

National Institute of Building Sciences

Provider Number: G168

Balancing aesthetics and performance –
How to protect buildings with open-joint
cladding from the elements without creating
a thermal bridge or compromising design

Course Number

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Dec. 13, 2017



Credit(s) earned on completion of this course will be reported to **AIA CES** for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course Description

The Science Pyramid in the Denver Botanic Gardens had a very specific design requirement: elemental biomimicry. The science of the building needed to be as innovative as the science found within it.

Offsets were created vertically, horizontally, and laterally, and presented no distinction between wall and roof. The faceted sides meet at the spine, where a glazed ribbon of skylights cuts diagonally through the building's footprint. These elements created structural and enclosure-related challenges; the largest being the transitions. The exterior panels left one-inch gaps throughout, increasing the UV exposure. The products used had to balance many variables to achieve the aesthetic form the architect had intended, while avoiding thermal bridging, which would pose energy loss and condensation problems.

This case study will illustrate how the challenges brought on by both the design of the building and the surrounding environment were mitigated with consulting, testing, and the science of advanced technology products. Learn how to protect a building with open-joint cladding from the elements such as intense heat, high UV index, rain, snow, and wind; how to protect your warranties by working with a consultant on product details; and, about the benefits/necessity of having a redundant system in your water-resistive barrier.

Balancing aesthetics and performance

How to protect buildings with open-joint cladding from the elements without creating a thermal bridge or compromising design

Learning Objectives

At the end of the this course, participants will be able to:

1. Different moisture protection technologies for open-joint cladding; how to prevent moisture barrier leaks and warranty issues;
2. Moisture protection solutions for unique structural needs;
3. Proper installation techniques for WRBs and air barriers and the benefits of consulting on product details;
4. Benefits of using tested/proven materials, using first-hand experience and in-field application.

Inspired by Nature, Protected by Science

- Started out as a competition for the design of Denver Botanic Gardens science building
- The winning design for the science building was to be a 34-foot-high pyramid, to mimic the local mountains
- Swisspearl fiber cement rain screen panels were used to complete the look



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Not your everyday pyramid

- With this specific form, offsets were created vertically, horizontally, and laterally
- The faceted sides meet at the spine, where a glazed ribbon of skylights cuts diagonally through the building's footprint
- These elements created quite a few structural and enclosure-related challenges



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The challenges

- The structure was to remain a lean-to, keeping the spatial requirements below void of any columns
- When the forces were transferred slightly lower to accommodate the spine and the striking gap between the two halves of the pyramid, a force-transfer needed to be created
- The resulting force-transfer was much less efficient than forces found in a typical pyramid, and needed to have bigger members to accommodate it



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The ripple effect

- The 5,258-square-foot structure was to include 16 sides, with painted steel tubes and angular windows
- The shape, usage, types of cladding, and climate all had to be factored in when searching for the right materials
- Materials needed to maintain both a watertight exterior and the appropriate interior environmental conditions

Down to the envelope

- The biggest challenge was in the transitions
- Moving across one plane to the next, transitions might appear vertical/simple, but there are slight bends in the sheathing there, requiring laps and being closed off with flashing to maintain the continuity
- The challenges had a ripple effect across the design of the whole building, including the envelope



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Performance vs. aesthetics

- Studio NYL initially looked into standard commercial roofing solutions, but issues surrounding constructability and the overall design made those unviable options
- Needed a product with a redundancy to stop initial rainfall and UV
- It came in the form of a rain screen system; rain/snowfall and UV being caught by FRC cladding and the primary moisture and UV being resisted by DELTA -FASSADE S



