A PEAK BEHIND THE CURTAIN …
OUTLINE

Stick/Unitized Systems
Material Compatibility & Adhesion Issues
Fabrication & Installation Issues
Shadow Boxing
Glass Issues
Foreign Procurement
Industry Trends
Stick Systems

Anchors, Vertical Mullions, Rails, Backpans/Spandrels, IGUs

Source: Alumicor
Note air/water seal location between mullions and rails.

Source: CMHC Best Practice Guide
Air Flow and Rainwater Control
Unitized Systems
Unitized Systems (Captured)

Source: Alumicor
Structural Silicone Systems (SSG, 2 & 4 sided)

Weather Seal, IGUs, Structural Silicone, Silicone Compatible Tape or Gasket

Courtesy: The Dow Chemical Co.
Unitized Systems (SSG)
Toggle/Cassette Systems
Material Compatibility & Adhesion Issues
Field De-glazing
TRIPLE GLAZE UNITS
EXTERIOR - 6mm GREY HEAT STRENGTHENED
13mm STAINLESS STEEL SPACER BAR c/w ARG
MIDDLE: 6mm CLEAR HEAT STRENGTHENED c/w ARG
13mm STAINLESS STEEL SPACER BAR c/w ARG
INTERIOR - 6mm CLEAR ANNEALED

SPANDREL GLASS
6mm OPACI-COAT 300
COLOR - #3-2409 GUN POWDER

DOUBLE GLAZE UNITS
6mm GREY - EXTERIOR - HEAT STRENGTHENED
13mm STAINLESS STEEL SPACER BAR c/w ARG
6mm CLEAR ANNEALED - INTERIOR
Trial & Error
Don’t Forget To Ask For….

Sealant Manufacturer Prequalification Testing Including:

- Adhesion Testing
- Compatibility Testing
- Non-Staining Testing

TAKES 4 TO 6 WEEKS!
Lab Testing

Adhesion

Compatibility

Courtesy of The Dow Chemical Co.
Silicone and EPDM Incompatibility

Courtesy of The Dow Chemical Co.
<table>
<thead>
<tr>
<th>LEGEND</th>
<th>Silicone-sealant (neutral cure)</th>
<th>Silicone-sealant (acid cure)</th>
<th>Polyurethanes</th>
<th>Hybrids and Polyethers</th>
<th>Polysulfide</th>
<th>Thermo-plastics</th>
<th>Acryls</th>
<th>Butyl</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Red</strong>: Not recommended.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Organic sealants will not adhere to silicone blocks and gaskets</td>
</tr>
<tr>
<td><strong>Orange</strong>: Caution – known compatibility and adhesion issues.</td>
<td></td>
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<td>75% no compatibility issues but 25% lighter colored sealants will discolor (aesthetic issue)</td>
</tr>
<tr>
<td><strong>Yellow</strong>: No compatibility issues but verify adhesion.</td>
<td></td>
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<td></td>
<td>Lighter colored sealants will discolor</td>
</tr>
<tr>
<td><strong>Green</strong>: No compatibility issues, good adhesion.</td>
<td></td>
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<td></td>
<td>Lighter colored sealants will discolor</td>
</tr>
<tr>
<td>Silicone setting blocks and gaskets</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Lighter colored sealants will discolor</td>
</tr>
<tr>
<td>Silicone compton rubber (SCR)</td>
<td></td>
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<td>Lighter colored sealants will discolor</td>
</tr>
<tr>
<td>EPDM setting blocks and gaskets</td>
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<td></td>
<td>Lighter colored sealants will discolor</td>
</tr>
<tr>
<td>Neoprene setting blocks and gaskets</td>
<td></td>
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<td></td>
<td></td>
<td>Lighter colored sealants will discolor</td>
</tr>
<tr>
<td>Asphaltic-backed membranes (back side)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>Lighter colored sealants will discolor</td>
</tr>
<tr>
<td>Asphaltic-backed fully adhered membranes (front side typically polyethylene)</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Most sealants will not adhere, test to verify</td>
</tr>
<tr>
<td>Fully adhered membranes (breathable, typically woven surface)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>Most sealants will not adhere, test to verify</td>
</tr>
</tbody>
</table>

Courtesy: CSA A440.6 (Sneak Preview)
Ensure Pre-Qualification Testing has been Completed by Sealant Manufacturer

Review In-Plant QC testing

Perform Cut-Tests or Full De-Glaze for Field-Applied SSG
Fabrication Issues
LESSONS

