Building Science

Towering Inferno

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

www.buildingscience.com
Setting The Stage
Grenfell Tower
North Kensington, United Kingdom
June, 2017
Focus is on Cladding
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Effective Compartmentalization
Detection and Alarm Systems
Sprinkler Systems
Egress
Combustible Cladding
2" Vented Air Space
6" Isocyanurate Insulation

2" Vented Air Space
6" Isocyanurate Insulation
Cladding ignites
Insulation in cavity ignites

Fire blows out window
Fire propagates vertically and horizontally outside of cladding, and between the cladding and the cavity insulation.

Cladding ignites. Insulation in cavity ignites.

Fire blows out window.
Fire punches inward through window to inside.

Fire propagates vertically and horizontally outside of cladding, and between the cladding and the cavity insulation.

Cladding ignites. Insulation in cavity ignites.

Fire blows out window.
Dubai Address Hotel
Dubai, United Arab Emirates
January, 2015
Mermoz Roubaix, France
May 2012
• https://www.youtube.com/watch?v=KHZfLDxYBuU
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
<table>
<thead>
<tr>
<th>Pascals</th>
<th>mph</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Pa</td>
<td>20 mph</td>
</tr>
<tr>
<td>100 Pa</td>
<td>30 mph</td>
</tr>
<tr>
<td>150 Pa</td>
<td>35 mph</td>
</tr>
<tr>
<td>250 Pa</td>
<td>45 mph</td>
</tr>
<tr>
<td>500 Pa</td>
<td>65 mph</td>
</tr>
<tr>
<td>1,000 Pa</td>
<td>90 mph</td>
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</tbody>
</table>

Wind Speed (mph) vs. Stagnation Pressure (Pa)
Rain Screen
Plywood/OSB sheathing

Water control layer

\(\frac{3}{8}\)" spacer strip
- Interior lining - gypsum board with latex paint
- Cavity insulation
- Gypsum sheathing, plywood, OSB
- Water resistance barrier (WRB) - 10 to 20 perms
- Vented air space - 1 inch
- Brick veneer
Interior lining - gypsum board with latex paint

Cavity insulation

Gypsum sheathing, plywood, OSB

Water resistance barrier (WRB) - 10 to 20 perms

Drainage mat with filter fabric

Vented air space

Stone
Interior lining - gypsum board with latex paint

Cavity insulation

Gypsum sheathing, plywood, OSB

Water resistance barrier (WRB) - 10 to 20 perms

Drainage mat with filter fabric (or building paper over drainage mat)

Vented air space

Stucco with paint - paint layer greater than 10 perms
Stucco

Expanded polystyrene insulation (EPS)

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 finish
Cladding Attachment
Second layer of z-bars should be installed perpendicular to the first layer; orientation of the two layers will depend on the requirements of the cladding attachment system.

First layer of z-bars embedded in the insulation layer; should the first layer be installed horizontally, the exterior leg should be turned down to promote drainage to the exterior.
Open Rain Screen
EIFS…”Drain Screen”
Beer Screen?
TYPICAL EIFS CONFIGURATION

1. Concrete or Masonry Substrate
2. Wood or Steel Framing
3. Approved Sheathing/Substrate
4. Air/Water Resistive Barrier Coatings
5. Vertical Notched Trowel Adhesive Applied to Insulation Board
6. Insulation Board
7. Reinforcing Mesh Embedded in Base Coat
8. Base Coat
9. Finish Coat

EIFS with drainage can be attached to concrete, masonry, or approved sheathing substrates by adhesive or mechanical fasteners (refer to specific manufacturer for fastener type and patterns)
Beer Screen?
NFPA 285
Image Courtesy Payette
Image Courtesy Payette
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….