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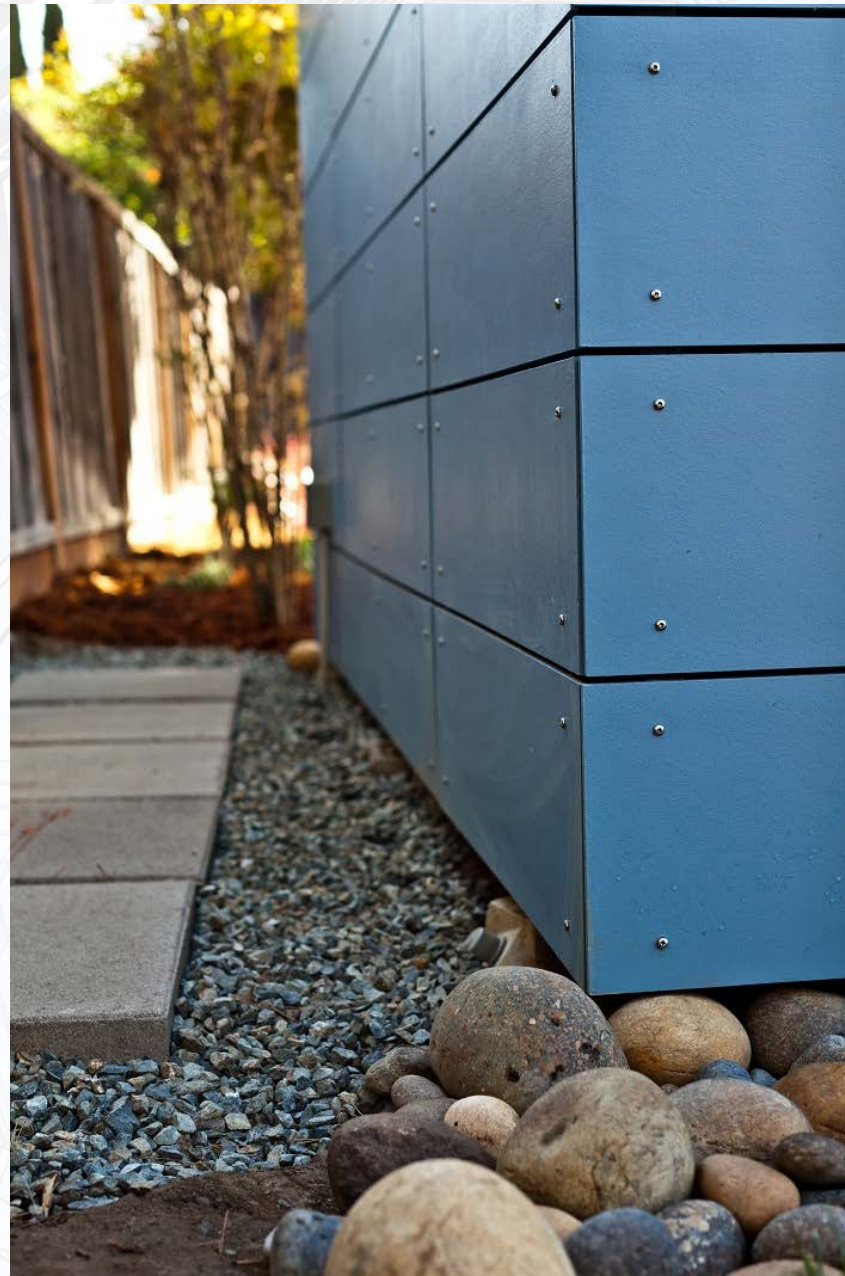




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Spotlight on open-joint cladding barriers

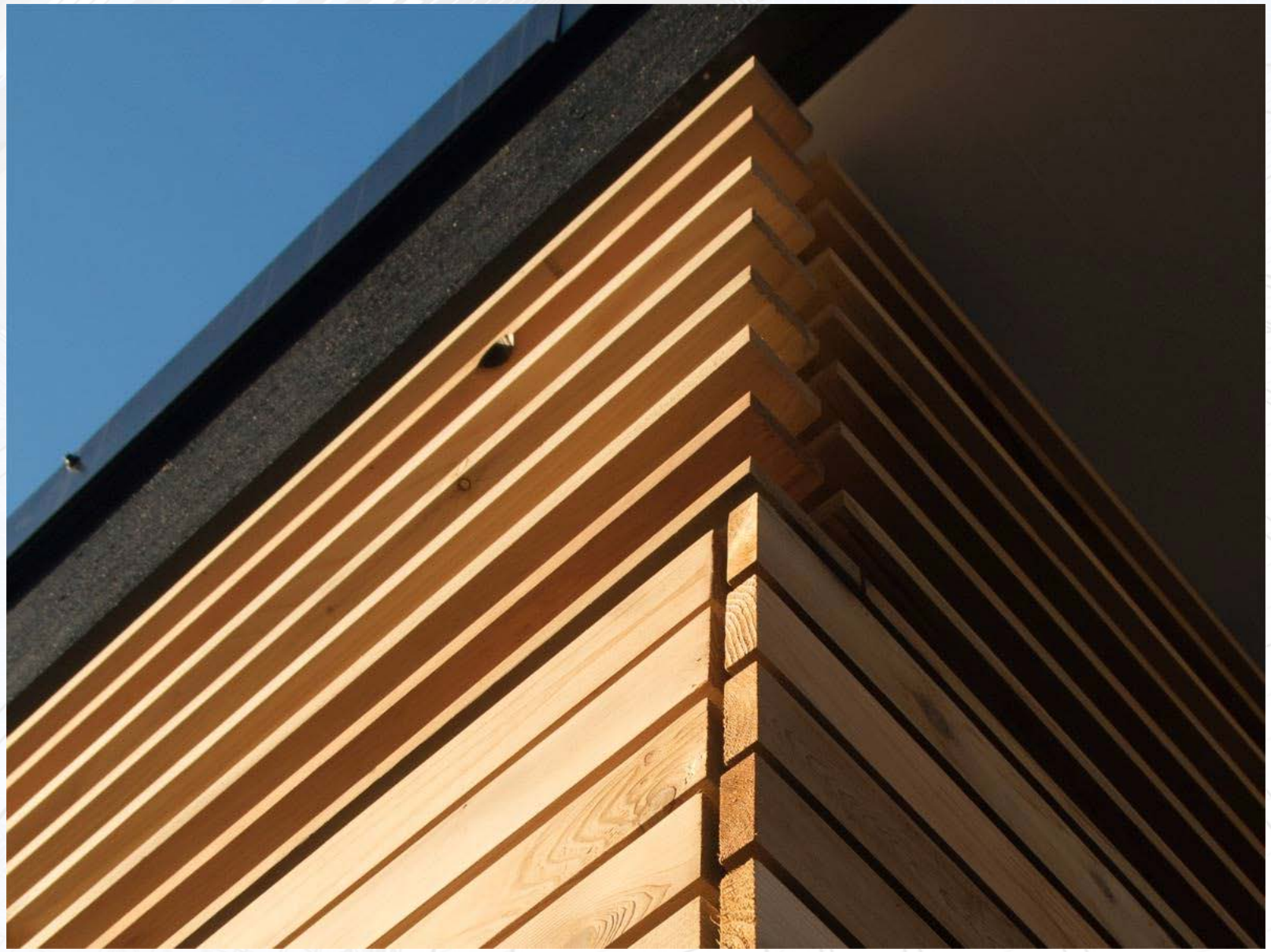
- The extremes of Denver's winter and summer climate and the high UV index made the performance requirements even more stringent
- That plus a large gap between panels, one inch throughout, increased the UV exposure, so a resilient product was needed
- All while avoiding creation of a thermal bridge



