

# THERMAL ENVELOPE DESIGN CONSIDERATIONS FOR INDOOR SWIM FACILITIES—ADDRESSING THE INTEGRATED ENVELOPE CHALLENGE

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## ABSTRACT

### **Problem Statement**

*Indoor swim facilities have been constructed across the country in recent years. These facilities are valuable community resources and are an important component of the quality of life for the citizens. Frequently, these facilities have been designed and constructed with serious deficiencies in the integrity of the thermal envelope. Architects often succeeded in designing an aesthetically pleasing building, yet failed to properly integrate the special thermal performance criteria in the design. Proper and effective vapor barriers are of paramount importance for indoor swim design. This is especially true in hot/humid and cold/dry climates in the United States. Failure of properly designed thermal envelopes have caused premature failures in structural and exterior wall components. Heating, ventilating, and air-conditioning (HVAC) engineers also have not incorporated the need for positive vapor barriers and humidity controls within the swim space. These HVAC systems often are incapable of handling the moisture output from the pool surfaces and the vapor migration through the wall cavities. Contractors have not been attentive to the high potential of condensation and moisture migrating from the interior space into the wall cavities. The resulting disputes and lawsuits could have been avoided with some simple design guidance and construction measures. This paper documents two cases of indoor swim facilities and presents lessons learned and basic principles to follow for designers.*

### **Issues and Lessons Learned**

#### *Challenges for Integrated Envelope Design for Indoor Swim Center*

- Challenge of vapor barrier integrity
- Challenge of envelope thermal performance
- Challenge of neutralizing natural stack effect in swim space

#### *Roof Design Considerations*

- Handling moisture condensation
- Overcoming thermal gradient

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