Uniform Dwelling Code
2017 Updates
SPS 322

ENERGY CONSERVATION
STANDARDS
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UDC Energy Conservation Code Summary

- 2016 Code Change to 2009 IECC
- Plan Review and Permit Issuance Process
- Rough Inspection
SPS 322.01 Scope. (1) This chapter applies to all one- and 2-family dwellings covered by this code that use any amount of non-renewable energy for heat generation.

(2) The equipment efficiency standards in this chapter apply to all one- and 2-family dwellings covered by this code that use the respective equipment.

(3) (a) The vapor retarder requirements under s. SPS 322.38 and the moisture control and ventilation requirements under s. SPS 322.39 apply to any dwelling with insulation installed, whether or not the insulation is required under this code.

(b) The vapor retarder requirements under s. SPS 322.38 do not apply to an unheated space, such as an attached, unheated garage.
Jan 1, 2016 Code Change
How it Affected RESCheck

- New Code and RESCheck Applications

- Code Compliance
  - Heat loss calculations
  - Equipment sizing
What CHANGED: SPS 322 Effective 1-1-2016

Chapter SPS 322
ENERGY CONSERVATION

| Subchapter I — Scope and Application | SPS 322.38  | Vapor retarders. |
| SPS 322.01 Scope.                  | SPS 322.39  | Ventilation and moisture control. |
| SPS 322.02 Application.            |              |                             |

| Subchapter II — Definitions        | Subchapter V — Systems |
| SPS 322.10 Definitions.            | SPS 322.40  | Indoor temperatures and equipment sizing. |
|                                  | SPS 322.41  | Temperature control. |
|                                  | SPS 322.42  | Duct systems. |
|                                  | SPS 322.43  | Duct and plenum sealing. |
|                                  | SPS 322.44  | Pipe insulation. |
|                                  | SPS 322.45  | Air conditioner and heat pump efficiencies. |
|                                  | SPS 322.46  | Replacement furnace and boiler efficiencies. |
|                                  | SPS 322.47  | Equipment requirements. |
|                                  | SPS 322.48  | Indoor Pools. |
|                                  | SPS 322.49  | Lighting Equipment. |

| Subchapter III — Insulation Materials and Installation | Subchapter VI — Simulated Performance Alternative |
| SPS 322.20 Basic requirements.                      | SPS 322.50  | General. |
| SPS 322.21 Protection of insulation.                | SPS 322.51  | Performance-based compliance. |
|                                                  | SPS 322.52  | Documentation. |
|                                                  | SPS 322.53  | Calculation procedure. |

| Subchapter IV — Dwelling Thermal Envelope            |
| SPS 322.30 General design requirements.              |
| SPS 322.31 Prescriptive insulation and fenestration criteria. |
| SPS 322.32 Specific insulation requirements.         |
| SPS 322.33 Slab floors.                             |
| SPS 322.34 Crawl spaces.                            |
| SPS 322.35 Thermally isolated sunrooms.             |
| SPS 322.36 Fenestration.                            |

| Note: New Testing Options and Requirements |

Published under s. 35.93, Stats. Updated on the first day of each month. Entire code is always current. The Register date on each page is the date the chapter was last published.

Register December 2015 No. 720
DEPARTMENT OF ENERGY
Office of Energy Efficiency and Renewable Energy
Guidance Surrounding Department of Energy Support of Building Energy Code Compliance Software


ACTION: Notice of availability.

SUMMARY: The U.S. Department of Energy (DOE) Building Energy Codes Program has made available guidance on how it intends to respond to requests for modified versions of energy code compliance software.

DOE has historically created a small number of custom versions of REScheck and COMcheck when requested by individual states which have adopted the national model codes with amendments. In recent years the number of these requests has increased to exceed available program resources. The following priorities provide internal consistency and transparency to the public regarding resources dedicated to REScheck and COMcheck.

1. Order of Priorities for Developing and Maintaining REScheck and COMcheck Versions

(a) Current version of national model codes as published.

