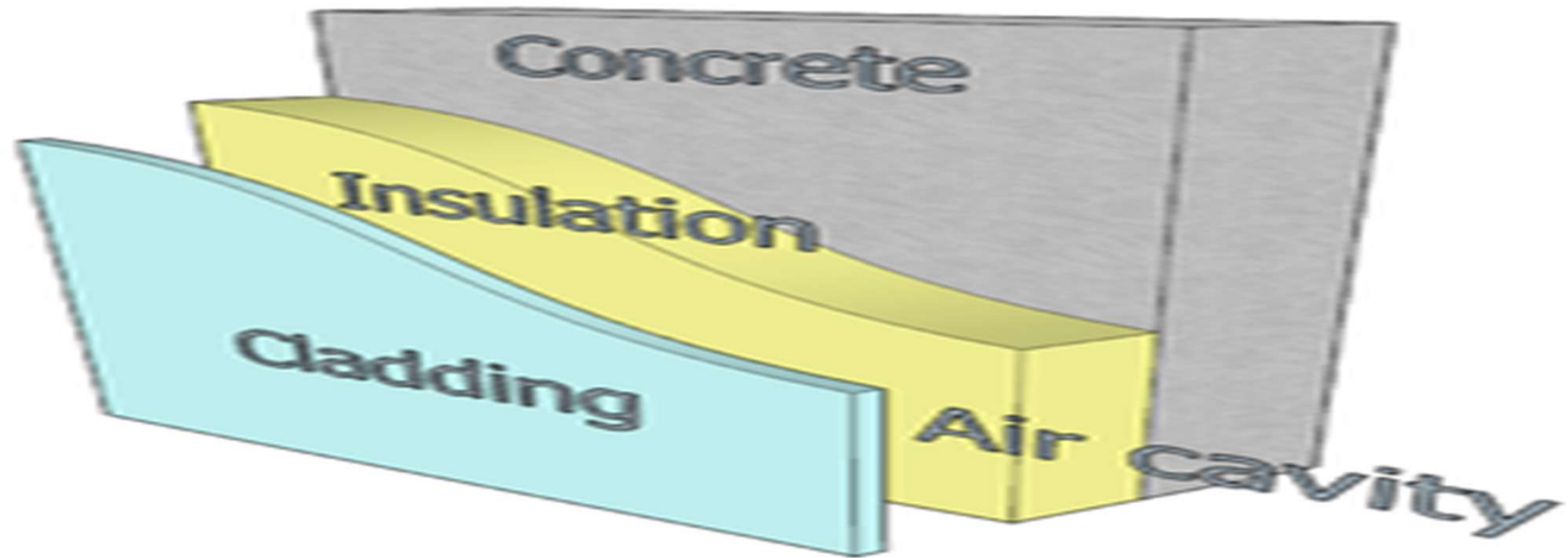


The Cladding

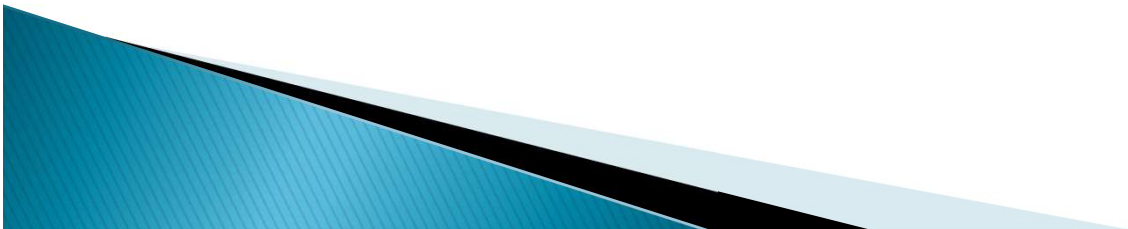
- ▶ As part of the project, in 2015–2016, the concrete structure received new windows and new aluminium composite rainscreen cladding, in part to improve the appearance of the building.
- ▶ Two types were used: Arconic's Reynobond PE, which consists of two coil-coated aluminium sheets that are fusion bonded to both sides of a polyethylene core; and Reynolux aluminium sheets. Beneath these, and fixed to the outside of the walls of the flats was Celotex RS 5000 PIR thermal insulation.¹



