



STATE OF MICHIGAN

DEPARTMENT OF LABOR & ECONOMIC GROWTH
LANSING

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NOTICE

2003 MICHIGAN UNIFORM ENERGY CODE TO TAKE IMMEDIATE EFFECT

In 2002, the Department of Labor & Economic Growth established a committee to review and update Michigan's Uniform Energy Code. After review and promulgation of the code, the Ingham County Circuit Court issued an injunction to halt the February 28, 2005, effective date of the rules. Therefore, the rules have been pending litigation since that time. On October 24, 2008, this matter was before the court with a decision following to dismiss the complaint and dissolve the injunction; thereby making the rules effective immediately.

Therefore, every unit of government enforcing the single state construction code must apply the 2003 Michigan Uniform Energy Code (MUEC) to newly issued permits.

The 2003 MUEC was distributed prior to the anticipated effective date of the rules; however, given the length of time that has passed, the bureau is placing a link to these rules on the web site, www.michigan.gov/bcc in order to download a free copy.

If you prefer the MUEC in the original format; you may purchase a copy at a cost of \$2.50 by downloading and completing the **Codes and Standards Order Form** and mailing it along with a check or money order made payable to "State of Michigan" to Michigan Department of Labor & Economic Growth, Bureau of Construction Codes, P.O. Box 30255, Lansing, Michigan 48909. Copies may also be purchased at the bureau's Okemos Office at 2501 Woodlake Circle, 1st Floor. Please call 517/241-9313 to check availability.

Technical questions regarding these rules may be addressed to the respective divisions as follows:

Plan Review Division	517/241-9328
Building Division	517/241-9317
Electrical Division	517/241-9320
Mechanical Division	517/241-9325
Plumbing Division	517/241-9330

Providing for Michigan's Safety in the Built Environment

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**SECTION N1102
BUILDING ENVELOPE**

N1102.1 Thermal performance criteria. The minimum required insulation *R*-value or the area-weighted average maximum required fenestration *U*-factor (other than opaque doors, which are governed by Section N1102.1.3) for each element in the building thermal envelope (fenestration, roof/ceiling, opaque wall, floor, slab edge, crawl space wall and basement wall) shall be in accordance with the criteria in Table N1102.1. Detached one-and-two family dwellings with greater than 15-percent glazing area; townhouses with greater than 25-percent glazing area; and any residential building in climates with heating degree days equal to or greater than 13,000; shall determine compliance using the building envelope requirements of Chapter 4 or 5 of the *International Energy Conservation Code*.

N1102.1.1 Exterior walls. The minimum required *R*-value in Table N1102.1 shall be met by the sum of the *R*-values of the insulation materials installed in framing cavities and/or insulating sheathing applied, and not by framing, drywall, structural sheathing, or exterior siding materials. Insulation separated from the conditioned space by a vented space shall not be counted towards the required *R*-value.

N1102.1.1.1 Mass walls. Mass walls shall be permitted to meet the mass wall criteria in Table N1102.1.1.1(1), based on the insulation position and the climate zone where the building is located. Other mass walls shall meet the frame wall criteria for the building type and the climate zone where the building is located, based on the sum of interior and exterior insulation. Walls with exterior insulation position have the entire effective mass layer interior to an insulation layer. Walls with integral insulation position have either insulation and mass materials well mixed as in wood (logs); or substantially equal amounts of mass material on the interior and exterior of insulation as in concrete masonry units with insulated cores or masonry cavity walls. Walls with interior insulation position have the mass material located exterior to the insulating material. Walls not meeting either of the above descriptions for exterior or integral positions shall meet the requirements for other mass walls in Table N1102.1.1.1(1). The *R*-value of the mass assembly for typical masonry constructions shall be taken from Table N1102.1.1.1(2). The *R*-value for a solid concrete wall with a thickness of 4 inches (102mm) or greater is R-1.1. *R*-values for other assemblies are permitted to be based on hot box tests referenced in ASTM C 236 or ASTM C 976, two dimensional calculations or isothermal planes calculations.

