#### Joseph Lstiburek, Ph.D., P.Eng, ASHRAE Fellow

# **Building Science**

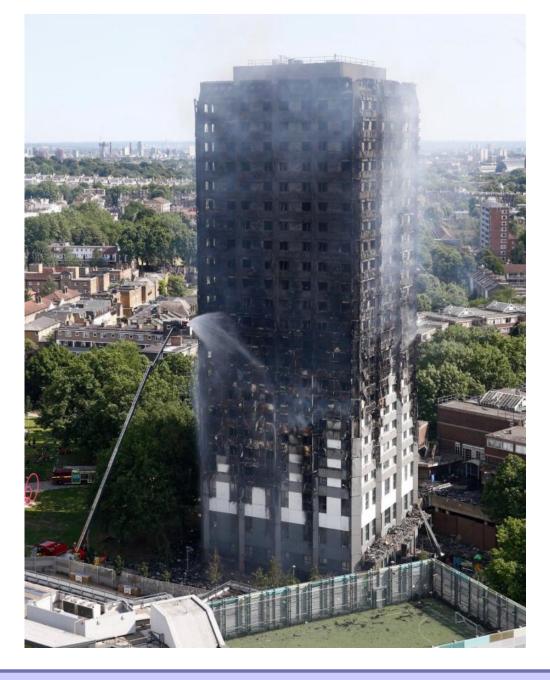
**Towering Inferno** 

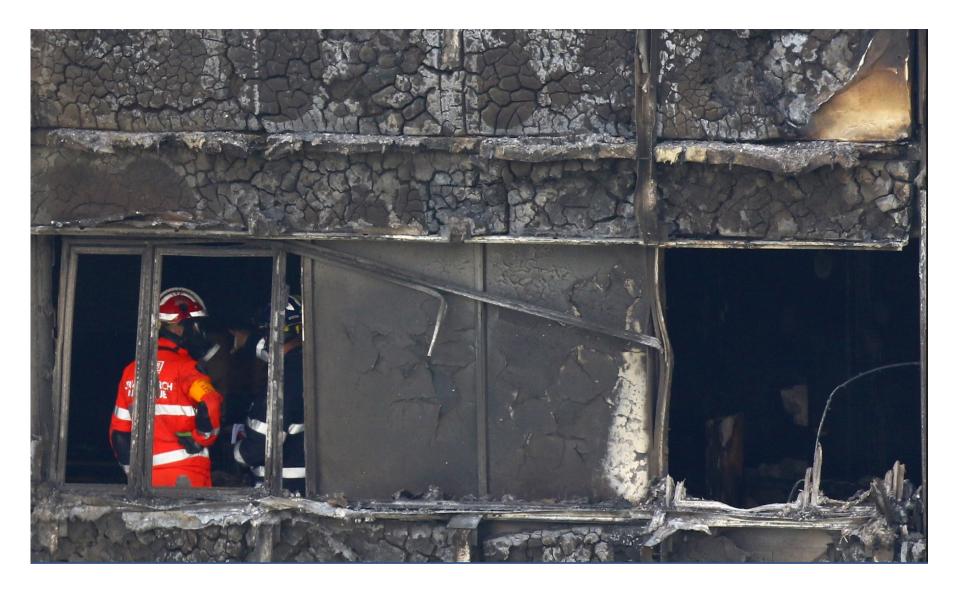
www.buildingscience.com

#### Setting The Stage

## Grenfell Tower North Kensington, United Kingdom June, 2017





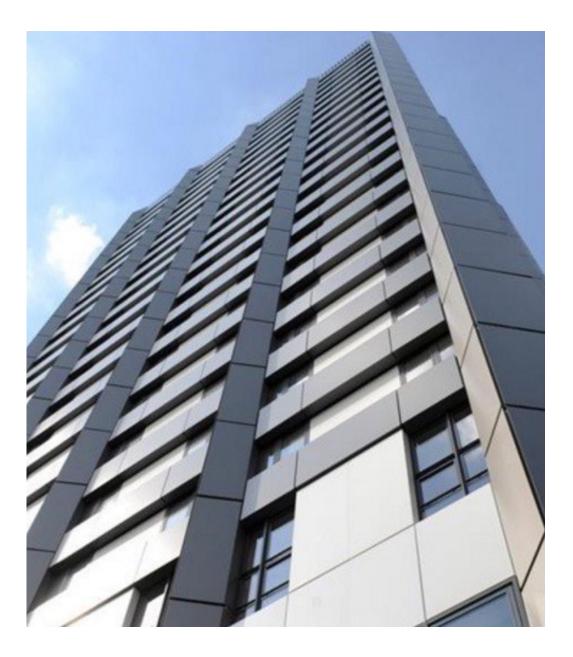


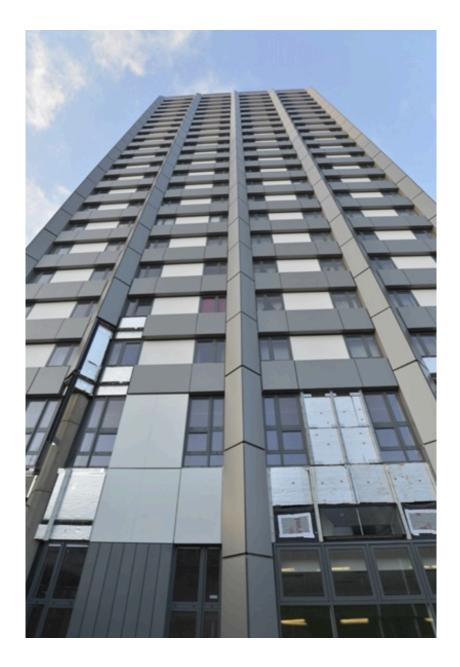
#### Focus is on Cladding

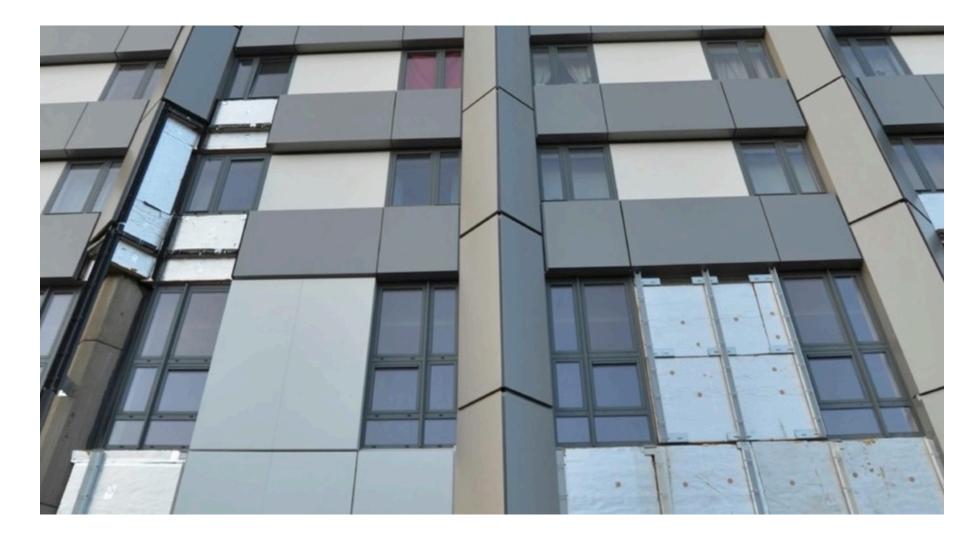
Focus is on Cladding Effective Compartmentalizaton Detection and Alarm Systems Sprinkler Systems Egress