DOE will not provide a custom version of REScheck or COMcheck for State or local codes that provide less energy savings than the current versions of the national model codes.
REScheck Software: Version and Function 322.31(2)(b)

Use Version IECC 2009 Setting for Building Envelope Compliance

Version 4.6.2.0 will provide ‘Compliance report’ using the 2009 IECC and then run the ‘Loads report’ using the WI UDC 2009
# 2009 IECC Baseline for Prescriptive Table

## TABLE 322.31–1

**INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Fenestration U-Factor</th>
<th>Skylight U-Factor</th>
<th>Ceiling R-Value</th>
<th>Wood Frame Wall R-Value</th>
<th>Mass Wall R-Value</th>
<th>Floor R-Value</th>
<th>Basement Wall R-Value</th>
<th>Crawl Space Wall R-Value</th>
<th>Heated Slab R-Value</th>
<th>Unheated Slab R-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.35</td>
<td>0.60</td>
<td>49(\text{e})</td>
<td>20(\text{f}) or 13+5(\text{g})</td>
<td>15/19</td>
<td>30(\text{h})</td>
<td>15/19</td>
<td>10/13</td>
<td>10/15</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>0.35</td>
<td>0.60</td>
<td>49(\text{e})</td>
<td>21(\text{f})</td>
<td>19/21</td>
<td>38(\text{h})</td>
<td>15/19</td>
<td>10/13</td>
<td>10/15</td>
<td>10</td>
</tr>
</tbody>
</table>

\(\text{a}\) R-values are minimums. U-factors are maximums.

\(\text{b}\) 15/19” means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. “15/19” shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. “10/13” means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

\(\text{c}\) The first R-value applies under the entire slab, regardless of depth below grade. The second R-value applies to the slab edge where the bottom of the slab is less than 12 inches below adjacent grade. Slab edge insulation shall extend downward from the top of the slab for a minimum of 48 inches or downward to at least the bottom of the slab and then horizontally to the interior or exterior for a minimum total distance of 48 inches. Also, see s. SPS 321.16 for protection against frost for slabs with supports less that 4 feet below grade.

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**Don’t Forget the Footnotes**
U-Factor and Total UA (REScheck Approach)
322.02 gives options

- **U-factor Alternative**
  - Similar to Prescriptive but uses U-factors instead of R-values
  - Allows for innovative or less common construction
    
    Techniques such as structural insulated panels or log walls

- **Total UA Alternative**
  - Same as U-factor alternative but allows trade-offs
  - across all envelope components
  - Approach used in REScheck software
Total UA Alternative (REScheck Approach) SPS 322.31-1

- Per Proposed Bldg
  - $U_{\text{wall}} \times A_{\text{wall}}$
  - $U_{\text{roof}} \times A_{\text{roof}}$
  - $U_{\text{door}} \times A_{\text{door}}$
  - $U_{\text{window}} \times A_{\text{window}}$
  - $U_{\text{skylight}} \times A_{\text{skylight}}$
  - Etc.

Per Table 322.31-1
- $U_{\text{wall}} \times A_{\text{wall}}$
- $U_{\text{roof}} \times A_{\text{roof}}$
- $U_{\text{door}} \times A_{\text{door}}$
- $U_{\text{window}} \times A_{\text{window}}$
- $U_{\text{skylight}} \times A_{\text{skylight}}$
- Etc.

$\text{Total } U_{\text{Proposed}} \times A_{\text{Proposed}} \leq \text{Total } U_{\text{Allowed}} \times A_{\text{Proposed}}$
Energy Conservation Basics – Heat Loss Calculations

Heat flux (Q) is the rate of heat energy transfer through a given surface per unit time.

- **Q** (Heat Flux) = **U** * **A** * **ΔT**
  - **Q**: Conduction Heat Loss (Btu/Hr)
  - **U**: Heat Transfer Coefficient or “U-Value” (Btu/Hr/ft²/°F)
  - **A**: Area (Ft²)
  - **ΔT**: Temperature Difference (°F)

- See SPS 322.31 for minimum envelope requirements.
Do NOT go to the DOE website for Download!