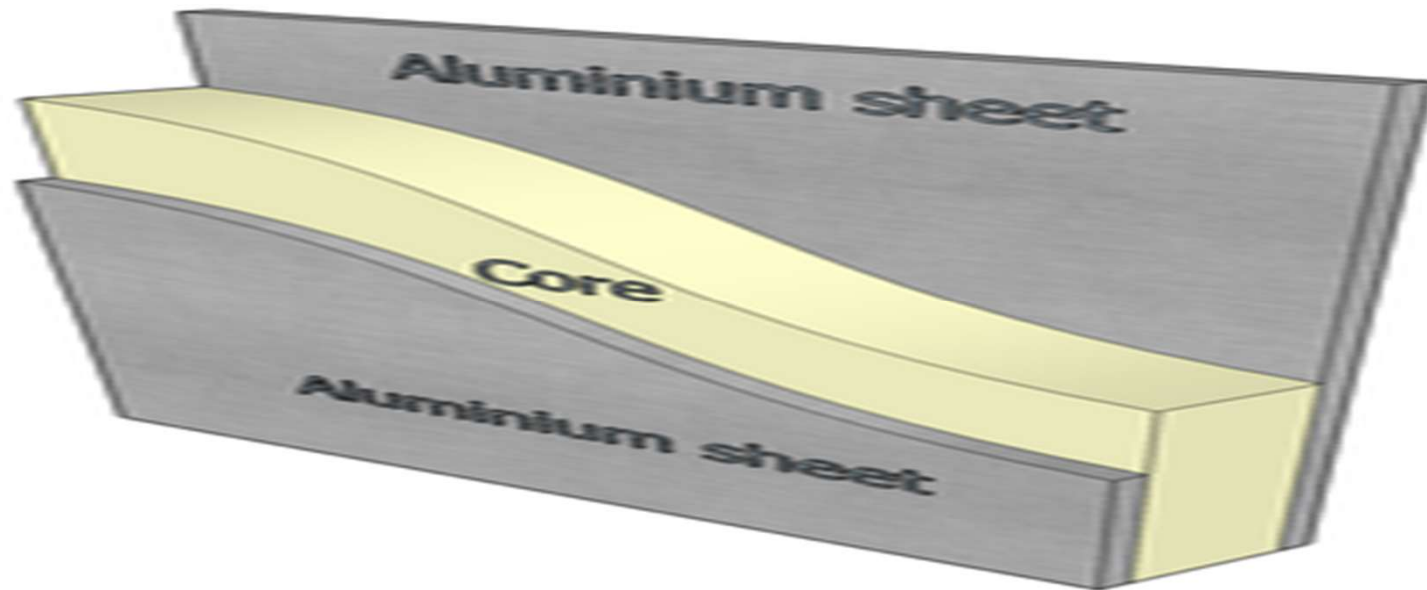
The Cladding



The structure consists of 3 mm cladding (Reynobond PE), 50 mm ventilated cavity, 150 mm insulation (Celotex RS5000) and 250 mm existing concrete



The Cladding



Structure of an ACM sandwich panel. In the case of Reynobond PE, aluminum sheets' thickness is 0.5 mm (0.020 in) and overall panel thickness is either 3, 4, or 6 mm. Fire safety experts have said that the building's new external cladding was a possible cause of the rapid spread of the fire. Experts said the gap between the cladding and the insulation worked like a chimney to spread the fire




The Cladding

- ▶ Interestingly, external cladding has been around for many years and used successfully on many buildings in over 50 countries.
- ▶ Aluminium Polyethylene Cladding which includes products referred to as ACM (Aluminium Composite Material) or referred to as sandwich panels the combustibility of which is dependant on the insulation material used between the layers of Aluminium.
- ▶ One has a poethylene core (similar to polystyrene) and the other has a Fibre Mineral core(less flammable) with the latter about \$5 per meter more expensive.