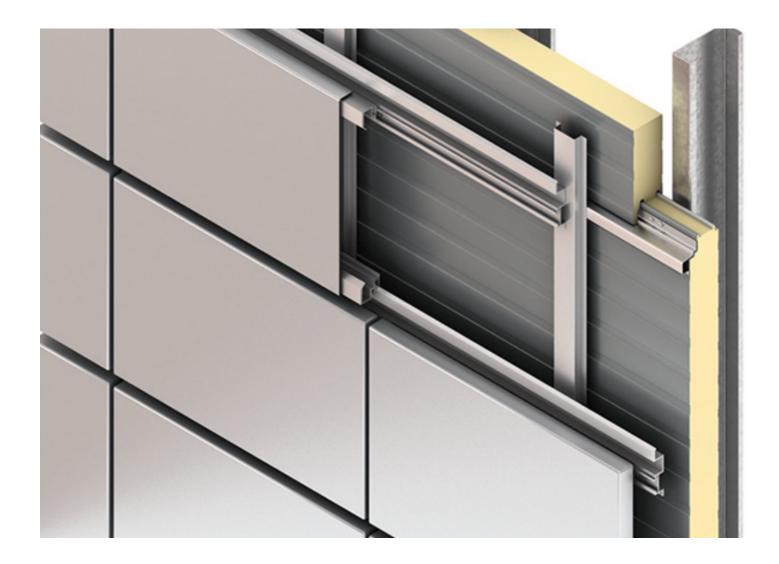


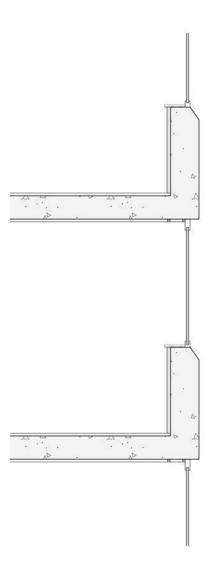


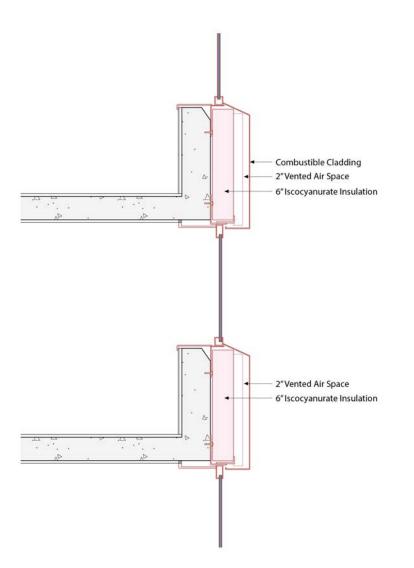


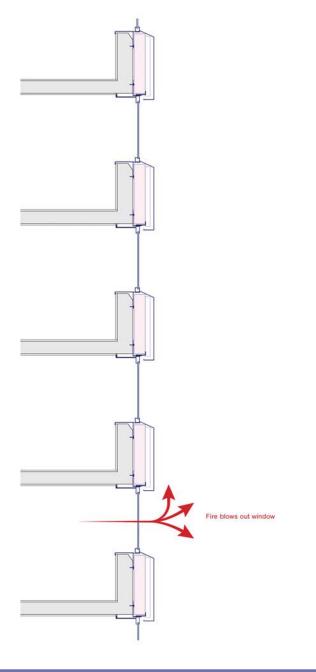


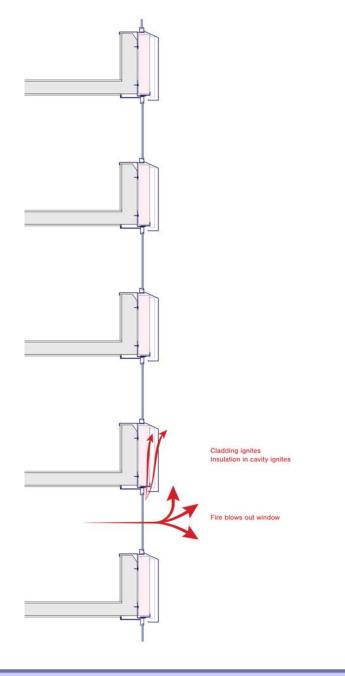




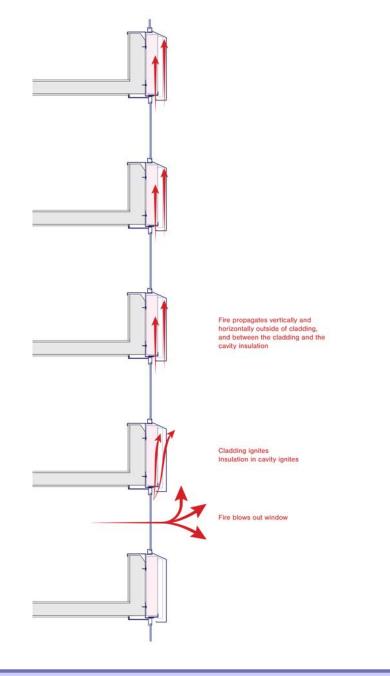




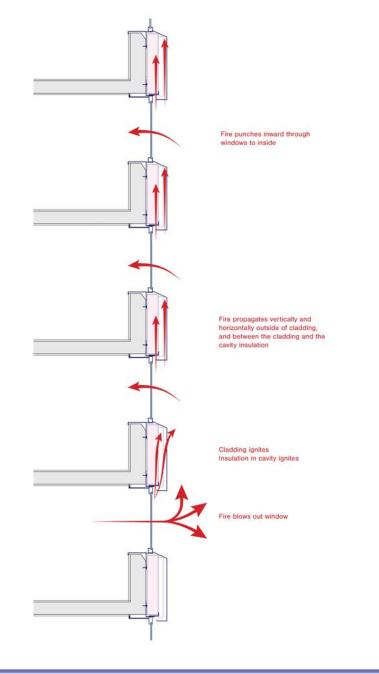




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Dubai Address Hotel Dubai, United Arab Emirates January, 2015





## Mermoz Roubaix, France May 2012

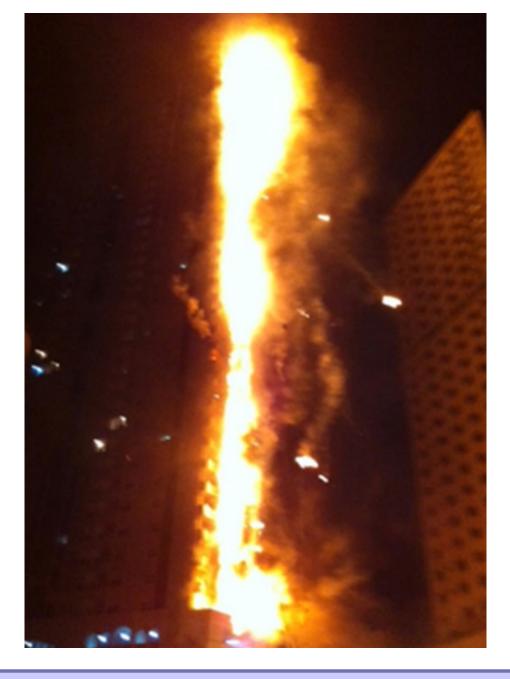


 https://www.youtube.com/watch?v=KHZfLDx YBuU Tamweel Tower Dubai, United Arab Emirates November, 2012





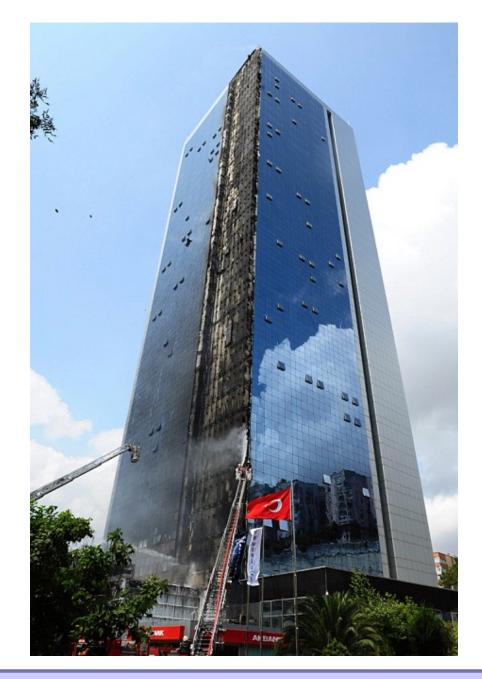
## Al Nahda Tower Sharjah, United Arab Emirates April, 2012