You Can’t Get There From Here

What’s New:
REScheck version 4.6.2 includes support for 2014 Florida. Build version 4.6.2.1 fixes an issue with compliance index when project is “Additions” and discontinues support for Wisconsin Uniform Dwelling Code.
BUT... You Can Get There From Here
COMPLIANCE: use the 2009 IECC

• You must use the ‘2009 IECC’ for COMPLIANCE!
You can only use the WI UDC 2009 for Loads!
Stand Alone Load Calculator
Based on Calculated UA Value

How To Use the Heating Equipment Sizing Summary

<table>
<thead>
<tr>
<th>Heating Equipment Sizing Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Information</strong></td>
</tr>
<tr>
<td>Project Name/Address</td>
</tr>
<tr>
<td>County</td>
</tr>
<tr>
<td>Design Temperature</td>
</tr>
<tr>
<td>&quot;Your UA&quot; from ResCheck</td>
</tr>
<tr>
<td>Conditioned Floor Area</td>
</tr>
<tr>
<td>Average Wall Height</td>
</tr>
<tr>
<td>Infiltration Rate</td>
</tr>
<tr>
<td>Equipment Oversizing Factor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Load Summary</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductive Losses</td>
</tr>
<tr>
<td>Infiltration Losses</td>
</tr>
<tr>
<td>Oversizing Factor Losses</td>
</tr>
<tr>
<td>Total Building Heating Load</td>
</tr>
</tbody>
</table>

Enter items in Yellow to get your total Heat Loss. Print and attach with your completed ResCheck Form.

REScheck Software Version 4.6.2

Compliance Certificate

- **Project**: Test House
- **Energy Code**: 2009 IECC
- **Location**: Wausau, Wisconsin
- **Construction Type**: Single-family
- **Project Type**: New Construction
- **Orientation**: Brg, faces 0 deg. from North
- **Conditioned Floor Area**: 2320 ft²
- **Glazing Area**: 10%
- **Climate Zone**: 6 (8427 HDD)
- **Compliance**: Passes using UA trade-off

The % Better or Worse Than Code index reflects how close to compliance the house is based on code trade-off rules. It does NOT provide an estimate of energy use or cost relative to a minimum code level.
(b) In Tables 322.31-1 and 322.31-2, zone 2 consists of the following 15 northern counties: Ashland, Bayfield, Burnett, Douglas, Florence, Forest, Iron, Langlade, Lincoln, Oneida, Price, Sawyer, Taylor, Vilas and Washburn. Zone 1 consists of all other counties not included in zone 2.
**UDC ‘Design Zones’ 1-4**

![Map of UDC Design Zones](image)

**SPS 323.02 (1) Outdoor Design Temperatures**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>25° below zero F</td>
</tr>
<tr>
<td>Zone 2</td>
<td>20° below zero F</td>
</tr>
<tr>
<td>Zone 3</td>
<td>15° below zero F</td>
</tr>
<tr>
<td>Zone 4</td>
<td>10° below zero F</td>
</tr>
</tbody>
</table>
Plan review for energy code compliance can be conducted quickly and efficiently. The U.S. Department of Energy’s REScheck Compliance Software is designed to create simplified compliance certificates that can be easily reviewed by enforcement personnel. This Quick Reference Guide will guide you, step-by-step, through a typical plan review process. There are three basic steps for conducting a building energy code plan review:

**Step 1:** Verify the documentation has been correctly prepared.

**Step 2:** Verify the levels of efficiency shown on the plans meet or exceed that shown in the documentation.

**Step 3:** Verify all of the information to conduct a field inspection is included in the plans or documentation for the inspector to use on site.
# Compliance Certificate

