Introduction to the 2015 Michigan Energy Code (chapter 11)

This document is intended to provide a basic overview of the new State of Michigan Residential Energy Code requirements only, additional research and training is required for a full understanding of the code requirements.

3-3-2016

Introduction;

The 2015 Michigan Energy Code (MRC chapter 11) has been expanded to provide details for the energy efficiency requirements for construction of residential dwellings; this includes additions, alterations and renovations to existing dwellings. The habitable areas in the structure are now viewed as being contained within a thermal envelope. All of the building elements are evaluated for their energy efficiency as related to the thermal envelope. Examples of these elements are of course insulation, windows, doors and heating system, but now include the overall performance and efficiency of the water distribution system, electrical system, appliances and the air and heat transference of exterior walls.

The 2015 MRC Energy Code is intended to regulate the long term energy efficiency of dwellings. The Energy Code is designed to allow for use of approved alternative techniques and materials to achieve the energy efficiency requirements of the code. Examples of alternatives are, SIP panels, IFC walls, minimal framing methods, and other systems that meet the energy efficiency requirements.

The following items are only a general outline of the new code requirements; please refer to the 2015 Michigan Residential Codes for actual code details and requirements.

(N1101.9) Defined terms.

BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, floor, roof, and any other building elements that enclose conditioned space or provides a boundary between conditioned space and exempt or unconditioned space.

CONDITIONED SPACE. An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent conditioned space.

(1101.8) Documentation: The areas that are part of the thermal envelope must be designated on the building plans. An energy compliance schedule outlining the insulation materials and their R-values along with the U-factors for fenestration products being used (air barriers, windows, doors and skylights) and their locations in the thermal envelope must be provided with the building plans. The method of energy compliance either Performance or Prescriptive to be used must also be designated on the compliance schedule.

(N1101.16) Certificate of Compliance must be permanently affixed on the exterior of electrical service panel or in the immediate area in plain view. The certificate of compliance must provide a list of the building components related to the overall energy efficiency of the building, such as floor, wall and ceiling insulation type and R-ratings, exterior window and door U-factors (total weighted U-factor), HVAC system types and energy efficiencies, Air Exchange system type, and/or other related energy efficiency systems. The Certificate of Compliance must be signed by the general contractor or an approved energy evaluation professional.

Conditioned Basement and Crawlspace Walls;

Option 1; Continuous R-15 approved closed cell styrofoam type insulation from the sill plate to the basement floor on the interior or to the top of footing on exterior of the building. Exterior insulation material must be protected by an approved covering that extends a min. 6” below grade. Interior insulation material must be covered or meet the flame spread and smoke development requirements.

Option 2; Interior only, stud framed walls with R-19 cavity insulation, materials used must be covered or meet the flame spread and smoke requirements. Insulation materials considered hazardous must be inaccessible to the occupants. Wood framing materials that have contact with concrete must be treated or have an isolation barrier. Insulation may not contact concrete surfaces unless approved by the manufacture.

Rim Joist Areas: Install minimum R-19 insulation in floor joist cavities against the rim joist. The rim joist area must be included in the air barrier assembly.
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Basement Floors (conditioned or unconditioned): Must have a minimum 4” poured concrete floor or approved treated wood floor system installed over a continuous 6 mill vapor barrier over graded base soil extending over the footings to wall assembly, all seams to be lapped 6” and sealed or taped.

Unconditioned Basement or Crawl Space Walls:
The walls of unconditioned basement or crawl space areas are not required to be insulated, but the following items are required for the floor or the dwellings thermal envelope (floor above). *Thermal envelope floor systems located above unconditioned spaces are required to be insulated to an R-30, with minimal interruption by plumbing, mechanical, or electrical system components. The thermal envelope must also have an approved air barrier system as per table 1102.4.1.1. Thermal envelope floor insulation used in basements and/or crawlspaces (with mechanical equipment) must meet the fire code requirements. Doors and/or access panels used to access unconditioned basements and crawl spaces must be sealed or weather stripped and properly insulated.
Notes;
1) Floor insulation and air barriers must be inspected by the building inspector before installing HAVC, plumbing and/or electrical systems.
3) Crawl Space Areas used only as building support and/or mechanical areas do not require a concrete floor.