Polat Tower Istanbul, Turkey July, 2012



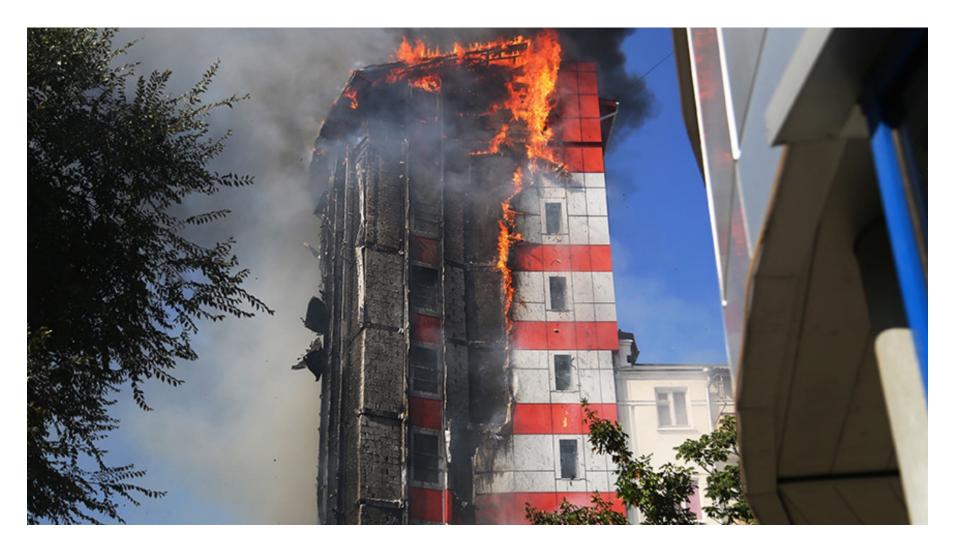


Dubai Torch Tower Dubai, United Arab Emirates August, 2017





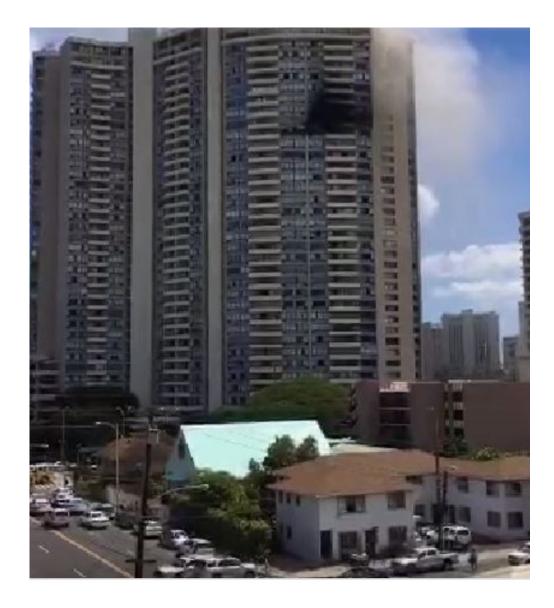
## Thorn House Hotel Rostov-on-Don, Grozny, Chechnya September, 2017



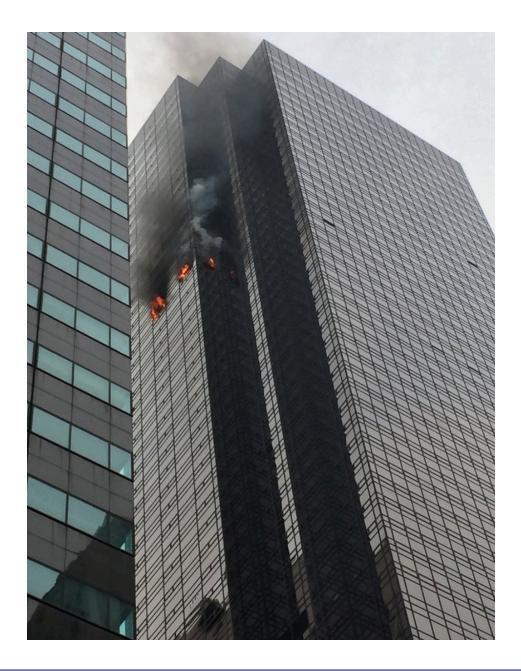


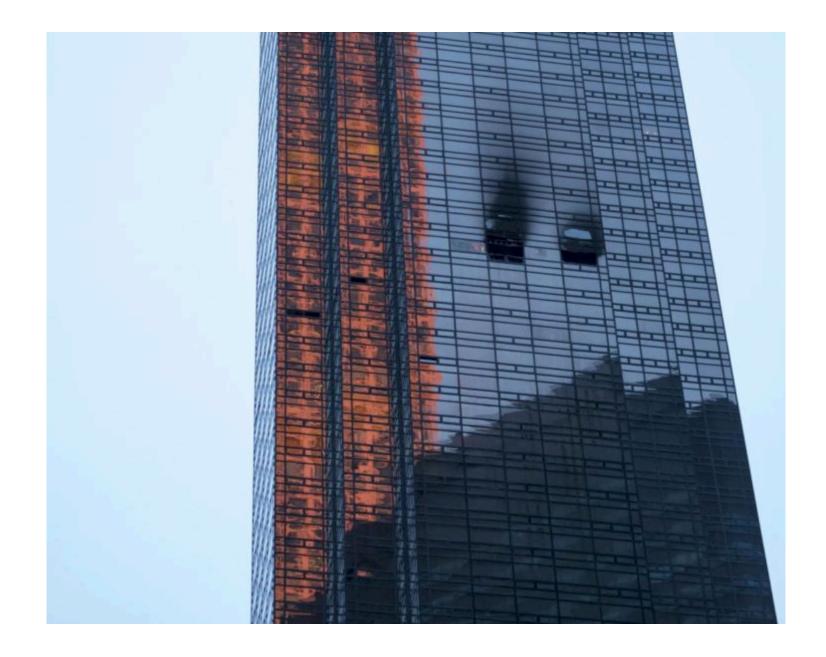
# Marco Polo Apartments Honolulu, Hawaii July, 2017

