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

Energy Requirements – Heating/Cooling Existing Screened and Enclosed Porches and Decks with Mini Split System

Code: 2018 NC Energy Conservation Code **Date:** October 15, 2019
Section: R503.2[i], R402.1 Exception 1,2

Code: 2012 NC Residential Code
Section: N1109.2, N1102.1 Exception 1,2

The following scenarios and answers address questions concerning existing residential exterior decks and porches that are enclosed with mesh screens, vinyl/plastic enclosures or glass where the owner plans to install a mini split system (or similar single-zone system[ii]) to heat and/or cool the space and identifies which provisions would apply with respect to energy conservation requirements based on the selected code for compliance.

Scenario 1:
An **existing** screened porch that has mesh screening is having a vinyl/plastic screen system installed and a mini split system is being installed to heat and/or cool the space. Are building thermal envelope provisions required?

Answer:
First, the permit holder has a choice as to whether they wish to follow the requirements for new construction, or if they want to follow the requirements for an existing structure. There are significantly lower thresholds in the existing building path(s), but the code official does not know the intended path unless the permit holder informs the code official of their plans. Once the permit holder informs the jurisdiction which code path they are choosing it can be inspected accordingly.

NC Energy Conservation Code Paths
The first path is utilizing either of the exceptions under R402.1.

> **Path #1 – Install HVAC incapable of maintaining the space as a *conditioned space (Exception 2)*, or install heating/cooling system using less than 1.0 watt/SF of floor area (Exception 1).**
> With respect to the **2018 NC Energy Conservation Code (NCECC),** it is dependent on whether the space meets or does not meet the criteria for "conditioned space[iii]" as defined in the 2018 NCECC. The 2018 NCECC defines "conditioned space" as subject to being able to maintain a space temperature within the space at 50 degrees F or higher during the heating season or 85 degrees F or lower during the cooling season or communicates directly with a conditioned space.
>
> If you install an HVAC system that is small enough such that the space is not considered a conditioned space, you can simply install the HVAC system without triggering any thermal envelope requirements.

This is an unusual situation, however, since even a very small unit in a sunroom will be able to keep the space conditions in the conditioned range, 50F and 85F during the design winter day and design summer day, respectively. During non-design days, the HVAC unit will be capable of maintaining temperatures within this range, and that is okay. This scenario is very unlikely for this building scenario, but it is a code possibility.

Section R402.1 Exception 1 allows for non-compliance with the thermal envelope if the installed heating/cooling unit is less than 1.0 W/SF. Please recognize how small this is. Although it is not impossible, it is difficult to even purchase permanently-installed equipment that is this small (baseboard heaters and small electric heaters). For instance, in a 10x20 sunroom, that is 200 SF of floor area. The maximum heating equipment size you could use is 200 Watts, or 0.2 kW and still meet this code section. This is smaller than even most plug-in electric heaters which generally start at 500 Watts.

Section R503.2 Change in space conditioning. This pathway has the least code requirements if you are going from an existing unconditioned space to a conditioned space.

Path #2- Install HVAC adequate to condition space, follow Existing Building Chapter
If you install a system that is large enough to make the space into a conditioned space, then the requirements of **Sections R503.2 Change of space conditioning**[iv] can be followed. In a small space like a residential sunroom, there are likely no additional requirements; and the thermal envelope is not specifically required to be upgraded.

Path #3-Install HVAC adequate to condition space, follow new building requirements
If you install an HVAC system large enough to make the space into a conditioned space, then you can also follow the requirements that a new space would require, specifically called out in Section R402.2.13 and R402.3.5.

If you decide to go with the Section R503.2, you can always exceed those minimal requirements without having to comply with the full requirements of a new building; it is okay to exceed minimum code, but if you inform the permitting office that you intend to meet the requirements for a new building, then that is what they will inspect for. It is strongly suggested the permit holder state their intended code path up front so there are no misunderstandings.

NC Residential Code Paths

With respect to **Chapter 11 of the 2018 NC Residential Code**, it defines "conditioned space" the same as in the Energy Code. In the 2012 Code cycle the definition was slightly different but starting in 2018 they are the same. As such, the pathways under Chapter 11 of the 2018 NC Residential Code are the same as in the NC Energy Code. However, there is not a code section in Chapter 11 that discusses exempt building areas due to them not being conditioned. This is largely because this is the 1-and-2 family dwelling code, and the vast majority of the spaces would be heated and cooled. The logic though in Path #1 from the **NC Energy Conservation Code** can be used.

Path #1 – Install HVAC incapable of maintaining the space as a *conditioned space*
As discussed in the paragraph above, although Chapter 11 does not discuss the exempt areas, because of the definitions, this path is technically possible, although unlikely as discussed in the Residential Energy Code.

Path #2- Install HVAC adequate to condition space, follow Existing Building Section N1107

If you install a system that is large enough to make the space into a conditioned space, then the requirements of **Sections N1109.2 Change of space conditioning** can be followed. In a small space like a residential sunroom, there are likely no additional requirements; and the thermal envelope is not specifically required to be upgraded.