**Project:** North Meadows Development

- **Energy Code:** 2009 IECC
- **Location:** Abbotsford, Wisconsin
- **Construction Type:** Single-family
- **Project Type:** New Construction
- **Conditioned Floor Area:** 2,000 ft²
- **Glazing Area:** 15%
- **Climate Zone:** 6 (9125 HDD)
- **Permit Date:** 3/17/00

<table>
<thead>
<tr>
<th>Assembly</th>
<th>Gross Area or Perimeter</th>
<th>Cavity R-Value</th>
<th>Cont. R-Value</th>
<th>U-Factor</th>
<th>UA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling 1: Flat Ceiling or Scissor Truss</td>
<td>736</td>
<td>38.0</td>
<td>0.0</td>
<td>0.030</td>
<td>22</td>
</tr>
<tr>
<td>Ceiling 2: Flat Ceiling or Scissor Truss</td>
<td>592</td>
<td>30.0</td>
<td>0.0</td>
<td>0.035</td>
<td>21</td>
</tr>
<tr>
<td>Wall 1: Wood Frame, 16” o.c.</td>
<td>1,647</td>
<td>13.0</td>
<td>6.0</td>
<td>0.053</td>
<td>71</td>
</tr>
<tr>
<td>Door 1: Glass</td>
<td>84</td>
<td>30.0</td>
<td>0.0</td>
<td>0.030</td>
<td>22</td>
</tr>
<tr>
<td>Window 1: Vinyl Frame, Double Pane with Low-E</td>
<td>204</td>
<td>30.0</td>
<td>0.0</td>
<td>0.320</td>
<td>65</td>
</tr>
<tr>
<td>Door 2: Solid</td>
<td>20</td>
<td>13.0</td>
<td>6.0</td>
<td>0.350</td>
<td>7</td>
</tr>
<tr>
<td>Wall 2: Wood Frame, 16” o.c.</td>
<td>276</td>
<td>19.0</td>
<td>0.0</td>
<td>0.047</td>
<td>44</td>
</tr>
<tr>
<td>Door 3: Solid</td>
<td>18</td>
<td>30.0</td>
<td>0.0</td>
<td>0.350</td>
<td>7</td>
</tr>
<tr>
<td>Floor 1: All-Wood Joist/Truss, Over Unconditioned Space</td>
<td>938</td>
<td>19.0</td>
<td>0.0</td>
<td>0.047</td>
<td>44</td>
</tr>
<tr>
<td>Floor 2: All-Wood Joist/Truss, Over Outside Air</td>
<td>32</td>
<td>30.0</td>
<td>0.0</td>
<td>0.033</td>
<td>1</td>
</tr>
<tr>
<td>Floor 3: Slab-On-Grade:Unheated Insulation depth: 2.0’</td>
<td>82</td>
<td>8.0</td>
<td>8.0</td>
<td>0.779</td>
<td>64</td>
</tr>
</tbody>
</table>

**Compliance:** Fails using UA trade-off

- **Compliance:** 6.7% Worse Than Code
- **Maximum UA:** 326
- **Your UA:** 348

The % Better of Trade Off Code Index reflects how close to compliance the house is. It is based on code trade-offs and it does not provide an estimate of the energy use or cost relative to a minimum-code home.

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**Items to Check**

- Check the compliance index for trade-offs.
- Review the R-values and U-factors for each assembly.
- Ensure all assemblies meet the minimum requirements.
- Verify the gross area or perimeter for each assembly.

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*Note: The above information is for illustrative purposes only.*
332.36 (6) Fenestration
U-Values Shown on Sticker for Doors Windows & Skylights
322.20(6)(a) A Permanent Certificate Shall be Posted on or Adjacent to the Electrical Panel

