

**NC Department of Insurance  
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**Building Envelope Air Sealing-Utility Penetrations**

**Code:** 2012 NC Energy Conservation Code  
**Section:** 402.4.1

**Date:** February 4, 2013

**Code:** 2012 Residential Code  
**Section:** N1102.4.1

**Date:** February 4, 2013

**Question:**

Are penetrations of only the interior membrane of a wall that is also the thermal barrier required to be sealed per the Energy Code Section 402.4.1 or 402.4.2.1?

**Answer:**

No. The general requirements for sealing the building thermal envelope are outlined in Section 402.4.1, and includes the following language "...the building thermal envelope shall be durably sealed with an air barrier system to limit infiltration".

This code section would, in itself, require the air barrier to be continuous at utility penetrations that interrupt the air barrier system. This would include outdoor electrical boxes and panels that penetrate the outer wall membrane. The air barrier would need to be placed behind the box or panels in order to maintain a continuous seal, or other means of providing same. However, this code section does not specifically require electrical boxes that penetrate the inner membrane of the exterior wall to be sealed. In other words, penetrations of the membrane from within the living space are not required to be sealed as code minimum. However, any penetration that has a pathway from the conditioned area to unconditioned areas is required to be sealed where it penetrates the barrier separating conditioned from unconditioned space. For instance, if there is a light switch on the interior of the external wall, it is not required to be sealed per NC ECC 402.4.2.1, but the conductors leading to it are required to be sealed where they penetrate into the crawl space, attic, or anywhere else it may penetrate the buildings' air barrier. Any utility penetration that goes through the thermal envelope, i.e. pierces the external wall membrane and then the internal membrane, is required to be sealed at both membrane penetrations.

There are many training sites on the Internet that illustrate sealing of all electrical boxes in walls whenever they penetrate a membrane. This may be good practice, but is presently not code minimum.

**Keywords:**

Air barriers, utility penetrations