The Cladding

- ▶ To further add to the woes of combustible cladding the builders installed Poly Isocyanurate Product(PIR) insulation under the cladding to attain high degree of insulation and thus energy efficiency and lowering heating costs to occupants.
 - ▶ This product is same as that in ISP in coolrooms and is highly flammable melts and burns as a liquid and toxic, flaming falling pieces of which can be seen in videos of the fire.
 - ▶ This also explains the high degree of toxins in smoke emanating from the fire in the cladding
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The Fire

- ▶ So now we have a residential high rise apartment building built under an older building regulation predominately non combustible concrete with minimal fire separation, early warning, suppression or fire fighting equipment and poorly maintained building both in respect to services and debris and obstructions to stairs and corridors so a non compliant building in many aspects and now with a non compliant external cladding and no additional fire safety measures to combat a increase in fire source features.



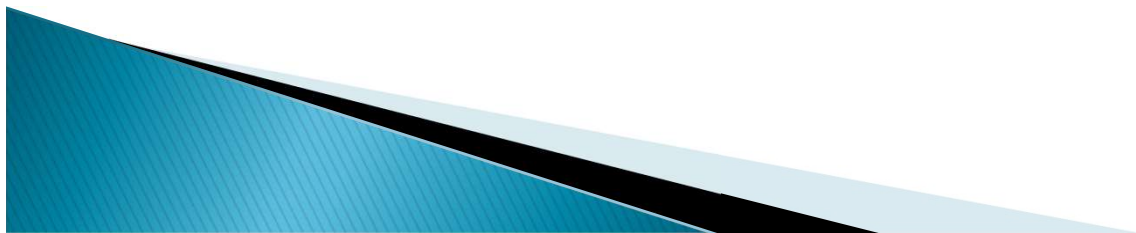
The Fire

- ▶ A fire breaks out in a refrigerator in a unit on level 4 at 0054 hours on 14 June 2017.
- ▶ Crews quickly extinguished the fire in this apartment but not before it spread to the insulation and cladding material on the outside once the fire breached the window of the flat of origin.
- ▶ The rate of spread was faster than the arriving fire crews could cope with and once the fire exceeded the 10th floor any attempt to use ladders and monitors was useless.



The Fire

- ▶ Surprisingly as a result of the refurbishment the roads servicing the buildings were reduced in size to accommodate more pedestrian activity and curb traffic movements around the Tower.
- ▶ This reduced road access meant that with vehicles parked along the sides access for aerial ladders and platforms was not available and in some cases responding fire crews were parked over 400 metres from the building and the area became gridlocked with emergency vehicles as access was limited and reduced



The Fire

- ▶ The fire burned for over 60 hours, responded 45 fire trucks, 250 firefighters, dishoused 650 persons from Grenfell and a further 1500 residents of the other 2 residential towers in the borough.
- ▶ Death toll from the fire now stands at 80 although this is expected to rise over the next few months while the tower is having all debris removed.
- ▶ There are still 23 apartments where Police have not been able to speak with the occupants





Aftermath

- ▶ Currently there is much political and governmental finger pointing and the responsibility for the disaster is likely to see a number of politicians and those responsible for installing the cladding and those who over saw the refurbishment project likely to face the Coroners court to explain their actions
- ▶ The British Government has placed an immediate ban on the use of cladding materials on refurbished buildings until a formal hearing delivers its reports on safety and risk issues surrounding its use and installation



Impact on built environment

- ▶ UK building regulations are likely to be toughened in light of this tragedy with restrictions on use of combustible cladding on buildings over 25 metres.
- ▶ They will also look at fire isolated stairs fire rated lifts and other fire safety measures that will provide a higher level of safety for occupants across the community
- ▶ UK is likely to introduce some tough regulations in public housing to ensure there are adequate safety measures in place to ensure minimal loss of life. This will include evacuation plans, routes and procedures



International Impact

- ▶ Internationally there has also been some cautious reviews on the extent of the use of these types of cladding and how widespread it is in cities.
- ▶ In Australia a review was already underway after the Lacrosse tower fire in Melbourne where the external cladding burned the entire side of the residential apartment complex starting on a balcony as a result of faulty Bar B Que.
- ▶ Other states have followed a review including Queensland and Western Australia