### Wisconsin Energy Efficiency Certificate

<table>
<thead>
<tr>
<th>Insulation Rating</th>
<th>R-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling / Roof</td>
<td>49.00</td>
</tr>
<tr>
<td>Wall</td>
<td>19.00</td>
</tr>
<tr>
<td>Floor / Foundation</td>
<td>10.00</td>
</tr>
<tr>
<td>Ductwork (unconditioned spaces):</td>
<td>_____</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Glass &amp; Door Rating</th>
<th>U-Factor</th>
<th>SHGC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window</td>
<td>0.31</td>
<td>0.33</td>
</tr>
<tr>
<td>Door</td>
<td>0.14</td>
<td>NA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heating &amp; Cooling Equipment</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forced Hot Air Furnace</td>
<td>90 AFUE</td>
</tr>
</tbody>
</table>

Name: ___________________________ Date: ____________

Comments:
Air Sealing and Insulation
SPS 322.37(6)

- 2 options to demonstrate compliance
  - When tested air leakage is \(< 7\) ACH when tested with a blower door at pressure of 33.5 psf
    Testing after rough in and installation of building envelope penetrations
  - When items listed in Table 332.37, applicable to the method of construction, are **field verified**.
    Inspector may request an approved party independent from the installer to inspect the air barrier & insulation
<table>
<thead>
<tr>
<th>Narrow cavities</th>
<th>Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garage separation</td>
<td>Air sealing is provided between the garage and conditioned spaces.</td>
</tr>
<tr>
<td>Recessed lighting</td>
<td>Recessed light fixtures are air tight, IC rated, and sealed to drywall. Exception—fixtures in conditioned space.</td>
</tr>
<tr>
<td>Plumbing and wiring</td>
<td>Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.</td>
</tr>
<tr>
<td>Shower/tub on exterior wall</td>
<td>Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.</td>
</tr>
<tr>
<td>Electrical/phone box on exterior walls</td>
<td>Air barrier extends behind boxes or air sealed-type boxes are installed.</td>
</tr>
<tr>
<td>Common wall</td>
<td>Air barrier is installed in common wall between dwelling units.</td>
</tr>
<tr>
<td>HVAC register boots</td>
<td>HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.</td>
</tr>
<tr>
<td>Fireplace</td>
<td>Fireplace walls include an air barrier.</td>
</tr>
</tbody>
</table>
“Conditioned space” means space within the dwelling thermal envelope which is provided with heated air or surfaces to provide a heated space capable of maintaining the temperature of the space to at least 50°F at design conditions.

Building Envelope Specific Requirements

- Building Envelope consists of:
  - Fenestration
  - Ceilings
  - Walls
    - Above grade
    - Below grade
    - Mass walls
  - Floors
  - Slab
  - Crawl space
Ceilings

- Requirements based on
  - Assembly type
  - Continuous insulation
  - Insulation between framing

- Meet or exceed R-values
Above Grade Walls

Insulate walls including those next to unconditioned spaces

Don’t forget to insulate rim joists
Floors over Unconditioned Space

• Space can be unheated basement or a crawlspace or outdoor air

<table>
<thead>
<tr>
<th>Climate Zones</th>
<th>R-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>13</td>
</tr>
<tr>
<td>3-4ab</td>
<td>19</td>
</tr>
<tr>
<td>4c-6</td>
<td>30*</td>
</tr>
<tr>
<td>7-8</td>
<td>38*</td>
</tr>
</tbody>
</table>

• Insulation must maintain permanent contact with underside of subfloor

*Exception:
Climate Zones 4c-8
R-19 permitted if cavity completely filled

This Condition No Longer Allowed
Below-Grade Walls

- ≥ 50% below grade

<table>
<thead>
<tr>
<th>Climate Zones</th>
<th>R-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>5/13</td>
</tr>
<tr>
<td>4-5</td>
<td>10/13</td>
</tr>
<tr>
<td>6-8</td>
<td>15/19</td>
</tr>
</tbody>
</table>

Insulated from top of basement wall down to 10 ft below grade or basement floor, whichever is less.

b “15/19” means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. “15/19” shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. “10/13” means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.
R-Values entered as standard truss into RESCheck. Program adjusts for the compression of the material.
Raised Heel Truss

- Raised Heel/Energy Truss credit if insulation is full height over exterior wall (*Prescriptive*)
  - R-30 instead of R-38  No Attic
  - R-38 instead of R-49  Attic
Energy Truss With Soffit Dam and Ventilation Baffle

Insulation Baffle for Proper Venting
Attic-Access Cover to be Insulated - Weatherstripped
SPS 322.32(1)(b)

Enter R-Value in RESCheck
Independently From Ceiling

Use Square Footage of Hatch Perimeter
As Separate Entry
• Attic-Access Cover to be Insulated - Weatherstripped
  SPS 322.32(1)(b)
Insulation dams prevent loose-fill insulation from falling through access.