N1102.1.1.2 Steel-frame walls. The minimum required *R*-values for steel-frame walls shall be in accordance with Table N1102.1.1.2.

N1102.1.2 Ceilings. The required Ceiling *R*-value in Table N1102.1 assumes standard truss or rafter construction and shall apply to all roof/ceiling portions of the building thermal envelope, including cathedral ceilings. Where the construction technique allows the required *R*-value of ceiling insulation to be obtained over the wall top plate, R-30 shall be permitted to be used where R-38 is required and R-38 shall be permitted to be used where R-49 is required.

N1102.1.3 Opaque doors. Opaque doors separating conditioned and unconditioned space shall have a maximum *U*-factor of 0.35. One opaque door shall be permitted to be exempt from this *U*-factor requirement.

N1102.1.4 Floors. The required *R*-value in Table N1102.1 shall apply to all floors, except any individual floor assembly with over 25 percent of its conditioned floor area exposed directly to outside air shall meet the *R*-value requirement in Table N1102.1 for Ceilings.

N1102.1.5 Basement walls. When the basement is a conditioned space, the basement walls shall be insulated in accordance with Table N1102.1. When the basement is not a conditioned space, either the basement walls or the ceilings separating the basement from conditioned space shall be insulated in accordance with Table N1102.1. When insulating basement walls, the required *R*-value shall be applied from the top of the basement wall to a depth of 10 feet (3048mm) below grade or to the top of the basement floor; whichever is less.

**TABLE N1102.1
SIMPLIFIED PRESCRIPTIVE BUILDING ENVELOPE THERMAL COMPONENT CRITERIA MINIMUM
REQUIRED THERMAL PERFORMANCE (U-FACTOR AND R-VALUE)**

Exterior Enclosure	Zones		
	1	2	3
Wall Assemblies	R-21	R-21	R-21
Fenestration/Opening (area weighted average of the total area of fenestration units) ¹	U = 0.35 (R = 2.85)		
Roof/Ceiling Assemblies ²	R-49	R-49	R-49
Floors over unconditioned spaces	R-21	R-21	R-21
Slab on grade construction ³	R-11, 4ft	R-13, 4 ft	R-18, 4ft
Crawl space walls ⁴	R-20	R-20	R-20
Basement walls	Continuous Insulation	R-10	R-15
	Cavity Insulation	R-11	R-10

TABLE N1102.1.1.1(1)
MASS WALL PRESCRIPTIVE BUILDING ENVELOPE REQUIREMENTS

BUILDING LOCATION		MASS WALL ASSEMBLY R-VALUE a (hr-ft ² °F) / Btu	
Climate Zone	HDD	Exterior or integral insulation	Other mass walls
1	6,000-6,999	R-15.5	R-18.4
2	7,000-8,499	R-15.5	R-18.4
3	8,500-12,999	R-18.4	R-18.4

For SI: 1 (hr-ft²°F)/Btu = 0.176 m²·K/W.

TABLE N1102.1.1.2
STEEL-FRAME WALL MINIMUM PERFORMANCE REQUIREMENTS (R-VALUE)

CLIMATE ZONES	HDD	EQUIVALENT STEEL-FRAME WALL CAVITY AND SHEATHING R-VALUE a (hr ft ² °F) / Btu
1	6,000-6,999	R-13+R-10, R-19+R-9, R-25+R-8
2	7,000-8,499	R-13+R-10, R-19+R-9, R-25+R-8
3	8,500-12,999	R-13+R-10, R-19+R-9, R-25+R-8

For SI: 1 (hr-ft²°F)/Btu = 0.176 m²·K/W.

a. The cavity insulation R-value requirement is listed first, followed by the sheathing R-value requirement.