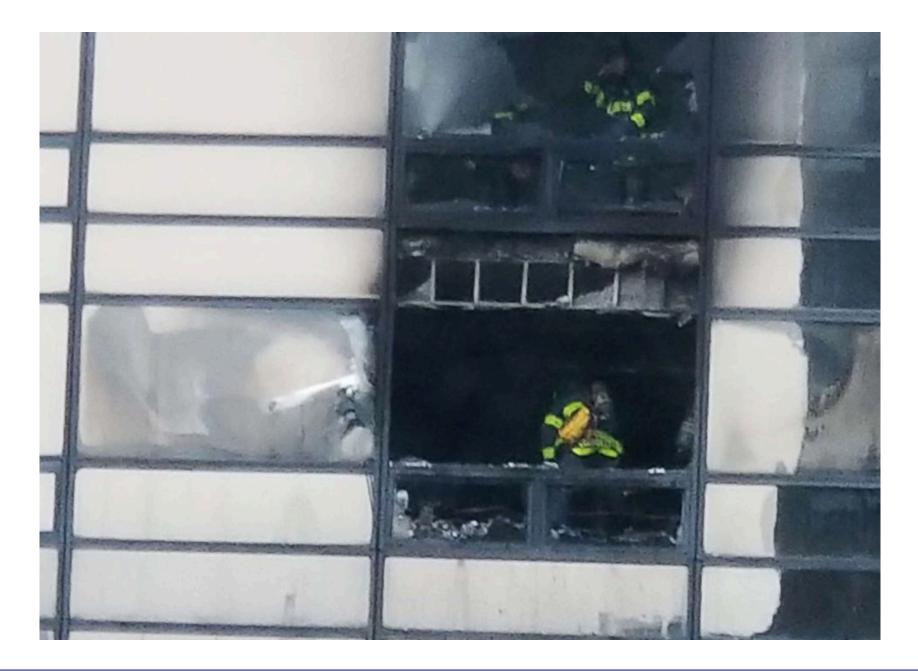




Trump Tower New York, New York April, 2018







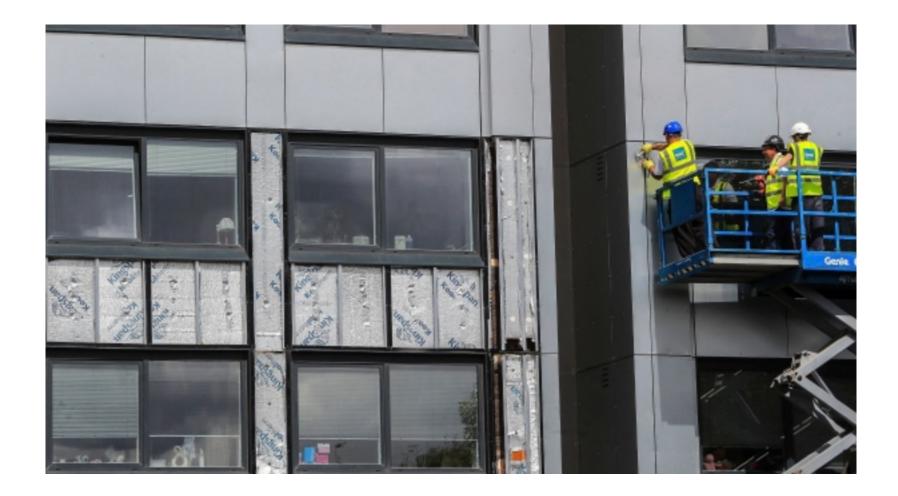
Monte Carlo Casino Las Vegas, NV January, 2008



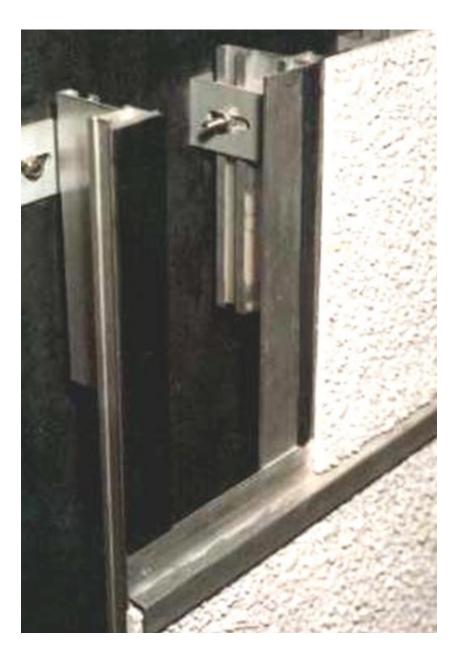




### The English Fix



### **Cladding Attachment**



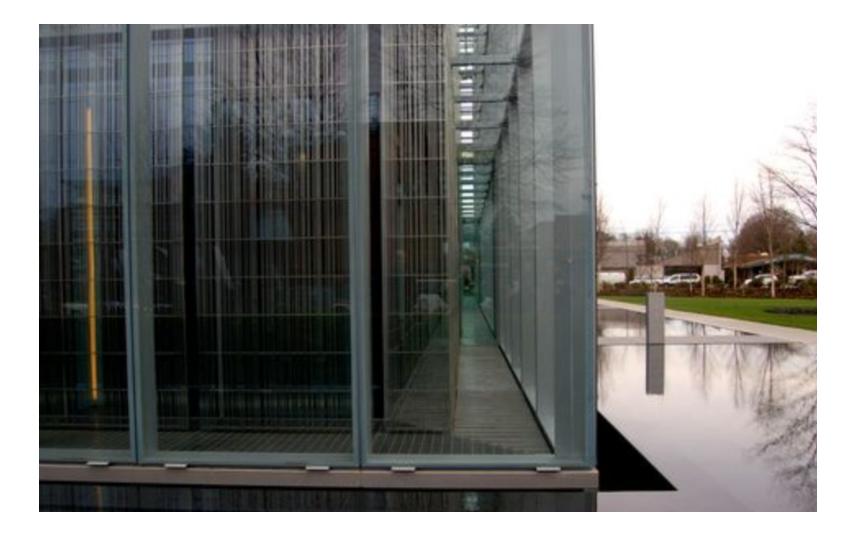
# Hooker Chemical Building Niagara Falls, New York