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What professionals want

- “With this project, we really needed something that was tried and true, as the time frame from the competition entry to the opening of the building was just **nine months**. The sequencing was critical.”

- William Babbington, AIA PE LEED® AP BD+C, Principal and Façade Design Director at Studio NYL, and Secretary - Building Enclosure Council National Board

**Studio NYL was the structural engineers of record and façade designers of the Science Pyramid*



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Proof is in the testing

- Reserved for hygrothermal testing results

Why choose DELTA[®]-FASSADE S?

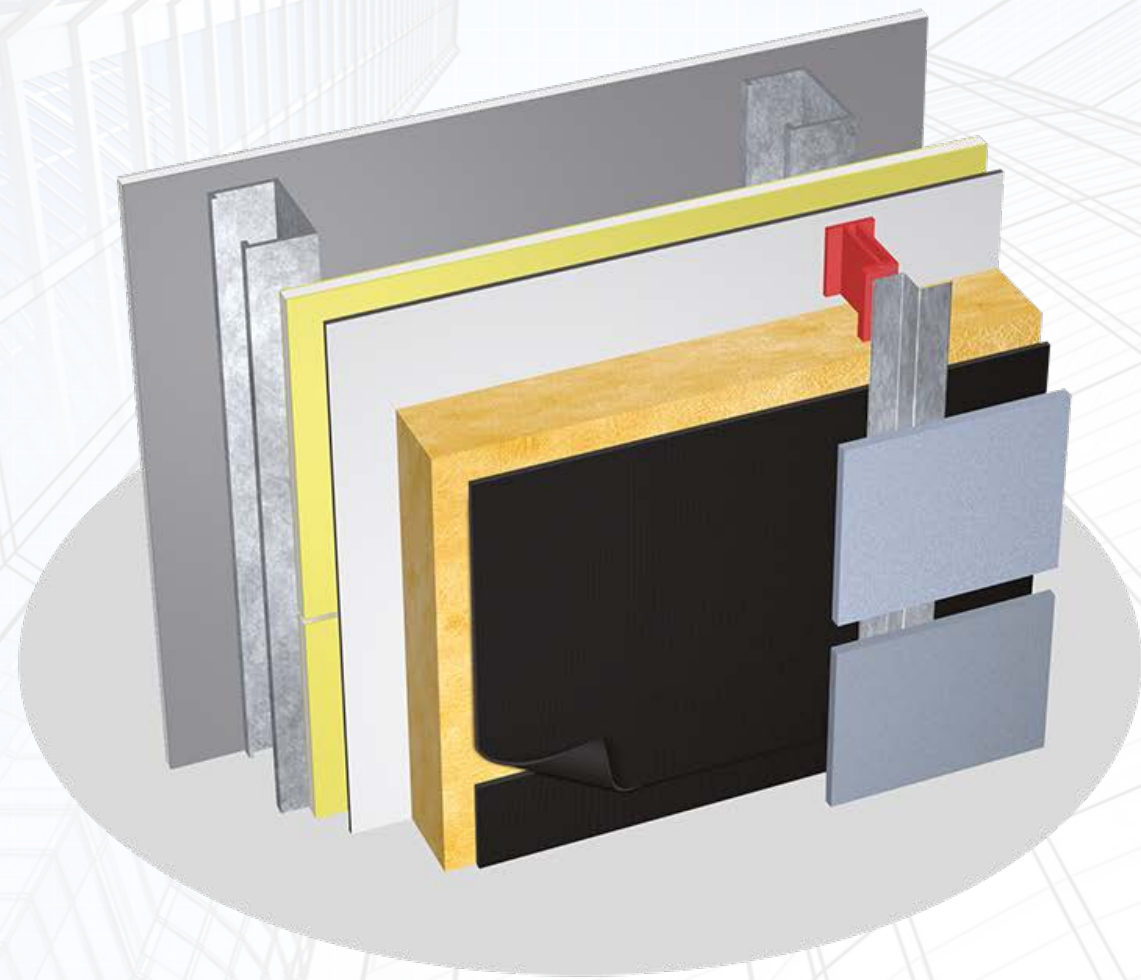
- It meets the most important qualities for a WRB in open-joint rain screen systems: most notably UV resistance
- Origins are in European roofing, meaning it's going to be more resilient under the construction foot traffic – very strong and pliable
- It doesn't compromise on performance or aesthetics – it delivers on both