R408.31063

TABLE N1102.1.1.1(2)
MASS ASSEMBLY R-VALUES

ASSEMBLY TYPE	UNGROUTED CELLS NOT INSULATED (hr ft ² °F) / Btu	UNGROUTED CELLS INSULATED (hrft ² ° F) / Btu		
		No grout	Vertical cells grouted at 10 ft. o.c. or greater	Vertical cells grouted at less than 10 ft. o.c.
6" Light weight concrete block	2.3	5.0	4.5	3.8
6" Medium weight concrete block	2.1	4.2	3.8	3.2
6" Normal weight concrete block	1.9	3.3	3.1	2.7
8 Light weight concrete block	2.6	6.7	5.9	4.8
8 Medium weight concrete block	2.3	5.3	4.8	4.0
8 Normal weight concrete block	2.1	4.2	3.8	3.3
12 Light weight concrete block	2.9	9.1	7.9	6.3
12 Medium weight concrete block	2.6	7.1	6.4	5.2
12 Normal weight concrete block	2.3	5.6	5.1	4.3
Brick cavity wall	3.7	6.7	6.2	5.4
Hollow clay brick	2.0	2.7	2.6	2.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 (h-ft² F)/Btu = 0.176 m²·K/W.

N1102.1.6 Slab-on-grade floors. For slabs with a top edge above finished grade or 12 inches (305 mm) or less below finished grade, the required R-value in Table N1102.1 shall be applied to the outside of the foundation or the inside of the foundation wall. The insulation shall extend downward from the top of the slab, or downward to the bottom of the slab and then horizontally in either direction, until the distance listed in Table N1102.1 is reached. When installed between the exterior wall and the edge of the interior slab, the top edge of the insulation shall be permitted to be cut at a 45-degree (0.79 rad) angle away from the exterior wall. Insulation extending horizontally away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil. In locations of 500 HDD or greater, R-2 shall be added to the values in Table N1102.1 where uninsulated hot water pipes, air distribution ducts or electric heating cables are installed within or under the slab.

Exception: Slab perimeter insulation is not required for unheated slabs in areas of very heavy termite infestation probability as shown in Figure R301.2(6). Where this exception is used, building envelope compliance shall be demonstrated by (a) using *International Energy Conservation Code* Section 502.2.2 or *International Energy Conservation Code* Chapter 4 with the actual slab insulation R-value in Table N1102.1, or (b) using *International Energy Conservation Code* Section 502.2.4.

N1102.1.7 Crawl space walls. Where the floor above the crawl space is uninsulated, insulation shall be installed on crawl space walls when the crawl space is not vented to outside air. The required R-value in Table N1102.1 shall be applied inside of the crawl space wall, downward from the sill plate to the exterior finished grade level and then vertically and/or horizontally for at least an additional 24 inches (610 mm). The exposed

earth in all crawl space foundations shall be covered with a continuous vapor retarder having a maximum permeance rating of 1.0 perm [(57 mg)/(s · m² · Pa)], when tested in accordance with ASTM E 96.

N1102.1.8 Masonry veneer. For exterior foundation insulation, that horizontal portion of the foundation that supports a masonry veneer shall not be required to be insulated.

N1102.1.9 Protection. Exposed insulating materials applied to the exterior of foundation walls shall be protected. The protection shall extend at least 6 inches (152 mm) below finished grade level.

N1102.1.10 Air leakage. All joints, seams, penetrations; site-built windows, doors, and skylights; openings between window and door assemblies and their respective jambs and framing; and other sources of air leakage (infiltration and exfiltration) through the building thermal envelope shall be caulked, gasketed, weather stripped, wrapped, or otherwise sealed to limit uncontrolled air movement.