# John E. Jaqua Academic Center University of Oregon, Eugene, Oregon

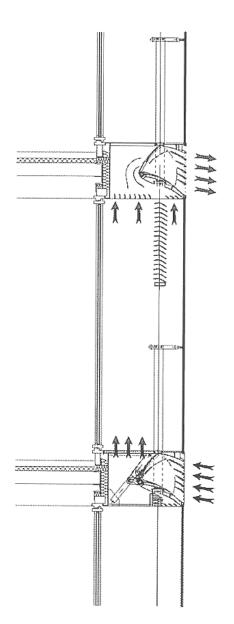




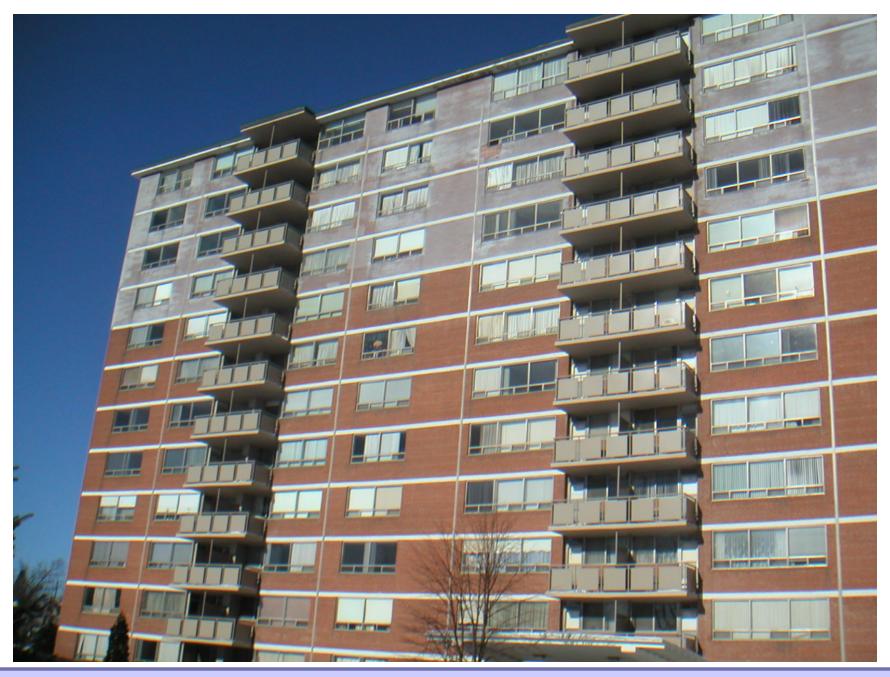
# Stattdor Building Dusseldorf, Germany







#### Where I Grew Up

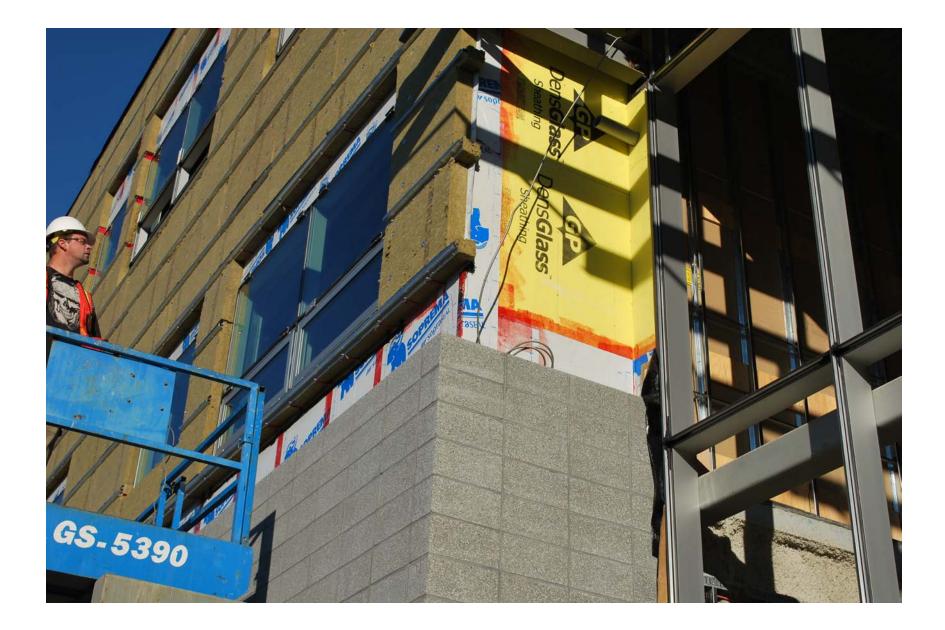






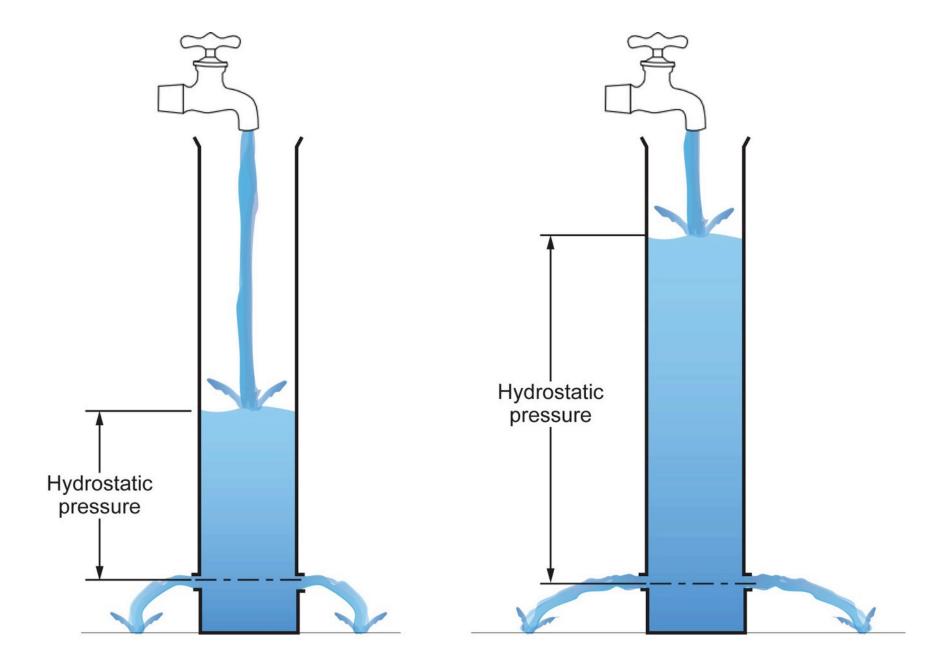




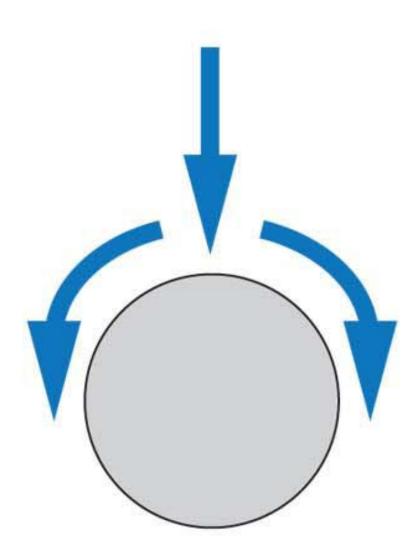


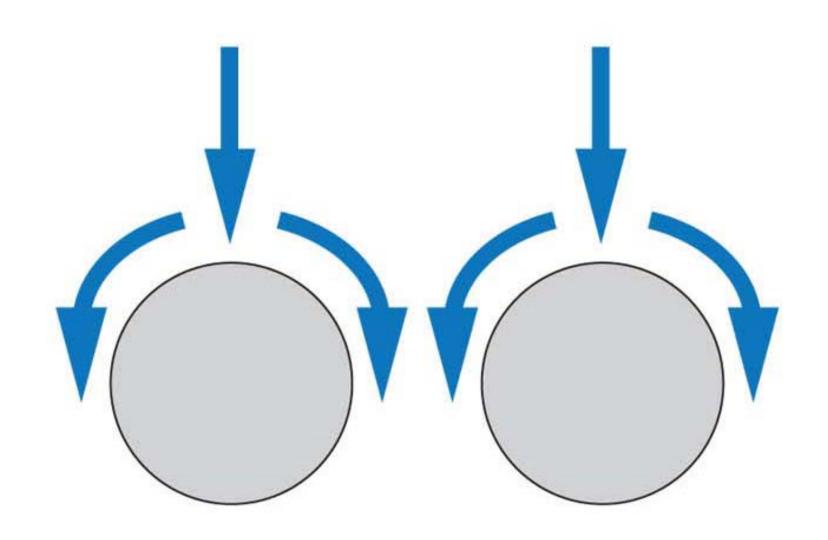
### Rain

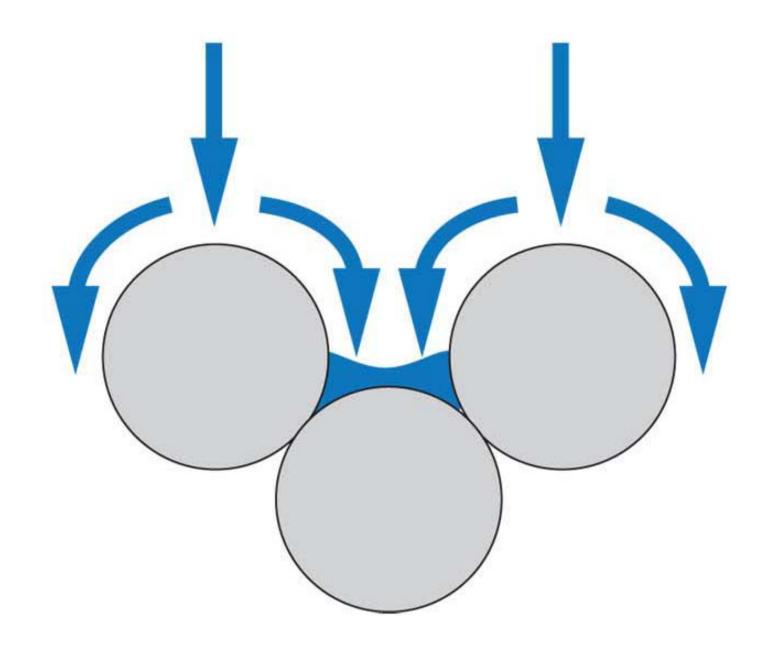