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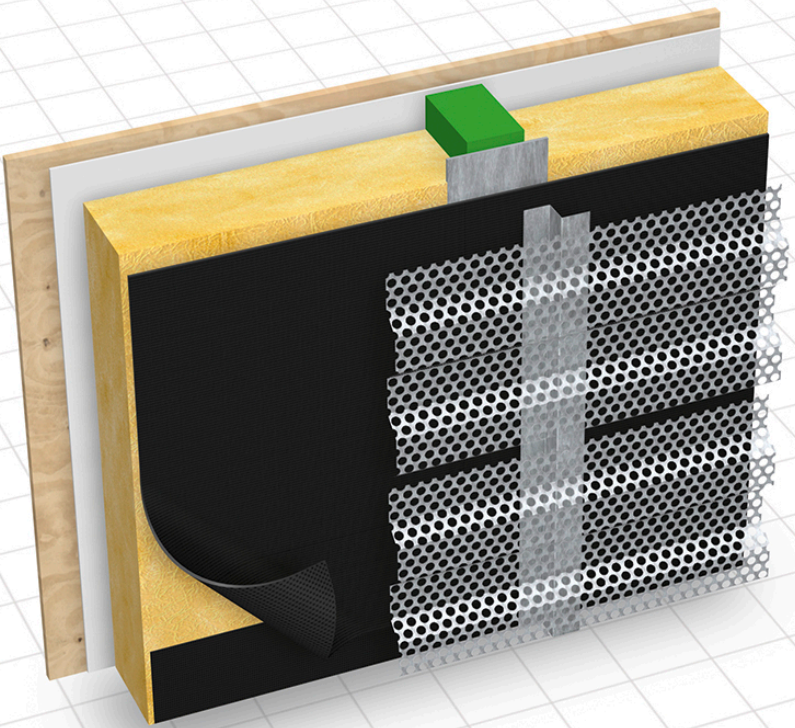