Slab on Grade Foundations (monolithic foundations) for heated dwellings
See 2015 MRC section N1102.2.9 for details of Option 1 vertical foundation thermal protection or Option 2 shallow foundation thermal and frost protection systems.

Floor Areas over Unconditioned spaces (basements, crawl spaces, dwelling areas over garages)
Thermal envelope floor systems are required to be insulated to an R-30, with minimal interruption by plumbing, mechanical, or electrical system components. The thermal envelope must also have an approved air barrier system as per table 1102.4.1.1. Thermal envelope floor insulation used must meet the fire code requirements.
Notes;
1) Floor insulation and air barriers must be inspected by the building inspector before installing HAVC, plumbing and/or electrical systems.

Exterior Wall Insulation and Air Barrier Systems
Option 1; Wood framed Option 2x6 walls with cavity insulation total wall assembly equal to R-20.

Option 2; Wood framed 2x4 walls with R-13 cavity insulation and approved continuous exterior R-5 insulation or R-5 insulated siding. Note; the rim board area is included in exterior insulation requirement.

Exterior Wall Air Barrier; Wall areas that are part of the thermal envelope must have an air barrier that prevents outdoor air infiltration into the heated areas. Air barriers may be a single component, such as approved properly sealed house wrap or properly sealed exterior R-5 insulation sheeting. An example of a multiple component air barrier is properly sealed wall framing connections in conjunction with properly sealed and painted drywall on all exterior wall assemblies. Air barriers must also be provided for bulkheads, fireplace chases, bathtub/shower units and other interior components that connect to the outside wall assembly.
House/garage common walls, knee walls, and all other wall assemblies that are part of the thermal envelope must meet all requirements listed above.
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Exterior windows and glass doors
Exterior windows must have a fenestration value (U factor) of .32 and glass doors a value of .35. If the Prescriptive method of certification is used for the building, the average of all the windows must equal a U factor of .32
Exterior windows and doors must be properly installed, insulated and sealed to prevent air infiltration.

Ceiling Assembly’s
Ceiling areas with attic spaces above require R-49 insulation continuous above the thermal envelope.
An exception is ceiling/attic areas that allow ceiling insulation to extend over the wall assembly to the exterior wall sheeting, without being compressed by the roof deck or ventilation baffles may be R-38.
Ceiling areas without attic spaces must be designed for the required R-49 or R-38 as per code.
An exception is a ceiling area up to 500 square feet, may be a minimum R-30 insulation, without being compressed by the roof deck or ventilation baffles. (Note this may affect the ability use U factor tradeoffs).
Ceilings areas of the thermal envelope must comply with the air barrier requirements of the code. All penetrations thru the ceiling air barrier assembly must be sealed, such as can lights, appliance vents, plumbing components.
Also access panels, pull down stairs and other items of this nature must be sealed and insulated as required.