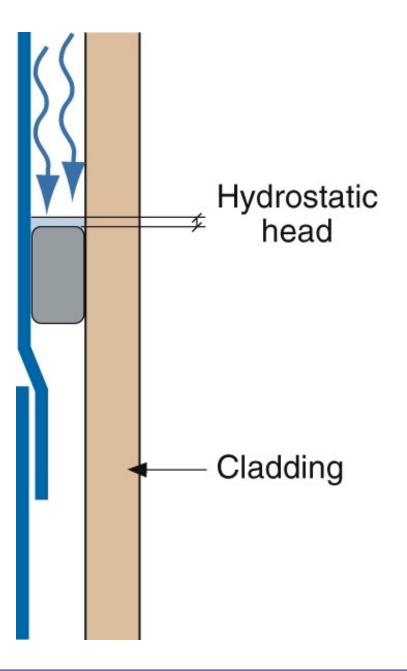


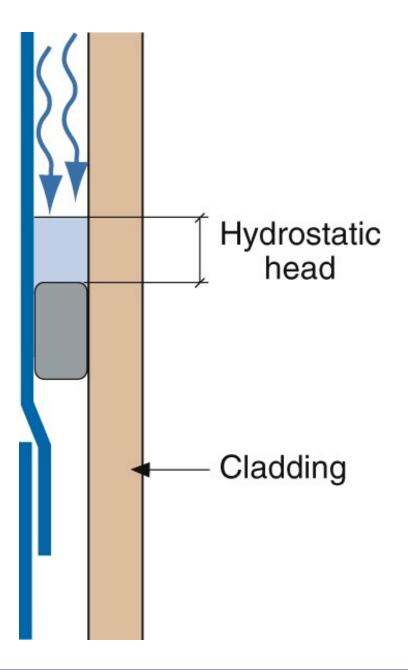


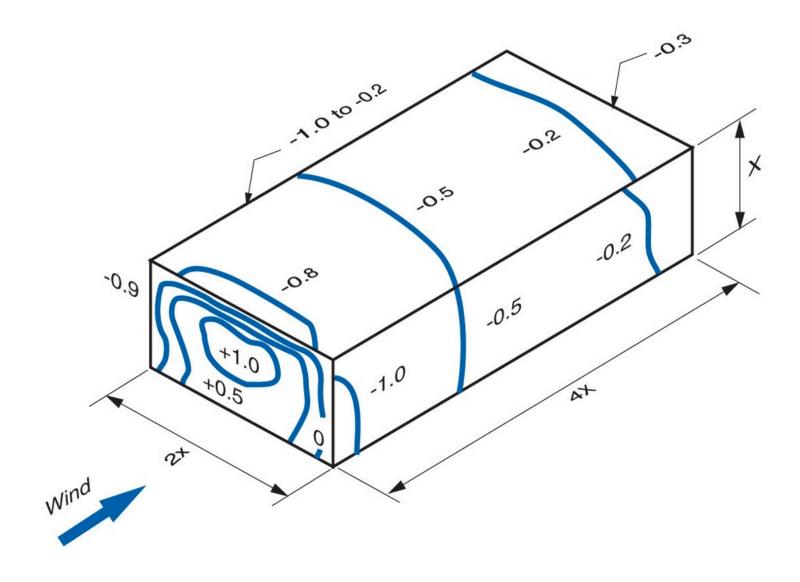




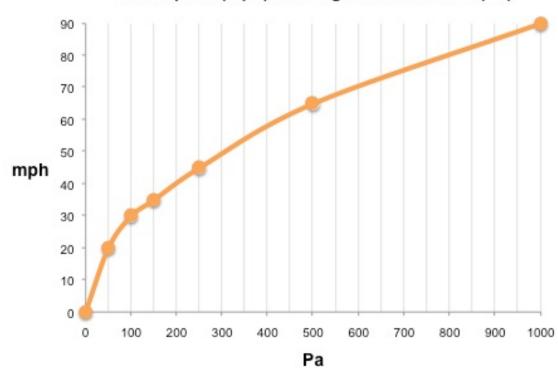






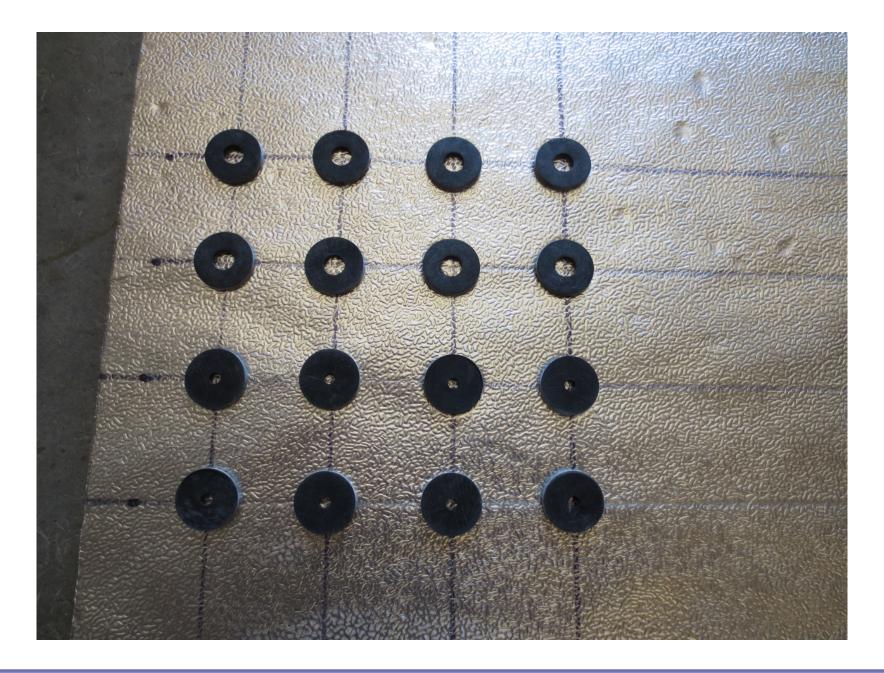


Pascals		mph	
50	Pa =	20	mph
100	Pa =	30	mph
150	Pa =	35	mph
250	Pa =	45	mph
	Pa =		
1,000	Pa =	90	mph



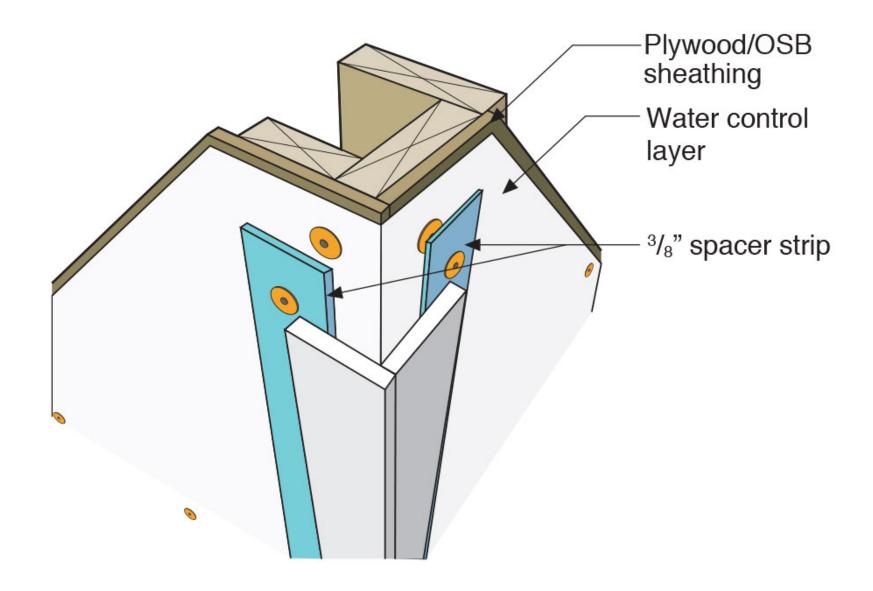
Wind Speed (mph) vs. Stagnation Pressure (Pa)