Path #3-Install HVAC adequate to condition space, follow new building requirements
If you install an HVAC system large enough to make the space into a conditioned space, then you can also follow the requirements that a new space would require, specifically called out in Section N1102.2.13 and N1102.3.5.

As with Chapter 4 of the NCECC, it is advisable to clarify which code path you are intending to meet at the time of permitting so that the work can be inspected accordingly.

NC Existing Building Code Path

With respect to the **2018 NC Existing Building Code**, the provisions of Section 811 would apply. These provisions apply to energy conservation in Alteration Level 2 work (work area is less than 50% of the building area) and the energy provisions of the 2018 NCECC invoked to by this section apply to the elements of the building being altered. Since the only alterations are replacement of the screening and the mini split being installed, the provisions of the 2018 NCECC pertaining to HVAC would only apply since the proposed work does not involve alterations to the building thermal envelope.

Scenario 2:
An existing screened porch that has mesh screening is being enclosed with glass and a mini split system is being installed to heat and/or cool the space. Are thermal envelope provisions required?

Answer:

The pathways for this alteration are the same as for **Scenario 1**. The only difference is the installation of glazing is likely to cost more than the method described in Scenario 1 and may more readily put the project cost over $10,000 as described in NC Energy Conservation Code R503.2, NC Residential Code N1109.2, and NC Existing Building Code Section 811.1.5. Even if the cost of the project exceeds $10,000, there is not a mandatory upgrade to the thermal envelope. The reality is though, that there is very little else do to in s space like this, so a partial upgrade of the envelope may be the most practical means of meeting the 10% requirement of these sections. This code path does not require an “all or nothing” upgrade of the thermal envelope, and if the renovation is less than $10,000 there are no requirements triggered.

Follow-up Question #1:
Can a permit holder opt to install full conditioning in a sunroom not designed to the conditioned sunroom thermal envelope standards for a new building while still operating under the original permit of the new building?

Answer:
No.

In order to use the pathways of R503.2, N1109.2, or Existing Building Code 811.1.5, the original permit for the structure would have to have been closed out and a Certificate of Occupancy granted. However, after that is done, the building owner could opt to pull a permit and then use the pathways allowed for existing buildings

(R503.2, N1109.2, 811.1.5). The existing building pathways were not designed as a loop-hole, but the code does not restrict the use of these pathways once the new building becomes an existing building.

Keywords:
none

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[i] This interpretation was formerly under Section 101.4.3 of the 2012 Energy Code.

[ii] The code is not limited to mini-split or ptac systems, it is just these are the most common for this scenario.

[iii] For consideration as not being a "conditioned space", given the space is enclosed and provided with a barrier to isolate the space from the outdoors, then sizing of the HVAC system should consider this as part of the design basis for the load calculation and be sized accordingly to not be capable of maintaining indoor temperatures (a space temperature within the space at 50 degrees F or higher during the heating season or 85 degrees F or lower during the cooling season) sufficient to trigger application of the thermal envelope provisions for "conditioned space". For the purposes of load calculations to size appliances so as not to create a "conditioned space", the outdoor design temperatures used as the design basis for sizing equipment would be selected per ACCA Manual J for the outdoor design temperatures and the indoor design temperatures would be selected to be less than 50 degrees F during the heating season and greater than 85 degrees F during the cooling season, as appropriate. This would allow some flexibility for tempering of the air within the enclosed space which would be beneficial for humidity control and freeze protection without triggering the building thermal envelope requirements. If the design indoor temperatures are selected as 50 degrees F or above for heating or 85 degrees F or below for cooling, then the space would be considered "conditioned space" and the applicable thermal envelope requirements would apply, as appropriate.

[iv] NC Energy Conservation Code. R503.2 Change in space conditioning. New work performed shall meet the requirements of this code. Projects changing unconditioned space to conditioned space and costing more than $1,000 shall require 10 percent of the project cost to be used toward meeting the requirements of Chapter 11 of the North Carolina Residential Code for one-and-two family dwellings and townhouses or the North Carolina Energy Conservation Code. Project costs for the purpose of this section is the total project cost listed on all permits related to the work required to convert the unconditioned space to conditioned space and excludes the 10 percent added from this section. Under this section, existing building envelope elements that become a part of the building thermal envelope and are not changed are not required to be upgraded. The additional 10 percent of the project cost shall be appropriated for additional energy conservation features of choice that are addressed in Chapter 11 of the North Carolina Residential Code for one-and-two family dwellings and townhouses or the NC Energy Conservation Code. In addition to the 10 percent project cost, any existing wall, ceiling, or floor cavities that are exposed during construction shall at a minimum be insulated to comply with Chapter 11 of the North Carolina Residential Code, or the NC Energy Code or be filled to fill the cavity, whichever is less. Roof systems requiring air space for ventilation shall retain that ventilation space required. Projects costing less than $10,000 are not subject to the 10-percent project cost addition provision.