Air seal gasket between trim and panel.

The hatch lid pushes up and out of the way for access.
322.32(1)(b) Uninsulated Drop - Down Stair Assembly
Tube skylights shall be insulated per manufacturer’s recommendations
Slab Edge Insulation
Slab on Grade Insulation Req’t
SPS 322.33(1)(a)

- Any heated or unheated slab floor, the bottom of which is < 12” below adjacent grade, shall be provided with perimeter insulation in accordance with Table 322.31-1 or Table 322.31-4, except as provided in par. (b).

Don’t Forget
SPS 321.16
Frost Protected Shallow Foundations
Slab Edge Insulation

- Slabs with a floor surface < 12 inches below grade
  - R-10 (typically 2 inches) insulation in Zones 4 and above
  - Downward from top of slab a minimum of 48” (zones 6, 7, 8)

- Insulation can be vertical or extend horizontally under the slab or out from the building (must be under 10 inches of soil)
Insulation on a foundation wall for a basement may be interrupted at the junction with a foundation wall.
Vapor Retarder At the Foundation Wall
SPS 322.34(2)(d)

- The edges of the vapor retarder shall extend at least 6 inches up the foundation wall and shall be attached and sealed to the foundation wall or insulation.
322.38(2) Vapor Retarder required on all frame assemblies (warm in winter side)
Vapor Retarder Installation
SPS 322.38(1)(b)

- Vapor retarder shall be continuous.
  - Except as provided in subd. 2.
- Seams that are not over a framing member shall be taped or sealed.
322.32(7) Box Sill and Rim Joists
Insulated to the Required Wall R-Value

321.11(1)(c) Exempt From
Thermal and Vapor Barrier Requirements
Heating and Cooling Supply Ducts that pass through unconditioned spaces (attics, garages) to be provided with min. R-8 insulation.

Cooling Supply Ducts: Exterior of the insulation shall be covered with vapor retarder that meets the requirements in SPS 322.38(1)
Vapor Retarder Insulation & Installation SPS 322.42 (1) & (1m)

Requires Complete Coverage Top and Bottom
Vapor Retarder Insulation & Installation SPS 322.42 (1) & (1m)

Requires Complete Coverage Top and Bottom
What’s All This About Duct Tightness Testing?
Duct Tightness Tests  322.43 Duct Sealing

Mandatory Requirements

Duct Systems with Joints Not Located Entirely Within the Conditioned Space

- Duct tightness shall be verified by either –
  - Post construction test
    - Leakage to outdoors: \( \leq 8 \text{ cfm/} \text{per 100 ft}^2 \text{ of conditioned floor area} \) or
    - Total leakage: \( \leq 12 \text{ cfm/} \text{per 100 ft}^2 \text{ of conditioned floor area} \)
      - tested at a pressure differential of 0.1 in w.g. (25Pa) across entire system, including manufacturer’s air handler enclosure
    - All register boots taped or otherwise sealed
  - Rough-in test
    - Total leakage \( \leq 6 \text{ cfm/} \text{per 100 ft}^2 \text{ of conditioned floor area} \)
      - tested at a pressure differential of 0.1 in w.g. (25Pa) across roughed-in system, including manufacturer’s air handler enclosure
    - all register boots taped or otherwise sealed
    - if air handler not installed at time of test
      - Total air leakage \( \leq 4 \text{ cfm/} \text{per 100 ft}^2 \) (If furnace not yet installed)