N1102.1.11 Recessed lighting fixtures. When installed in the building envelope, recessed lighting fixtures shall meet one of the following requirements:

1. Type IC rated, manufactured with no penetrations between the inside of the recessed fixture and ceiling cavity and sealed or gasketed to prevent air leakage into the unconditioned space.
2. Type IC or non-IC rated, installed inside a sealed box constructed from a minimum 0.5-inch-thick (12.7 mm) gypsum wallboard or constructed from a preformed polymeric vapor barrier, or other air-tight assembly manufactured for this purpose, while maintaining required clearances of not less than 0.5 inch (12.7 mm) from combustible material and not less than 3 inches (76 mm) from insulation material.
3. Type IC rated, in accordance with ASTM E 283 admitting no more than 2.0 cubic feet per minute (cfm) (0.944 L/s) of air movement from the conditioned space to the ceiling cavity. The lighting fixture shall be tested at 1.57 psi (75 Pa) pressure difference and shall be labeled.

N1102.2 Maximum solar heat gain coefficient for fenestration products. The area-weighted-average solar heat gain coefficient (SHGC) for glazed fenestration installed in locations with 3,500 or fewer heating degree days shall not exceed 0.40.

N1102.3 Fenestration exemption. Up to 1 percent of the total glazing area shall be exempt from *U*-factor requirement.

N1102.4. Replacement fenestration. Where some or all of an existing fenestration unit is replaced with an entirely new replacement fenestration product, including frame, sash and glazed portion, in an existing building, the replacement fenestration shall have a *U*-factor that does not exceed the maximum fenestration *U*-factor and an SHGC that does not exceed the maximum fenestration SHGC in table N1102.5. Replacement skylights and roof windows shall be permitted to have a maximum *U*-factor of 0.60. The replacement fenestration products shall also satisfy the air leakage requirements of section N1101.3.2.2.

R408.31064

N1102.5 Prescriptive path for additions and window replacements. As an alternative to demonstrating compliance with section N1105 or N1102, additions with a conditioned floor area less than 500 square feet (46.5m²) to existing single-family residential buildings and structures shall meet the prescriptive envelope component criteria in table 1102.5 for the designated heating degree days (HDD) applicable to the location. The *U*-factor of each individual fenestration product (windows, doors and skylights) shall be used to calculate an area-weighted average fenestration product *U*-factor for the addition, which shall not exceed the applicable listed values in table N1102.5. For additions, other than sunroom additions, the total area of fenestration products shall not exceed 40 percent of the gross wall and roof area of the addition. The *R*-values for opaque thermal envelope components shall be equal to or greater than the applicable listed values in table N1102.5. Replacement fenestration products (where some or all of an existing fenestration unit is replaced with an entire new replacement unit, including the frame, sash and glazing) shall meet the prescriptive fenestration *U*-factor criteria in table N1102.5 for the designated HDD applicable to the location.

Conditioned sunroom additions shall maintain thermal isolation; shall not be used as kitchens or sleeping rooms; and shall be served by a separate heating or cooling system, or be thermostatically controlled as a separate zone of the existing system.

Exception: Replacement skylights shall have a maximum *U*-factor of 0.60 when installed in any location above 1,999 HDD.