#### **Rain Screen**

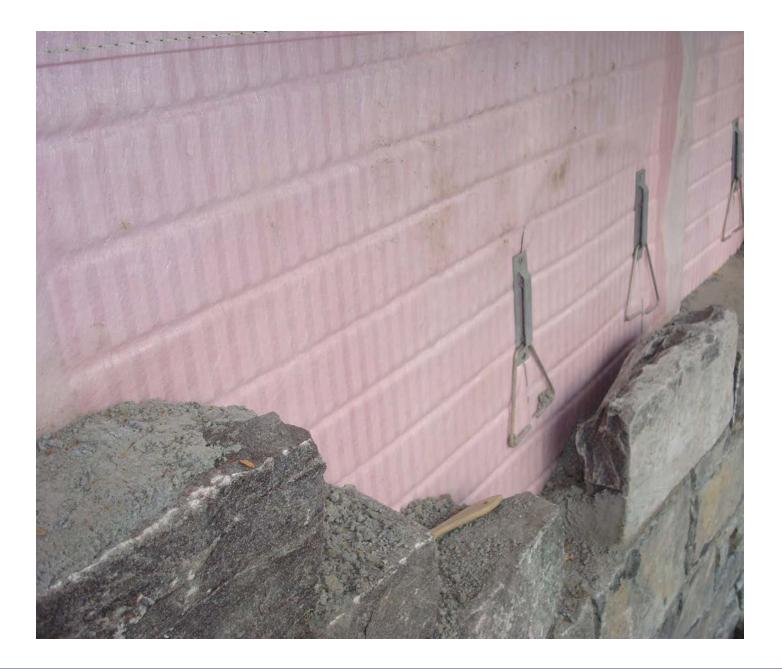


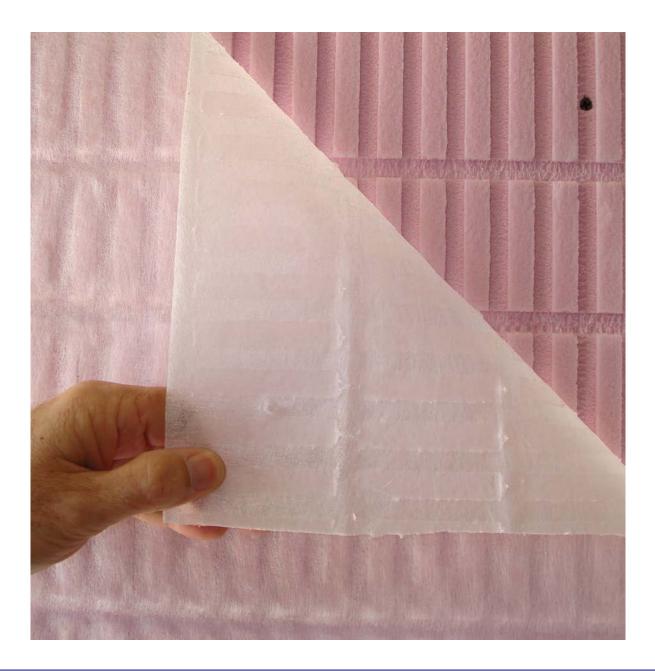


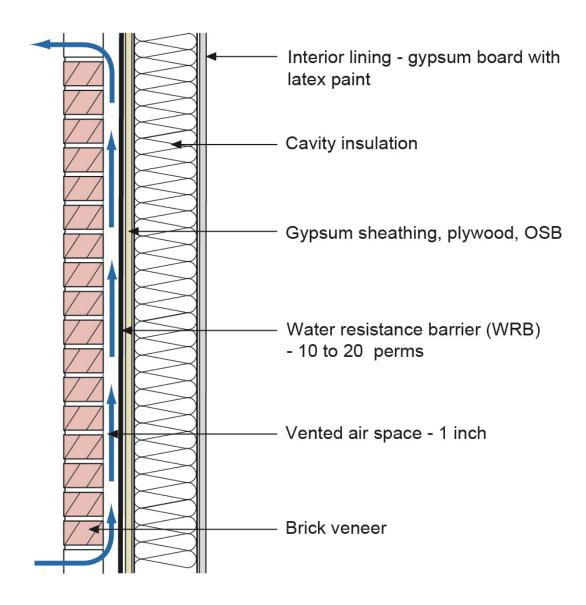


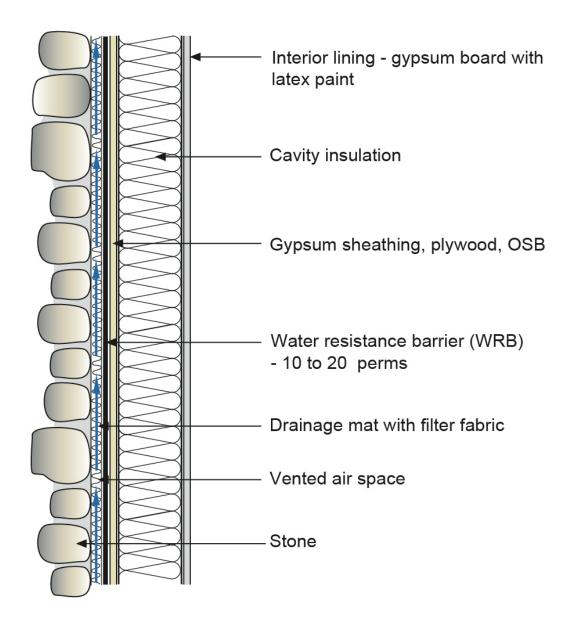


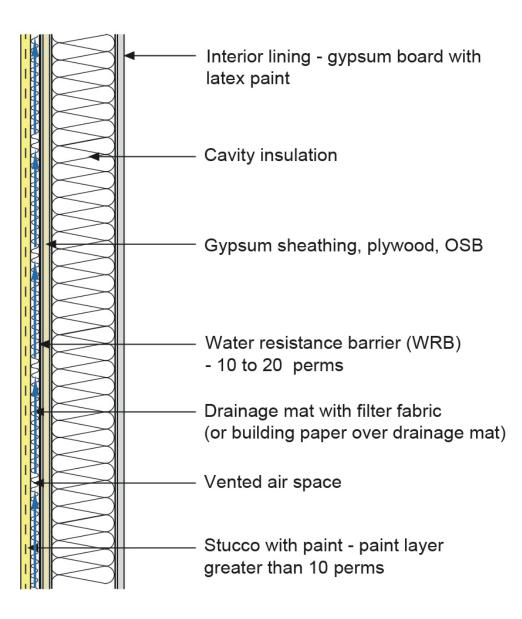






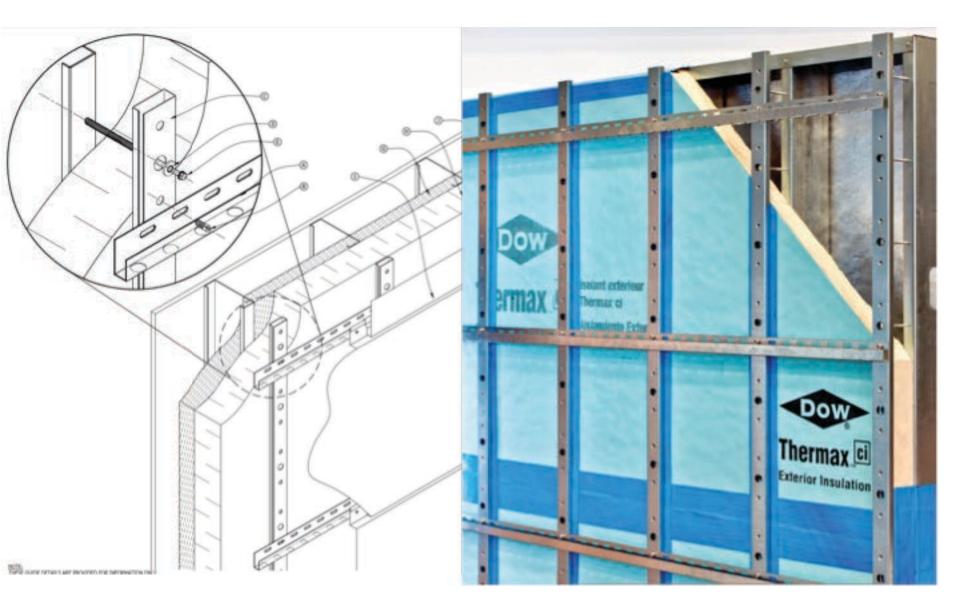


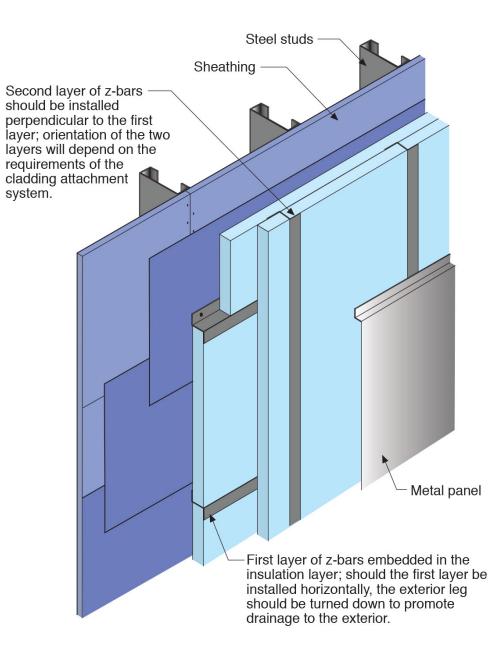


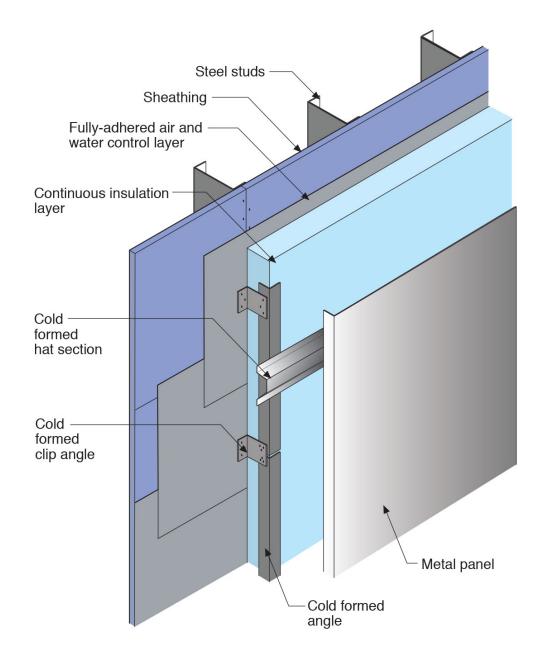


Stucco —	気合	
Expanded polystyrene insulation (EPS)		
	以公	
Air gap —		
Water control layer		
Non paper-faced exterior gypsum		
sheathing, plywood or oriented strand		
board (OSB)		
Insulated wood stud cavity		
Gypsum board		
Latex paint or vapor semi- permeable textured wall fiinish		
Lease and a second s		