Mechanical Energy Compliance Requirements as per 2015 MRC Section 1103
*Air Exchange Rates (4 per hour), all new dwellings, additions and major home renovations are required to have an air exchange rate for all areas in thermal envelope of 4 air exchanges per hour. The air exchange rate of all new dwellings must be verified with a blower door test performed by an approved professional. Blower door tests may be required for additions and major home renovations depending on the scope of the project.
*Whole House ventilation systems are required in Zone 6-A for new homes with an air exchange rate of 4 per hour, and may be required for additions and home renovations depending on the size and scope of the project.
Option 1- Heat Recovery Ventilators (HRVs) and Energy Recovery Ventilators are the most energy efficient methods of providing the proper air exchange requirements. Both systems draw in fresh outdoor air preheat it and use combinations of HVAC and independent duct work to distribute the air thru the house and exhaust it back outdoors, and are considered to be balanced systems.
Option 2- Supply Only and Exhaust Only air exchange systems are the least energy efficient methods of providing proper air exchange requirements, but are also the least costly methods. Both systems are considered to be unbalanced systems.
Ventilation Compliance- the mechanical contractor or general contractor must provide documentation verifying the installed Whole House Ventilation system meets the required volume of air intake and exhaust based on the cubic feet of the thermal envelope. This documentation must be approved by the mechanical inspector.
*HVAC air distribution systems locate outside the dwelling must be pressure tested, sealed, and insulated to a Minimum R-8.
*HVAC air distribution systems locate outside a conditioned space must be pressure tested, sealed, and insulated to a Minimum R-6.
*HVAC air distribution systems locate inside of the thermal envelope and/or a conditioned space are not required to be pressure tested, or insulated, but must be sealed.
*HVAC systems must be properly sized in accordance with ACCA Manual J.
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Plumbing Energy Compliance Requirements as per 2015 MRC Section 1103
* Both supply and return lines of the recirculation system be insulated to an R-3.
* Water supply lines located outside of the thermal envelope must be insulated to a minimum R-8.

Electrical Energy Compliance Requirements as per 2015 MRC Section 1104
* High Efficiency type light is mandatory for a minimum of 75% of all the permanently mounted light fixtures and/or lamps in the dwelling. High Efficient lamps are detailed in the current electrical codes.
* Electronic ignition systems are required for all fuel gas type service equipment and/or appliances, continuous burning pilots are not allowed.

Energy Compliance Methods
Documented proof of a dwelling’s compliance with the MRC 2015 Energy Efficiency Codes is mandatory.
Documentation and testing results showing proof of compliance must be provided to the building official by an approved third party. The building official must approve all documentation and testing before a Certificate of Occupancy is issued.

A Certificate of Compliance must be completed by the builder, design professional or owner/builder (building permit holder) as outlined in section N1101.16. This certificate must be permanently affixed on the door of the electrical panel or in the immediate area of the electrical panel in plain view.

* Option 1, Certified above code construction programs. Buildings approved in writing by an energy efficiency program, such as Energy Star 3 or IECC 700-2012 “Silver”, are considered to be incompliance. MRC 2015 energy codes identified as mandatory are still required.

* Option 2, Prescriptive Method, this approach uses the mandatory requirements for insulation systems, window U-factors, air barriers and other mandatory energy codes to meet the requirements for the dwelling’s thermal envelope. The proper installation of these elements must be field verified by an independent third party certification preparer or the code official. The inspection of the mandatory energy requirements and related information is then used to produce the energy compliance Certificate by an approved third party company.

* Option 3, Prescriptive Method using the allowed tradeoffs, this approach uses the same inspections of installed mandatory requirements for insulation systems, window U-factors, air barriers and other mandatory energy codes to meet the requirements for the dwelling’s thermal envelope, but may use certain allowed tradeoffs in the preparation of the energy compliance Certificate. Examples of these tradeoffs are using the totaled average of all window U-factors to meet the required U-factor of 32, or using the allowed reduction in ceiling insulation to meet the requirements. The energy compliance certificate is then produced by an approved third party company.

* Option 4, Performance Method, this method uses an approved computer software program to evaluate the overall energy efficiency of the components that make up the dwelling’s thermal envelope and the building’s service systems including appliances that use energy. The computer software then produces an energy rating for the whole house, which in our area (6-A) must be 54 or less. All performance evaluation based reports must be produced by an approved third party company (mandatory).

* Blower Door Tests are required for new homes and may be required for additions and home renovations depending on the size and scope of the project. Blower Door tests must be conducted by an approved technician in accordance with the code requirements. The blower door test results must be documented by the approved technician and a signed copy of the results provided to the Building Official. Dwellings in zone 6-A must have an air exchange rate of 4 per hour. An exception may be made by the Building Official for use in the Performance method of energy certification, provided the performance compliance meets the required rating of 54 in zone 6-A.
Note: the building official may require the blower door test be performed a state certified third party individual or company.