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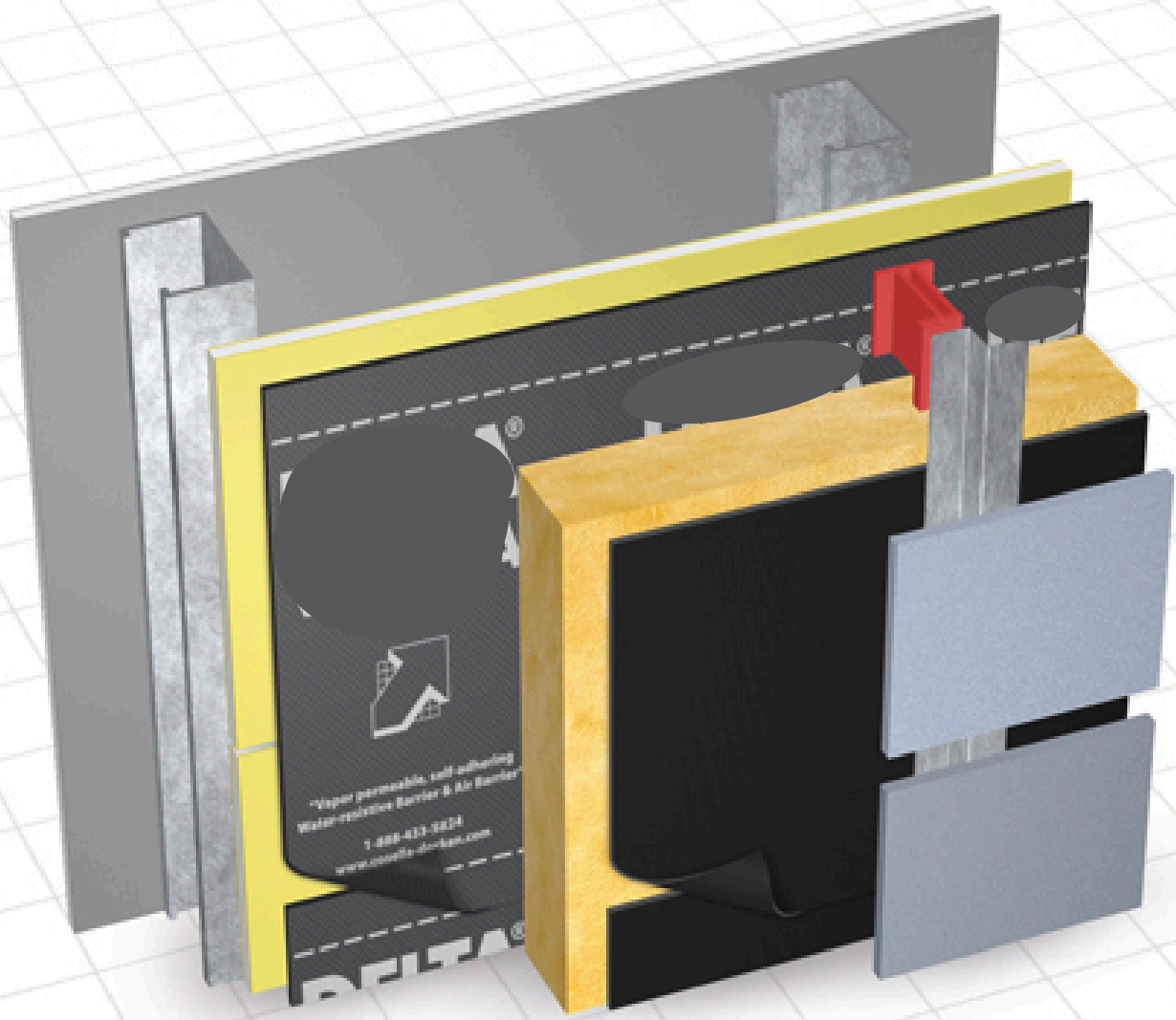




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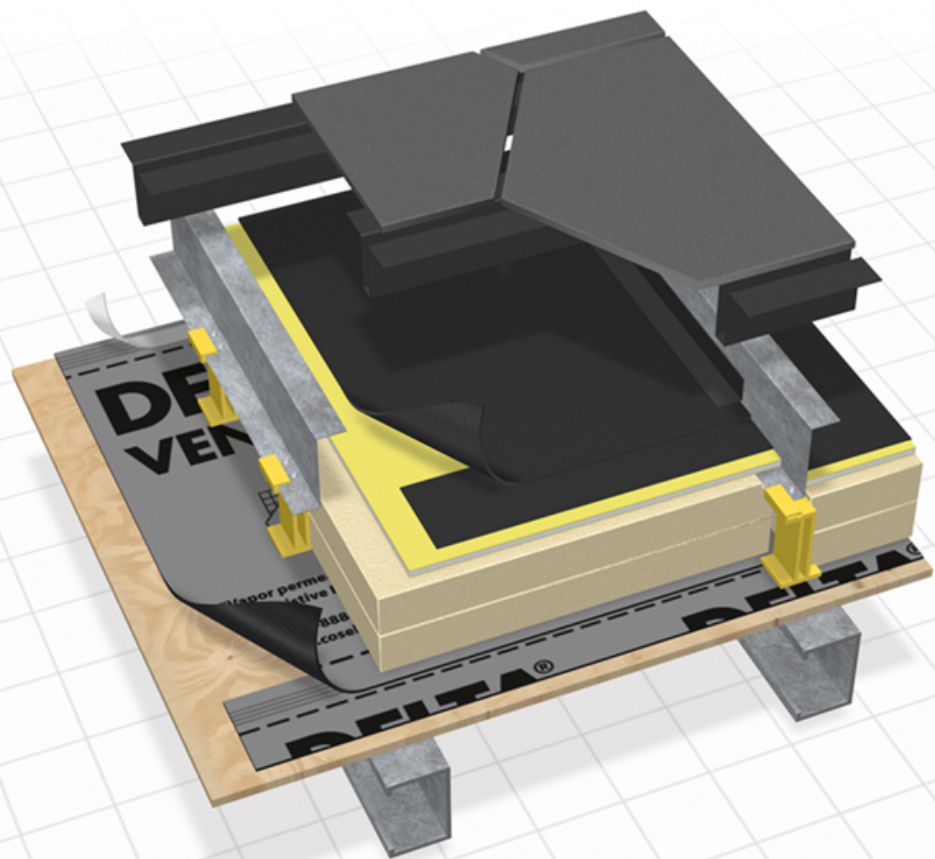