## **Cladding Attachment**







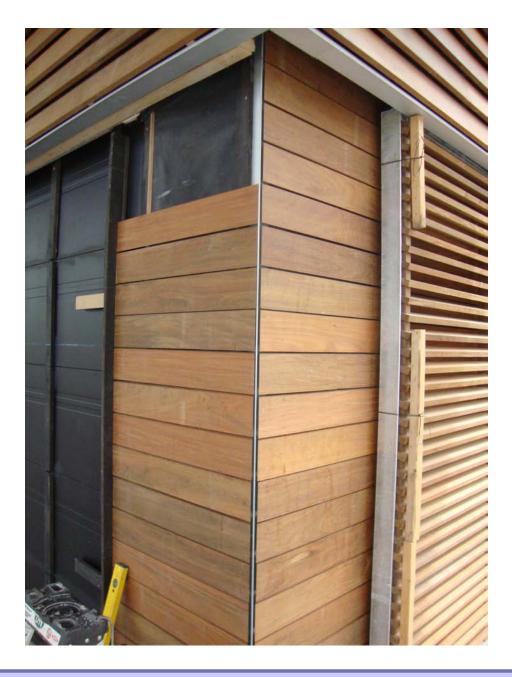


#### **Open Rain Screen**





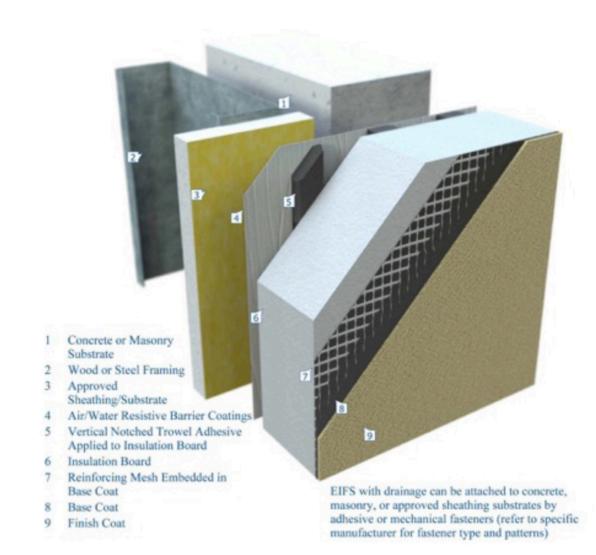




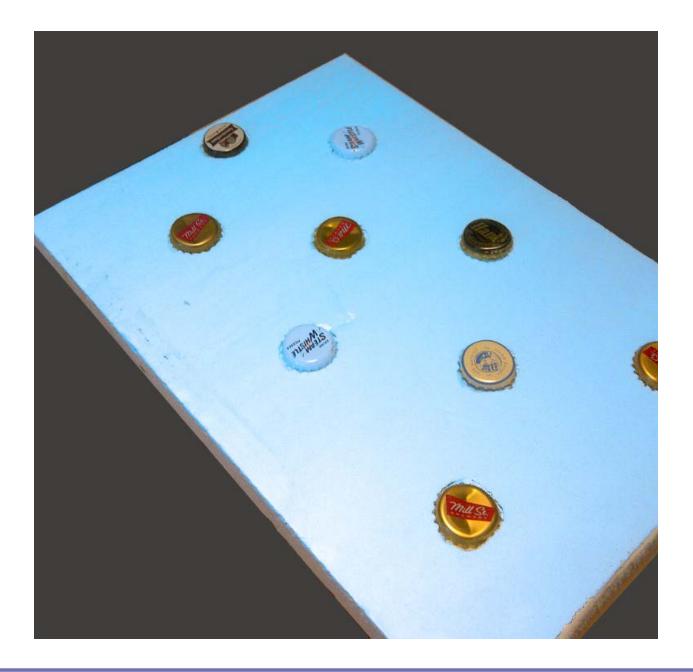
# EIFS...."Drain Screen"

#### Beer Screen?

#### TYPICAL EIFS CONFIGURATION



#### Beer Screen?

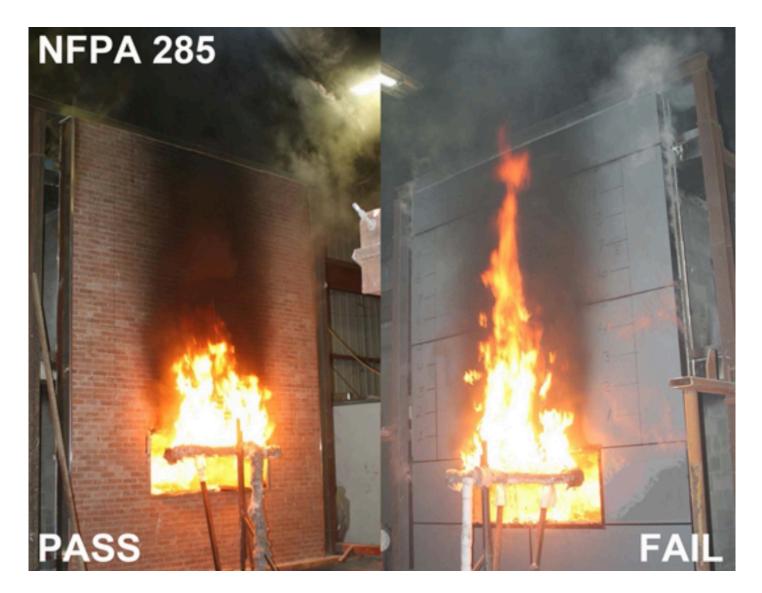


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#### **NFPA 285**



#### Image Courtesy Payette



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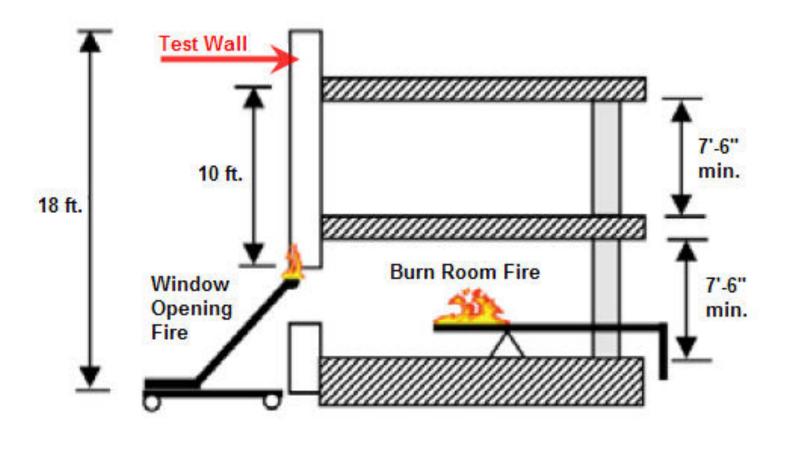


Image Courtesy Carlisle

Thank Jesse Beitel....

### Wild Fires

#### Wild Fires

# Biggest Problem is Due to Embers Drawn into Vented Attics

### Wild Fires

# Biggest Problem is Due to Embers Drawn into Vented Attics

Easy Solution...Unvented Attics

## Need To Understand Vented And Unvented Attics....