**Abbreviated Report Form N1107.1
Heating Energy Analysis Comparison Report**

Builder's Name: _____
 Project Address: _____
 City/Township/County: _____

PROPOSED ALTERNATIVE HOUSE		STANDARD DESIGN HOUSE	
ROOF/CEILING (INC. SKYLIGHTS)	SUBTOTALS	ROOF/CEILING (INC. SKYLIGHTS)	SUBTOTALS
$A_1 \quad /R_1 = A_1 /R_1$ $A_2 \quad /R_2 = A_2 /R_2$ $A_3 \quad /R_3 = A_3 /R_3$ $A_1 /R_1 + A_2 /R_2 + A_3 /R_3 =$ $/R =$ Total Roof/Ceiling Area	Line 1	 Total Roof/Ceiling Area	x 0.0204 = (all zones) Line A
GROSS WALL		GROSS WALL	
Opaque Wall (Does not include band joist, windows, doors, etc.) $A_1 \quad /R_1 = A_1 /R_1$ $A_2 \quad /R_2 = A_2 /R_2$ $A_1 /R_1 + A_2 /R_2 =$	Line 2		
Band Joist $A \quad /R = A /R =$	Line 3		
Fenestration and Doors, Windows $A_1 \quad /R_1 = A_1 /R_1$ $A_2 \quad /R_2 = A_2 /R_2$ $A_3 \quad /R_3 = A_3 /R_3$ $A_1 /R_1 + A_2 /R_2 + A_3 /R_3 =$	Line 4		
Doors $A_1 \quad /R_1 = A_1 /R_1$ $A_2 \quad /R_2 = A_2 /R_2$ $A_1 /R_1 + A_2 /R_2 =$	Line 5		
Other $A \quad /R = A /R =$			
Total Gross Wall Area	Line 6		
GROSS WALL SUBTOTAL A/R (Lines: 2+3+4+5+6)	Line 7	Total Gross Wall Area	x 0.093 = (all zones) Line B

FOUNDATION/FLOOR	SUBTOTALS	FOUNDATION/FLOOR	SUBTOTALS
Floors Over Unconditioned Spaces A _____ /R _____ = A/R _____ =	Line 8	Floors Over Unconditioned Spaces _____ x 0.0476 = Total Floor Area (all zones)	Line C
Slab on Grade Floors (Area = Perimeter x 2') A _____ /R _____ = A/R _____ =	Line 9	Slab on Grade (Unheated) Z ₁ 0.0909 _____ x Z ₂ 0.0769 = Total Slab Edge Area Z ₃ 0.050	Line D
Crawl Space Walls (Area: Top foundation wall to average finished grade) A _____ /R _____ = A/R _____ =	Line 10	Crawl Space _____ x 0.050 = Total Crawl Space Wall Area (all zones)	Line F
Basement Walls (Area: Top foundation wall to average finished grade) A ₁ _____ /R ₁ _____ = A ₁ /R ₁ _____ A ₂ _____ /R ₂ _____ = A ₂ /R ₂ _____ A ₁ /R ₁ + A ₂ /R ₂ =	Line 11	Basement Walls Z ₁ 0.090 _____ x Z ₂ 0.090 = Total Gross Basement Wall Area Z ₃ 0.055	Line G
Basement Windows A _____ /R _____ = A/R _____ =	Line 12		
Total Gross Basement Wall Area			
FOUNDATION/FLOOR SUBTOTAL A/R (Lines: 8+9+10+11+12)	Line 13	FOUNDATION/FLOOR SUBTOTAL A/R (Lines: C+D+E+F+G)	Line H
PROPOSED ALTERNATIVE HOUSE SUB-TOTAL A/R (Lines: 1+7+13)	Line 14	STANDARD DESIGN HOUSE SUB-TOTAL A/R (Lines: A+B+H)	Line I

N1107.1.1 Alternative design constants. The alternative design constants of table N1107.1 may be used for

HEATING EQUIPMENT EFFICIENCY (If the same as Standard House, go to line 16 or 17) (Oil or Gas Fired) AFUE: _____ % Line 14: _____ = Adjusted A/R = AFUE: 0. _____	Line 15	HEATING EQUIPMENT EFFICIENCY (Oil or Gas Fired) AFUE: 78% Line I: _____ = Adjusted A/R = AFUE: 0.78	Line J
AIR LEAKAGE RATE (If the same as Standard House, go to line 17) _____ ACH x _____ ft ³ x 0.018 = Air Changes per Hour Volume of House	Line 16	AIR LEAKAGE RATE 0.55 ACH x _____ ft ³ x 0.018 = Volume of House	Line K
PROPOSED ALTERNATIVE HOUSE TOTAL (Lines: 15+16) Equal to or less than line L to pass	Line 17	STANDARD DESIGN LIMIT TOTAL (Lines: J+K)	Line L

the specific site weather data (heating degree days) for the proposed alternative design.