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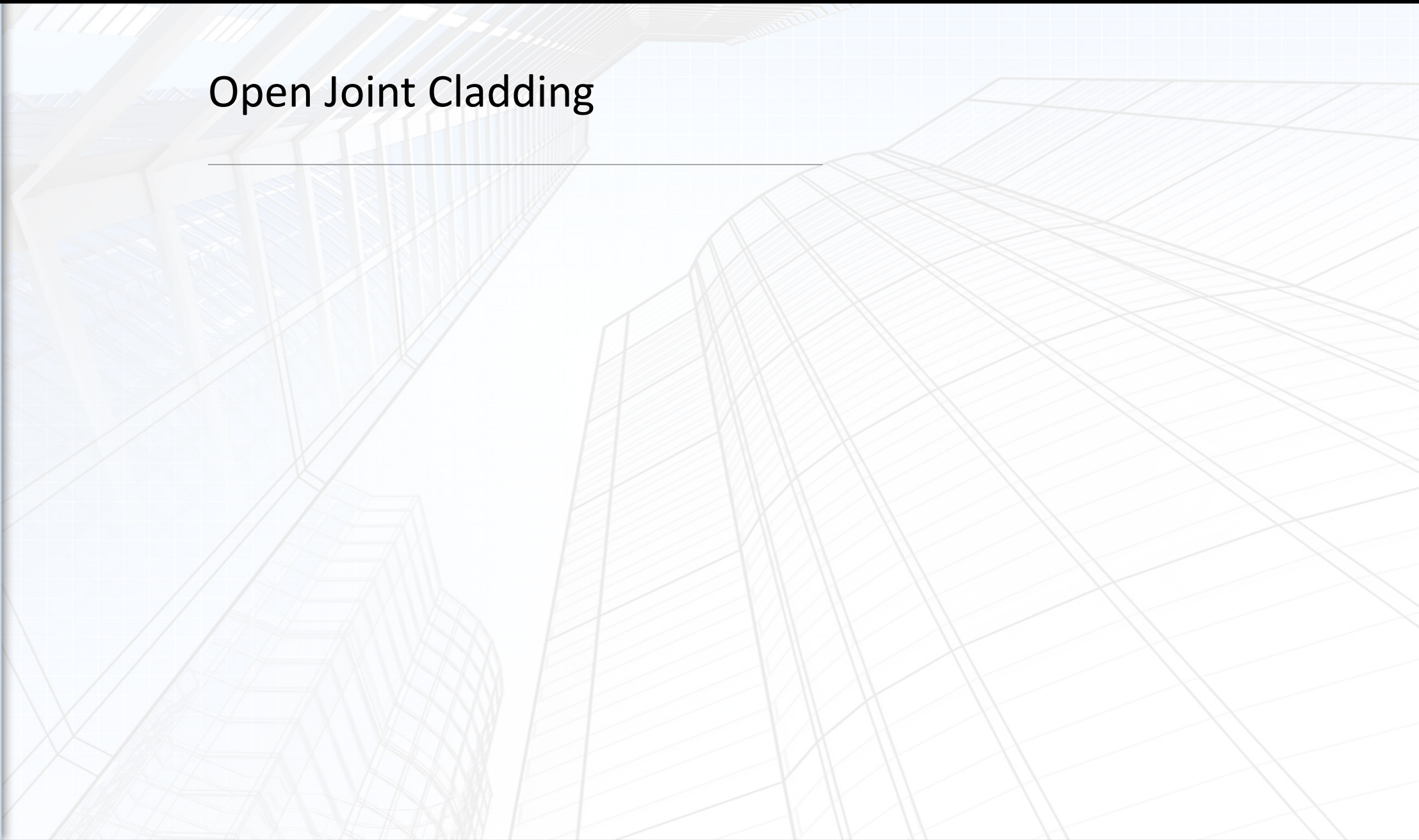