International Impact

- ▶ In NSW the ABCB has released an advisory note regarding the cladding and NSW Government has ordered an audit of all buildings and a review of practices and the use of this cladding.
- ▶ Importation bans are in place so that it cannot be imported into Australia.
- ▶ Currently, NSW has a External Cladding Review Committee which is chaired by Dept of Planning and has a number of Building professionals conducting inspections of buildings and making recommendations on replacement of unsafe cladding materials



Other Cladding fires

- ▶ Cultural Center fire (China)—believed to have spread via insulating foam panels on the building's façade
- ▶ 2010 Wooshin Golden Suites fire (Marine City, South Korea)—spread within 20 minutes from the 4th floor to the top of the 38-storey building, which featured flammable aluminium composite cladding with a polyethylene core, along with insulation made of glass wool or polystyrene
- ▶ 2010 Shanghai fire (China)—destroyed a 28-storey high-rise apartment building, killing at least 58 people; flammable polyurethane insulation applied to the outside of the building was reported to have been a possible contributory factor



Other Cladding Fires

- ▶ 2012 [Al Tayer Tower fire](#) ([Sharjah](#), United Arab Emirates)—the rapid spread of the fire, which started in a first-floor balcony and spread to the top of the 40-storey (34 residential, six parking floors) tower, was attributed to aluminium sandwich panels featuring a thermo-plastic core[\[130\]\[285\]](#)
- ▶ 2012 [Mermoz Tower fire](#) ([Roubaix](#), France)—saw fire spread rapidly up flammable cladding, resulting in one death and six injured[\[181\]\[286\]](#)




Other Cladding Fires

- ▶ 2015 fire at [The Address Downtown Dubai](#) (United Arab Emirates)—cladding fire in a [supertall](#) hotel and residential skyscraper
- ▶ 2012 [Tamweel Tower fire](#) ([Dubai](#), United Arab Emirates)—spread across dozens of floors via flammable aluminium cladding
- ▶ 2014 [Lacrosse Tower fire](#) ([Melbourne](#), Australia)—a fire started on an eighth-floor balcony took just 11 minutes to travel up 13 floors to the building's roof, spreading via the same type of aluminium composite cladding as was used in Grenfell Tower^{[\[289\]](#)}



Other Cladding Fires

- ▶ 2015 fire at [The Marina Torch](#) (Dubai, United Arab Emirates)—fire spreading up the cladding of several dozen storeys from the 50th floor to the top of the building
 - ▶ 2015 fire at [The Address Downtown Dubai](#) (United Arab Emirates)—cladding fire in a [supertall](#) hotel and residential skyscraper
 - ▶ 2016 Ramat Gan high-rise fire ([Ramat Gan](#), Israel)—a small fire in a flat quickly spread to the top of a 13-storey tower block via combustible external insulation panelling
 - ▶ 2016 [Neo Soho fire](#) ([Jakarta](#), Indonesia)—the fire occurred while the building was still under construction and spread rapidly up dozens of floors via flammable cladding
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Final Observations

- ▶ From a Compliance perspective the amount of non compliances surely should have alerted building officials that this building was unsafe and created an unsafe environment for residents once the cladding was installed.
- ▶ I believe this is a negligent non compliance and that in this instance a compliance audit was either not completed or not done by a qualified or trained officer.
- ▶ In any case it would appear that the owners of the Tower where not going to fund refurbishments or enhancements to fire services within the tower



Final Observations

- ▶ In this fire all 3 non compliance categories were evident and yet nothing was done to rectify the shortcomings.
- ▶ For many years Councils and compliance officers have dealt with new and innovative non compliant building elements. In many cases additional fire safety and building safety features are provided to off set the use of non compliant materials or products
- ▶ The use of new and innovative products is likely to be an on going process and their compliance to a standard or level of acceptance will be difficult to achieve



Final Observations

- ▶ At the end of the day compliance and compliance audits are done to ensure that the safety of the building and occupants in that building will not be compromised by installed elements and equipment and that any time occupants are able to egress a building with safety dignity and an assurance there safety and well being will not be placed at risk.
- ▶ Clearly failure to resort the compliance audit back to these basic fundamentals will mean we compromise the safety of occupants.



Any Questions?

