Department of
Licenses and Inspections
CITY OF PHILADELPHIA

Reference Code(s):
International Building Code
International Energy Conservation Code

FAQ:
I am replacing the existing roof covering of a low-slope roof assembly that has existing rigid-insulation entirely above a cast-in-place concrete roof deck. Does the existing insulation now need to meet new 2018 IECC requirements for R- or U-value because the roof covering is being replaced?

Background:

Changing the roof covering of an existing roof assembly which involves the removal of existing roof coverings is considered a *roof replacement*. Alternatively, installing a new roof covering above an existing roof membrane is a *roof recover* – this FAQ pertains to roof replacement only.

Roof replacement is defined under both IBC Section 202 and IECC Section 202 as follows (underline added for emphasis):

- **ROOF REPLACEMENT.** The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*.

When such work is proposed, IBC Section 1512.2 and IEBC 705.2 requires the complete removal of the existing roof coverings. Such removal includes all existing layers of roof coverings to such an extent that the roof "deck" is exposed. This will ensure any new roof covering installation occurs on a structurally sound and appropriate surface otherwise known as the roof "substrate". IBC Section 1512.2 reads:

- **1512.2 Roof replacement.** *Roof replacement* shall include the removal of all existing layers of roof assembly materials down to the roof deck.

The "substrate" identified above may or may not be existing above-deck insulating system. Where such "substrate" is damaged during the process of removal of the existing roof covering then, as the definition of roof replacement states, repairs must be made to ensure adequate support of any new roof covering.

To ensure proper insulation is provided when a roof replacement occurs, IECC Sections C503.1 and C503.2.1, which regulate alterations in general and roof replacements respectively, must be met and read:

- **C503.1 General.** […] *Alterations* shall be such that the existing *building* or structure is not less conforming to the provisions of this code than the existing *building* or structure was prior to the *alteration*. […].

- **C503.2.1 Roof replacement.** *Roof replacements* shall comply with Section C402.1.3, C402.1.4, C402.1.5 or C407 where the existing roof assembly is part of the *building thermal envelope* and contains insulation entirely above the roof deck. In no case shall the R-value of the roof insulation be reduced or the U-factor of the roof assembly be increased as part of the roof replacement.

The definition of *roof replacement* and the Department's interpretation of IBC Section 1512.2 as described above, therefore do not require the removal of existing undamaged substrate. As such, IECC Section C503.2.1 would only apply to work where existing insulation entirely above the roof deck, acting as the "substrate," is removed or damaged and must be replaced during the *roof replacement* process. The new insulation installed to replace existing insulation entirely above the roof deck removed during the *roof replacement* work must now comply with IECC Chapter 4 [CE] requirements as would be applied to new construction – specifically more restrictive R-value requirements.

In situations where roof insulation thickness increases for greater R-value computations would be detrimental to the existing safety and structural features of the building, such compliance may be considered *technically infeasible* per 2021 IEBC Chapter 2, which states:

- **TECHNICALLY INFEASIBLE.** An alteration of a facility that has little likelihood of being accomplished because the existing structural conditions require the removal or alteration of a load-bearing member that is an essential part of the structural frame, or because other existing physical or site constraints prohibit modification or addition of elements, spaces or features which are in full and strict compliance with the minimum requirements for new construction and which are necessary to provide accessibility.

At this time, the Department considers the items listed below as acceptable "existing physical or site constraints" that would be prohibitive, and therefore *technically infeasible*, to increasing for roof insulation thickness for higher R-value computations:

- Parapet heights and associated flashing limitations,
- Equipment curbs,
- Window sills, and
- Door thresholds

In these situations of *technical infeasibility*, *roof replacement* work that includes removal and replacement of existing insulation "substrate" shall be permitted to install new insulation entirely above deck of a minimum R-value no less than that which existed prior to the alteration per IECC Section C503.1. This exception shall be limited to *alterations* only. Any work on existing buildings that constitute a *change of occupancy* and there is an increase in demand for fossil fuel or electrical energy shall comply with all provisions of IECC Section C505 and shall not be eligible to cite *technical infeasibility* as identified above.

Answer:

Yes – in general *roof replacements* that include removal of all existing insulation entirely above the roof deck must install new above roof deck insulation that meets the minimum R-value requirements of the IECC as applicable to new construction.

As an exception, *roof replacement* work that encounters existing physical or site constraints that would constitute *technically infeasible* conditions, limited to those listed previously, shall be permitted to install new above roof deck insulation that meets or exceeds the R-value requirements of the existing insulation prior to *alteration*.

Questions?
Call 311 or (215) 686-8686 (if outside Philadelphia) or submit an online form via http://www.phila.gov/li/get-help.

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