Understand Material Limitations

Validate Integrity of Installation with Field Testing Early in the Process
Poor Exterior Rainwater Shedding
Poor Exterior Rainwater Shedding
Obstructed drainage
Obstructed drainage
Discontinuous or Deteriorated Concealed Seals

Discontinuous Inner Seals
Lessons

Provide Effective Water-Shedding Details
Provide Unobstructed Drainage Paths
Provide Continuous Inner Air/Water Seals
Installation Issues – Field Applied SSG
The preferred method
Installation Issues – IGU Support
LESSONS

Higher degree of field oversight and testing required with field applied SSG

Understand component support strategies
Shadow Boxing
Shadow Box Assembly

- Mineral Wool Insulation
- Airseal Bead
- Metal Backpan
- Vent/Drainage Holes at All Corners
- Ventilated Air Cavity
- Metal Liner
- Insulated Glass Unit
career path
It’s a Different Story in a Cold Climate…
So where’s the moisture coming from?
‘Pseudo’ Shadow Box

- Insulated Glass Unit
- Opacifier on #4 Surface
LESSONS

Shadow Box Assemblies are Risky in Cold Climates

Consider ‘Pseudo’ Shadow Box Approach Option

Use a Lighter More Reflective Metal Liner or Apply Pattern to Glass

Manage Mechanical Systems Appropriately
Removed for surface 2 lab test
Glass Issues - Colour

- Low-e consistently on Surface #3 and same product
- Same PVB interlayer
- All outer tinted grey lites from same batch
- No correlation between tin side and air side of glass
Spectrophotometer - ASTM C1736 / ASTM D2244, Delta E < 4.5
Delta E measured at 2.6 (inconsistency in low-e coating)

\[ \Delta E = \sqrt{(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2} \]

- \( L^* \) represents: Lightness varying from 0 (Black) to 100 (White)
- \( a^* \) represents: Colour varying in “+” values (Red) to “-” values (Green)
- \( b^* \) represents: Colour varying in “+” values (Yellow) to “-” values (Blue)

- \( 0 < \Delta E < 1 \)
  - observer does not notice
- \( 1 < \Delta E < 2 \)
  - only experienced observer can notice the difference
- \( 2 < \Delta E < 3.5 \)
  - unexperienced observer also notices the difference
- \( 3.5 < \Delta E < 5 \)
  - clear difference in colour is noticed
- \( 5 < \Delta E \)
  - observer notices two different colours

Figure No. 1 - CIELAB Colour Specification
Distortion
LESSONS

Be Careful with Cleaning Heat Treated Glass

Specify Colour and Roller Wave Tolerances

Full Size Mock-Ups

Exercise Care with Novel Coating Combinations
<table>
<thead>
<tr>
<th>Production Date</th>
<th>2018年01月27日</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substrate Note</td>
<td>膜系编码中前两位数字代表基片颜色 代号为：00-超白、01-白玻、02-绿玻灰、23-欧洲灰</td>
</tr>
</tbody>
</table>

保质期：至生产(包装)之日起6个月
“You get what you inspect, not what you expect”
- Bryan Hubbs

If you’re buying foreign product, Live in the Plant!
Industry Trends

![Diagram of a high-vacuum chamber with labels for Getters material, Edge Seal, Glass #1, Low-E Coating, Micro Support Pillars, Evacuation Port, and Edge Seal.]

<table>
<thead>
<tr>
<th>Makeup</th>
<th>Thickness</th>
<th>U-Value (R)</th>
<th>SHGC</th>
<th>VLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standalone VIG</td>
<td>5/16” / 8.3mm</td>
<td>0.07 (15.4)*</td>
<td>0.37</td>
<td>70%</td>
</tr>
<tr>
<td>Hybrid, DS</td>
<td>1 1/8” / 28.5mm</td>
<td>0.06 (18.0)*</td>
<td>0.27</td>
<td>56%</td>
</tr>
<tr>
<td>Hybrid, TS</td>
<td>1 1/8” / 28.5mm</td>
<td>0.05 (18.3)</td>
<td>0.22</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: GlassCan
HIGHER PERFORMANCE?

R2-3

R3-4

R19 to ??
cold formed steel frame and/or aluminum extrusion sheathing AVB material mineral wool insulation air space punched windows within a variety of cladding types install and connect like curtain wall size limited to transport
quality of fabrication
schedule
gasketed system eliminates exterior work/maintenance
higher thermal performance
single source
less waste
less labour
safety

lacking mature supply chain
cost
some limitations in building geometry
hybrid wall system
commitment at design concept stage
Questions?

Want to know more?

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dderose@synergypartners.ca