Exceptions: Duct tightness test is not required if the air handler and all ducts are located within conditioned space
Raised ceiling chase sealed with drywall mud

Extends conditioned space above ceiling for ductwork
Duct Insulated per Surrounding Area
If Ceiling R-38 Provide R-38 Around Ductwork

In attics, a sealed chase would be accepted as keeping the ducts within the conditioned space. If the sides of the chase are insulated with air permeable insulation exposed to the attic at more than 30 degrees from horizontal, then that insulation requires windwash protection per SPS 322.21(2).
Unheated Slab On-Grade

Figure 1.

Fig. 1 - Acceptable design for insulated duct outside building thermal envelope of an unheated slab on grade design
Acceptable design for heated slab on-grade design as duct is within building thermal envelope.
Ductwork installed below a concrete slab on grade also needs a minimum or R-8 insulation and here 2” extruded foam has been added to the sides and under the plastic ductwork.
322.37(3) Joint and Penetration Sealing

Unsealed Gaps
322.37(3) Joint and Penetration Sealing

Fibrous insulation is not an air barrier and cannot be used to air seal openings
322.37(3) Joint and Penetration Sealing

Insulated Sheathing Serving As Air Barrier and Drainage Plane
Cuts and Seams Must Be Taped or Sealed
322.37(3)  
Joint and Penetration Sealing  

Electrical Boxes
Whole House Fan Not Properly Sealed Nor Insulated
322.37(5) Fan Housing

Hole Cut Too Large, Difficult to Seal
322.37(5) Fan Housing
EXHAUST Fan Properly Sealed
322.37(3) Joint and Penetration Sealing

Kitchen Exhaust Duct Penetration Not Sealed
322.37(3) Joint and Penetration Sealing

Kitchen Exhaust Duct Penetration Not Sealed
322.37(3) Joint and Penetration Sealing

Fenestration Properly Sealed
322.37(4) (a), (b) & (c) IC Rated (Insulation Contact) Recessed Lighting

Recessed Lighting Fixtures

- Type IC rated and labeled in a sealed or gasketed enclosure
- Type IC rated and labeled as meeting ASTM E 283 when tested at 1.57 psf (75 Pa) pressure differential with no more than 2.0 cfm of air movement
- Sealed with a gasket or caulk between the housing and interior wall or ceiling covering
322.37(4)(c)2. IC (Insulation Contact) labeled recessed light with trim kit installed
IC Rated recessed light sprayed with foam to act as gasket against the drywall
322.37(4)(c)2. Non IC Rated Recessed Lighting?

Note: The department will accept cement board, drywall, and other materials that exhibit flame spread and smoke developed indices of 10 or less when tested in accordance with ASTM E−84.
322.37(3) Foam Gasket Properly Installed

Between Treated Sill Plate and Foundation
322.37(3) Redundant Sealing of Duct With Caulk, Tape, and Flashing
322.37(3) Joint and Penetration Sealings
322.37 (3) Chase Capped with Rigid Air Barrier and Duct Work Penetrations Properly Sealed
322.37 (3) Visible Light Around Door

Lack of Weatherstripping
322.37(3) Joint and Penetration Sealing

- Seal around rough openings of windows and doors.
- Seal along top plates on exterior walls.
- Seal along bottom plate on exterior walls.
- Seal along inside of bottom of first stud in interior wall or hold back first stud to pass drywall behind stud.
- Partitions: Seal at top plate where adjacent to an unconditioned space.
- Seal drywall to first stud in the wall.
IR photo showing effectively spray foam insulated/air sealed attic kneewall and floor cavities under kneewall.
Conditioned Air Leaks Around Unsealed HVAC Flue Pipes Through Fiberglass
Infrared Thermography During Depressurization Testing Reveals Air Leakage at Corner of Spray Foam-Insulated Room
Incongruity in Attic Insulation Revealed