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Open Joint Cladding





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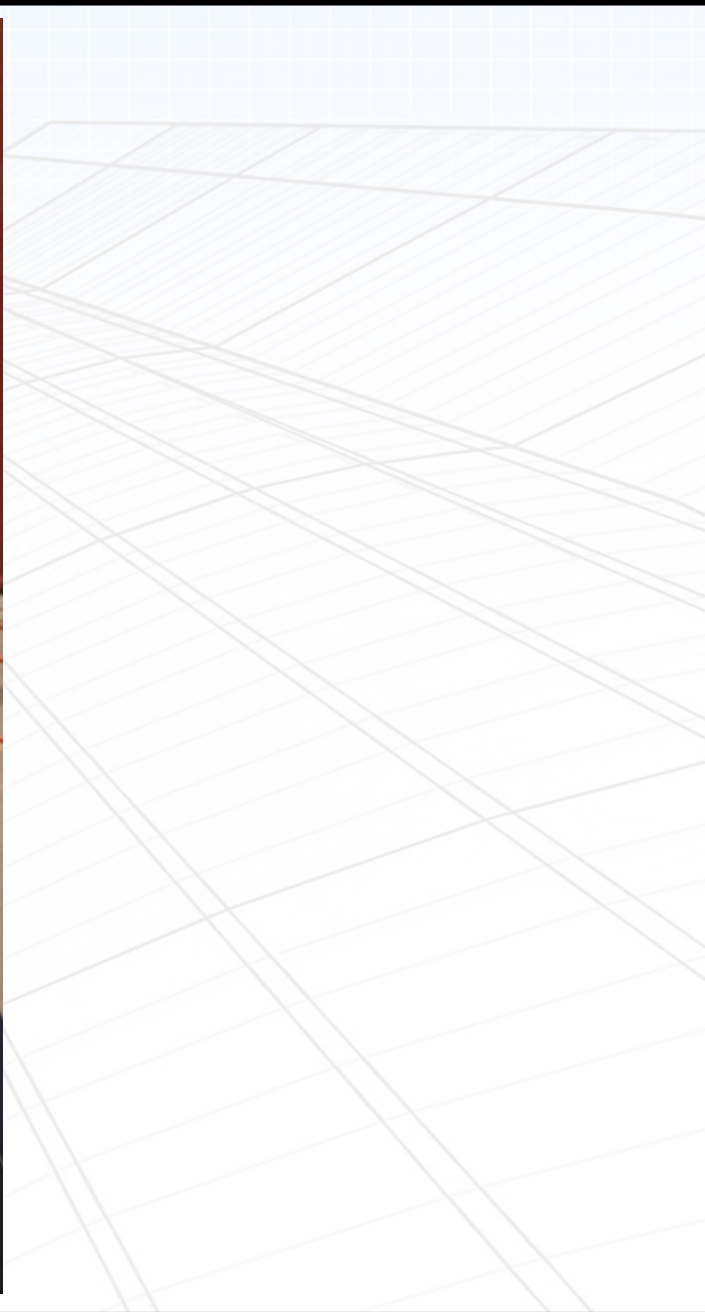




