**Minnesota Residential Energy Code**
**Working Draft, 5-30-07**
**Foundation Wall Insulation Sections**

Amendments to the International Residential Code, 2006 edition, Chapter 11.

## SECTION N1102, BUILDING THERMAL ENVELOPE

**N1104.1.3 Foundation insulation** Foundation insulation of basement and crawl space walls and the perimeter of slab-on grade floors must comply with this section. Insulation materials shall be installed according to manufacturer's installation specifications and any additional requirements of section N1104.1 through N1104.10. Adding additional insulation to increase R-values or adding an additional vapor retarder to foundation wall assemblies, other than those required in this section, is prohibited.

**Exceptions:**

1. Foundation walls enclosing unconditioned spaces shall meet this requirement unless the floor overhead is insulated in accordance with Section N1102.1.
2. Permanent wood foundations shall meet the requirements of R401.1.
3. Frost protected shallow foundations shall meet the requirements of R403.3
4. Insulating concrete form materials shall meet the requirements of Section R611.

**N1104.1.4 Basement foundation and crawl space walls.** Basement foundation and crawl space walls shall be insulated from the top of the foundation wall down to the top of the footing or from the top edge of the interior wall to the top of the slab if insulation is on the interior.

**N1104.1.5 Slab-on-grade and basement walkout foundation walls.** Slab-on-grade and basement walkout foundation wall insulation shall extend to the design frost line or top of footing whichever is less. The top edge of the insulation installed between the exterior wall and the edge of the interior slab shall be permitted to be cut at a 45-degree angle away from the exterior wall. Slab-edge insulation is not required in jurisdictions designated by the code official as having termite infestation.

**N1104.1.6 Foundation wall and rim joist area thermal insulation requirements.** The foundation wall system and rim joist area shall have an insulating layer with minimum thermal properties as required in this section. The insulation layer must be a minimum R-10 in accordance with Table N1102.1.

**Exception:** In the Southern Zone, the foundation and rim joist area insulation may be reduced to a minimum of an R-5 if

1. The insulation is located on the exterior or is integral to the foundation wall; and
2. An additional R-5 insulation is added to the minimum attic R-value level; and.
3. The heating system meets the minimum efficiency ratings in Table N110.4.1.6

**Table N1104.1.6 HVAC System Minimum Efficiency Requirement to Qualify for R-5 Exterior Insulation in the Southern Zone**

| Heating System Type (that is greater than or equal to) | Minimum Efficiency Rating | |
|---|---|---|
| | AFUE | HSPF |
| Furnace, Gas or Oil Fired | 90% | N/A |
| Boiler, Gas or Oil Fired | 85% | N/A |
| Heat Pump, Split Systems | N/A | 8.0 |

| | | |
|---|---|---|
| Heat Pump, Single Package or Equipment (including gas/electric package units) | N/A | 7.7 |

**N1104.1.7 Integral foundation insulation requirements** An insulation assembly installed integral to the foundation walls shall be manufactured for its intended use and installed according to the manufacturer's specifications.

**N1104.1. 9 Exterior foundation insulation requirements** An insulation assembly installed on the exterior of the foundation walls and the perimeter of slabs on grade:

1. Shall be of water resistant materials manufactured for its intended use;
2. Installed according to the manufacturer's specifications;
3. Shall comply with either ASTM C578, C612 or C1029 as applicable and;
4. Shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (152 mm) below grade. The insulation and protective covering system shall be flashed in accordance with the IRC.

**N1104.1. 10 Interior foundation insulation requirements** An insulation assembly installed on the interior of foundation walls shall meet the following provisions:

1. Masonry foundation walls shall be drained through the masonry block cores to an approved interior drainage system.
2. If a frame wall is installed it shall not be in direct contact with the foundation wall, unless that interior side of the foundation wall has been waterproofed.
3. Comply with the interior air barrier requirements in N1102.4.1
4. Comply with section N1104.1.10.1, N1104.1.10.2, N1104.1.10.3, or N1104.1.10.4.

**N1104.1.10.1 Rigid interior insulation** Rigid interior insulation shall comply with the following as applicable

1. Either ASTM C 578 or ASTM C 1289.
2. Dampproofing, waterproofing, or a water repellant shall be applied to the exposed above grade foundation walls or a layer of dampproofing or waterproofing shall be installed on the entire inside surface of the foundation wall. Water repellant materials shall comply with ASTM E 514 with 90% or greater reduction in water permeance when compared to an untreated sample.
3. Installation requirements
   a. Must be in contact with the foundation wall surface
   b. Vertical edges shall be sealed with acoustic sealant
   c. All interior joints, edges, and penetrations shall be sealed against air and water vapor penetration.
   d. Horizontally continuous acoustic sealant between the foundation wall and the insulation at the top of the foundation wall.
   e. Horizontally continuous acoustic sealant between the basement floor and the bottom insulation edge.
4. The insulation shall not be penetrated by the placement of utilities or by fasteners or connectors used to install a frame wall.