Infrared Thermography
Undetermined Object Within Wall Enclosure

Infrared Thermography
322.20(4) General Installation

Must be Properly Installed Per Manufacturer’s Instructions
Spray foam installed with voids
322.20(4) General Installation

Insulation Poorly Installed
(Compressed w/ gaps)
322.20(4) General Installation

Batt Insulation - Properly Installed To Be Covered With Vapor Retarder and Drywall

Note: If the insulation is on a below-grade wall, s. SPS 322.38 (4) may prohibit the use of vapor retarder material used as the covering.
322.20(4) General Installation

Closed Cell Foam Insulation Properly Installed Per Manufacturer’s Instructions
322.20(5)(b) Requires Markers Showing Insul. Depth 1 per 300ft²
322.39 (2)(a)
Ventilation and Moisture Control

Insulation Shall Not Block the Free Flow of Air

2. At least 50% of the net free ventilating area shall be distributed at the high sides of the roof.

3. The remainder of the net free ventilating area shall be distributed in the lower half of the roof or attic area.
Minimum $R-3$ required on
- HVAC systems
  - Exception: Piping that conveys fluids between 55 & 105°F

Minimum $R-2$ required on
- All circulating domestic hot water systems
  - Systems also require a readily accessible manual switch
321.24(3) Flashing properly installed
Creates complete drainage system

With continuous rigid insulation sheathing / siding
321.24(3) Corners Not Properly Flashed

Leaves a vulnerable area in the drainage system
322.21(3) Protection of Foam Insulation

Covering Must Extend min. 2 inches below grade

Protect from Physical Damage and UV Light with Permanent Opaque Weather Resistant Covering
322.33(2) R-10 Continuous Insulation Beneath Heated Slab Per Prescriptive Table

322.38(3) Min. 6 Mil. Vapor Retarder Required Beneath Slab
Properly Sealed Sump Crock

Not in code per se: But… 322.38(3)
Requires Vapor Retarder
Beneath Concrete Floors
321.11(1)(b) Foam plastic insulation Must be Separated from the Interior of the Dwelling by a Thermal Barrier
321.11(1)(b) Products must be tested and rated as a thermal barrier.
DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
SECTION: 07 21 00—THERMAL INSULATION
SECTION: 07 22 00—ROOF AND DECK INSULATION
SECTION: 07 25 00—WATER-RESISTIVE BARRIERS / WEATHER BARRIERS
SECTION: 07 27 00—AIR BARRIERS

REPORT HOLDER:

THE DOW CHEMICAL COMPANY

200 LARKIN CENTER
322.20(4)(b) .... Shall Be Installed

Per Manufacturer’s Instruction

Warning: This facing will burn. Do not leave exposed. Cover with approved building material in contact with facing. Keep open flames and other heat source away from facing. Consult the major warning, fire hazard and installation instructions or call 1-419-248-8234.

Advertencia: Este revestimiento puede incendiarse. No lo deje expuesto. Cúbralo con material aprobado para construcción que esté en contacto con el revestimiento. Manténgalo alejado de llamas y otras fuentes de calor. Vea el paquete para advertencias, peligro de incendio, instrucciones de instalación o llame al 1-419-248-8234.

3½" Fiber Glass Insulation
Code Change - June 2016
Crawl Spaces Must Be Insulated

322.34 (3) Uninsulated and Vented Crawl Spaces Removed by Emergency Rule   June 1, 2016
322.34 (2) & (3) Vapor Retarders
Insulation Reqs.  Thermal Barriers

R-10 Continuous:  Interior or Exterior
R-13 Cavity:  on Interior
322.34(2)(d)… Shall extend at least 6 inches up the wall and be attached and sealed
322.34 (2) & (3)  Vapor Retarders
Insulation Reqs.  Thermal Barriers

Exposed Foam OK If: No Heat Source Present
And…Crawl Space is Separated From Living Space

Vapor Retarder Extended up at least 6 inches and attached
Crawl Spaces: You Never Know What You Might Find In There

Suburban Los Angeles

Hello Kitty!
Thank You

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