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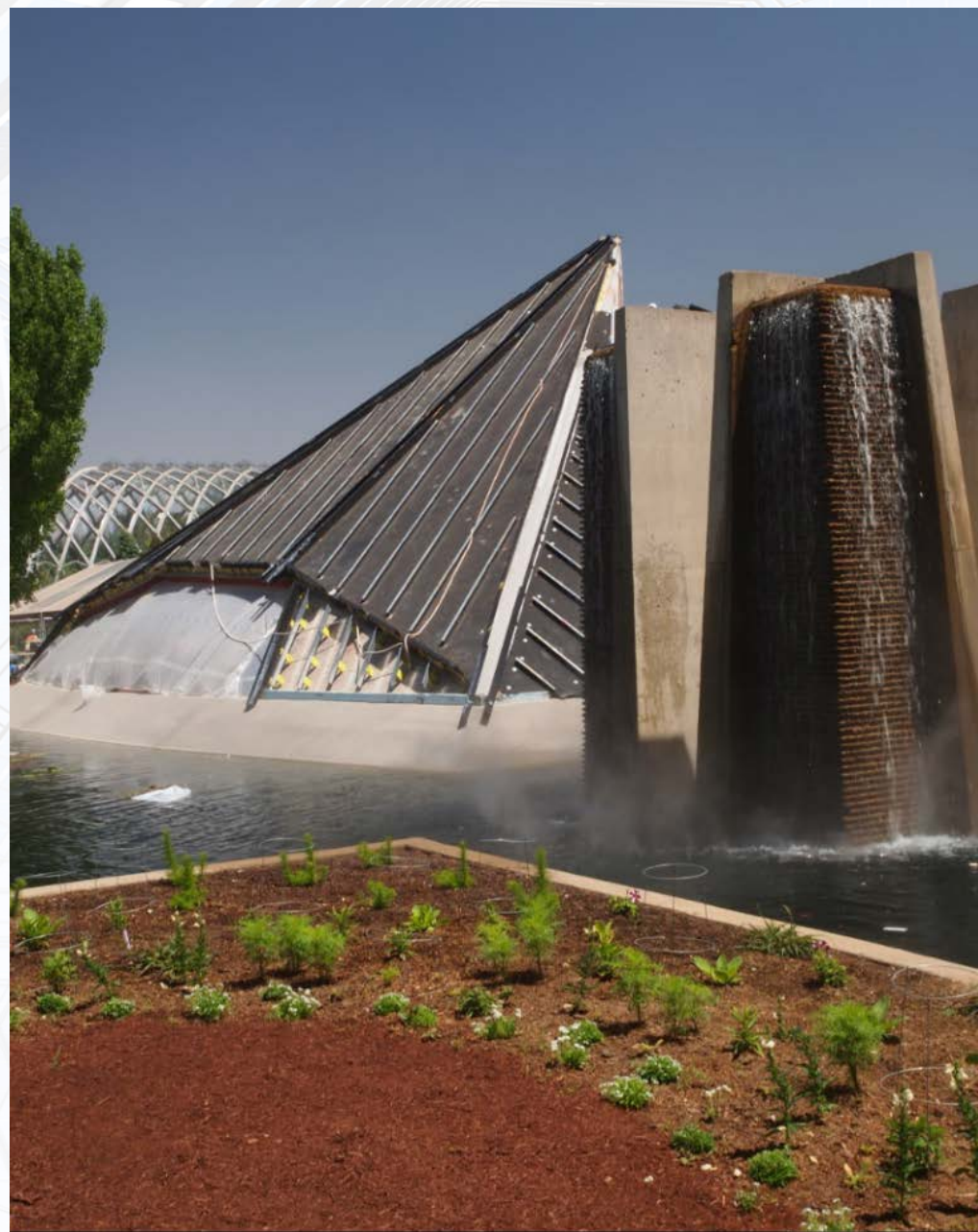




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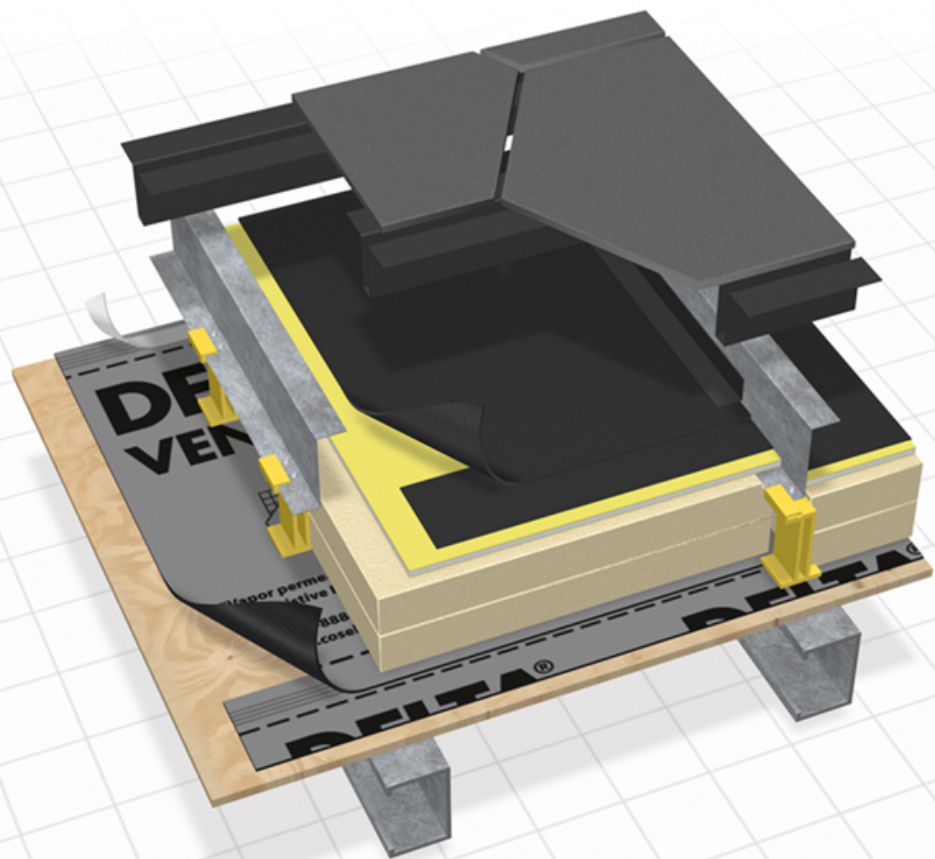




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This concludes The American Institute of Architects Continuing Education Systems Course

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