**N1104.1 10.2 Spray applied interior insulation** Spray applied interior insulation shall comply with the following as applicable

1. Closed cell polyurethane
   a. ASTM C 1029 compliant with a permeance not greater than 1 in accordance with ASTM E 96 procedure A.

b. Sprayed directly onto the foundation wall surface. There must be a 1" minimum gap between the foundation wall surface and any framing.

c. The insulation shall not be penetrated by the placement of utilities.

d. Through penetrations shall be sealed

2. ½ pound free rise open cell foam

a. Sprayed directly onto the foundation wall surface. There must be a 1" minimum gap between the foundation wall surface and any framing.

b. The insulation shall not be penetrated by the placement of utilities.

c. Through penetrations shall be sealed

**N1104.1.10.3 Semi-rigid interior insulation** Semi-rigid interior insulation shall comply with the following

1. ASTM __ with a maximum permeance of 1.1 per inch.
2. Must have a minimum density of (??) 2.9 pcf and have a fungal resistance per ASTM C1338.
3. Installation requirements
   a. Must be in contact with the foundation wall surface
   b. Vertical edges shall be sealed with acoustic sealant
   c. All interior joints, edges, and penetrations shall be sealed against air and water vapor penetration.
   d. Horizontally continuous acoustic sealant between the foundation wall and the insulation at the top of the foundation wall..
   e. Horizontally continuous acoustic sealant between the basement floor and the bottom insulation edge.

**N1104.1.10.4 Unfaced fiberglass batt interior insulation** Unfaced fiberglass batt interior insulation shall comply with the following

1. Waterproofing shall be applied to the entire inside surface of the foundation wall.
2. The top and bottom plates must be air sealed to the foundation wall surface and the basement floor.
3. In addition an air barrier material and vapor retarder material with a minimum a permeance of at least 1 in accordance with ASTM E 96 procedure A.
   a. Air sealed to the framing with construction adhesive or equivalent at the top and bottom plates and where the adjacent wall is insulated, and
   b. Air sealed utility boxes and other penetrations, and
   c. All seams shall be overlapped at least 6 inches and sealed with compatible sealing tape or equivalent.
   d. Up to R-13 batts are allowed.

**N1104.1.9 Foundation Wall Insulation Performance Option.** Insulated foundation systems designed and installed under this option shall meet the requirements of this section.

**1) N1104.1.9.1 Water separation plane.** The foundation shall be designed and built to have a continuous water separation plane between the interior and exterior. The interior side of the water separation plane must:

Have a stable annual wetting/drying cycle whereby foundation wall system water (solid, liquid and vapor) transport processes produce no net accumulation of ice or water over a full calendar year and the foundation wall system is free of adsorbed water for at least 4 months over a full calendar year;

Prevent conditions of moisture and temperature to prevail for a time period favorable to mold growth for the materials used; and

Prevent liquid water from the foundation wall system reaching the foundation floor system at any time during a full calendar year.

**a) N1104.1.9.1.1 Documentation.** The foundation insulation system designer shall provide documentation certified by a professional engineer registered in Minnesota demonstrating how the requirements of this section are fulfilled. The foundation insulation system designer shall also specify the design conditions for the wall and the design conditions for the interior space for which the water separation plane will meet the requirements of this section. The foundation insulation system designer shall provide a label disclosing these design conditions and the label shall be posted in accordance with N1101.8.

**b) N1104.1.9.1.2 Installation.** The *water separation plane* shall be designed and installed to prevent external liquid or capillary water flow across it after the foundation is backfilled.

**N1104.1.9.2 Foundation air barrier.** The foundation insulation system shall be designed and installed to have a foundation air barrier system between the interior and the exterior. The foundation air barrier system must be a material or combination of materials that is continuous with all joints sealed and is durable for the intended application. Material used for the foundation air barrier system must have an air permeability not to exceed 0.004 $ft^3/min.ft^2$ under a pressure differential of 0.3 in. water (1.57psf) (0.02 $L/s.m^2$ at 75Pa) as determined by either commonly accepted engineering tables or by being labeled by the manufacturer as having these values when tested in accordance with ASTM E2178.