

**NC Department of Insurance  
Office of the State Fire Marshal - Engineering Division  
1202 Mail Service Center, Raleigh, NC 27699-1202  
919-647-0000**

**Foundation Anchors in Brick Masonry**

**Code:** NC Residential Code  
**Section:** R403.1.6

**Date:** January 9, 2020

**Question:**

Can the anchors required by Section R403.1.6 be placed in the head joints of a clay brick masonry and in the voids within a clay brick masonry unit?

**Answer:**

Yes, the head joints are acceptable and the voids within brick units must be completely filled with mortar. The brick must be multiple-wythe or single-wythe, as is typical for brick veneer, if the anchors extend the minimum required distance into multiple-wythe masonry or concrete below the single-wythe wall or the single-wythe is bonded to an adjacent concrete slab. The anchor must be embedded a minimum of 7" in the masonry and the head or "L" of the anchor must extend under the surface of the masonry unit (see Figure 1 below). The anchor must also remain tight in the masonry after the nut is tightened against the sill plate as movement by the anchor may negate its purpose of resisting horizontal loads.

The requirement in R403.1.6 for "grouted cells" is addressing anchors within concrete masonry units where the cells are much larger than the voids in a clay brick masonry unit.

The anchor is still, however, required by R403.1.6 to be placed in the middle third of the wood plate that rests on the masonry.

This answer is based in part on empirical design information provided in a letter dated October 21, 2019 from Charles B. Clark, Jr., AIA, PE, LEED AP – Vice President, Engineering Services, the Brick Industry Association to Carl Martin (see attached).

**Note:**

This interpretation is only applicable to 115 and 120 mph wind zones.

**Reference:**

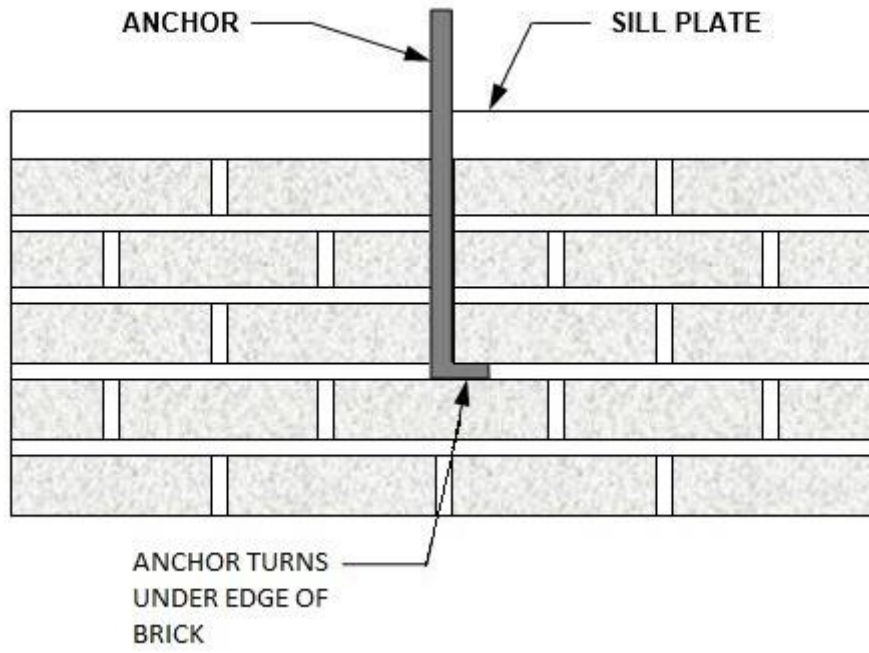
Section R403.1.6 reads in part:

“Bolts (meaning anchor bolts) shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of masonry units.”

**Keywords:**

foundation wall, wall bracing, anchorage

**Figure 1**





October 21, 2019

Mr. Carl Martin  
Building Code Council Secretary  
Office of State Fire Marshal  
Engineering & Codes  
1202 Mail Service Center  
Raleigh NC 27699-1202

Sent via email: carl.martin@ncdoi.gov

Re: Anchor Bolts in Brick Masonry Residential Foundations

Mr. Martin:

This letter is in regard to the longstanding practice in North Carolina of placing anchor bolts in brick masonry residential foundations. These foundations are typically constructed using either two wythes of brick masonry or a monolithic concrete slab foundation cast against a single wythe of brick masonry. Anchor bolts are placed into the foundation through the cells or cores of brick units, through the head joints between brick units, or between two wythes of brick masonry. The anchor bolts are embedded into the masonry by slushing mortar meeting ASTM C270 Type M or Type S around the bolts.

It is my understanding that the construction of brick masonry residential foundations as described above has been successfully used on many houses in North Carolina for more than 50 years. To put this in perspective, if one conservatively assumes that only 1 in 5 single-family housing starts were built with this type of foundation during that time period, that would mean that over 400,000 single family houses in North Carolina have a brick masonry residential foundation (Census Bureau).

In my nearly 20 years of experience at the Brick Industry Association, I have not been aware of any instances in which anchor bolts embedded in brick masonry residential foundations have prematurely failed. In short, anchor bolt construction using brick masonry residential foundations have had a long, successful track record of performance in North Carolina.

If you have any further questions, please do not hesitate to contact me.

Cordially,

Charles B. Clark, Jr., AIA, PE, LEED AP  
Vice President, Engineering Services  
cc: Mike McGee, McGee Brothers