

## **“Why is my brand new \$5000 Italian door leaking?”**

**By Scott Doyle**

This is a complaint that one of our builders got last winter from a very unhappy homeowner. Against the builder’s advice, the homeowner ordered a very high-dollar, foreign-made door. Of course, the builder lost this argument and when it arrived in a crate he ended up installing the door. I noticed the 80 square foot, ill-suited structure while performing the confirmed rating on this home (it was not something you could possibly miss!). I noted that the hollow, square, metal tubing and single-pane decorative glass construction type of the door were inappropriate for the climate and I had a long conversation with the superintendent about it. When the first Colorado winter rolled around, the homeowner noticed, to his dismay, that frost was accumulating on the metal frame of his door and moisture was pooling on the tile floor in the entryway. The accusation was that the *builder* must not have installed it correctly. The builder then turned to EnergyLogic for help.

Based on what the builder described to me over the phone, and my own observations during my inspection, it is my belief that the two conditions that caused water and ice to form on the front door of the house were excessive indoor moisture levels and a poorly insulated front door assembly. Basically, an EnergyStar home is a tight home - that’s partly what makes it more energy efficient and more comfortable. This can lead to greater indoor moisture levels, so we also provide good spot ventilation to remove moisture at the source (bathrooms and kitchen). We also use sealed combustion fireplaces, water heaters, and furnaces, etc. to keep the moisture and pollutants from mixing with the air in the house. Then we add a ventilation strategy- the builder was using the *Whisper Green™* exhaust fan running continuously to provide a controlled low-level, constant air exchange. The builder was doing everything right in the basic design based on current Building Science knowledge and practices. You should not have a condensation problem on your windows if you keep the indoor moisture levels low and don’t have any really cold surface, where moisture can condense. In this case, the home had both. We already knew from observation that the front door/glass assembly had poor thermal properties - the fancy Italian door was providing a huge, cold surface where moisture could condense. The builder also reported that the homeowner kept the humidifier set at 50%, which is way too high!

The first solution in a case like this is to turn the humidifier settings down immediately and remind the homeowner to use the spot ventilation that was provided. If that is not enough, the setting on the *Whisper Green™* fan could be adjusted (max air flow is 80 cfm) and wired to run continuously. The best (but most expensive) solution would be to eliminate the door altogether, which was obviously not constructed for our climate. I was not advocating disposing of this extremely expensive piece of Italian

metal, just relocating it so that it wasn't acting as part of the thermal boundary. A covered porch or entryway could be created with the iron door as the entry. Then a good insulated door could be installed between the porch and the conditioned space of the home. Win-win.

**The moral of this story: really cold surfaces plus high indoor moisture equals water and/or ice in the home and an uncomfortable (and likely very unhappy) homeowner. When you lose control of those factors, you lose control of condensation.** If you are called to a home, new or old, with a customer complaining of leaky windows and doors with problematic condensation, keep this story in mind. Below are some helpful links on this topic, of which the National Fenestration Rating Council probably has the greatest third party credibility:

[http://www.askthebuilder.com/590\\_Condensation\\_on\\_New\\_Windows.shtml](http://www.askthebuilder.com/590_Condensation_on_New_Windows.shtml)

<http://www.sunwindows.com/Services/Condensation.html>

<http://www.wdma.com/i4a/pages/index.cfm?pageid=3676>

<http://www.nfrc.org/documents/condensation.pdf>

<http://efficientwindows.org/faq.cfm>