

**MINNESOTA ENERGY CODE REQUIREMENTS FOR FOUNDATION INSULATION**

<b>EXTERIOR FOUNDATION INSULATION – GENERAL REQUIREMENTS</b>	<b>INTERIOR FOUNDATION INSULATION – GENERAL REQUIREMENTS</b>
<ul style="list-style-type: none"> <li>• Must be of water resistant materials manufactured for its intended use.</li> <li>• Must be installed according to the manufacturer’s specifications.</li> <li>• Must comply with ASTM C578 (rigid), C1621 (semi-rigid), C1029 (spray-applied), or C1289 (rigid), as applicable.</li> <li>• Must have a rigid, opaque and weather resistant protective covering to prevent the degradation of the insulation’s thermal performance.               <ul style="list-style-type: none"> <li>○ The protective cover must cover the exposed exterior insulation and extend a minimum of 6-inches below grade.</li> <li>○ The insulation and protective covering must be flashed with corrosion resistant flashing applied in such manner as to prevent entry of water into the wall cavity or penetration of water into the building structural frame components.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Masonry foundation walls must be drained through the masonry block cores to an approved interior drainage system.</li> <li>• If a frame wall is installed it must NOT be in direct contact with the foundation wall, unless the INTERIOR side of the foundation has been WATERPROOFED.</li> <li>• Must meet the requirements for rigid interior insulation, spray-applied interior insulation, semi-rigid interior insulation, or unfaced fiberglass batt interior insulation.</li> <li>• Must comply with the following interior air barrier requirements:               <ul style="list-style-type: none"> <li>○ Air barrier to be installed on warm-in-winter side of thermal insulation.</li> <li>○ Areas of potential leakage in the building thermal envelope shall be caulked, gasketed, weather-stripped, or otherwise sealed with an air barrier material, suitable film or solid material to form an effective barrier between conditioned and unconditioned spaces. The integrity of all air barriers must be maintained. Sealing methods between dissimilar materials must allow for expansion and contraction.</li> </ul> </li> </ul>
<b>BASEMENT FOUNDATIONS AND CRAWL SPACES – GENERAL REQUIREMENTS</b>	<b>SLAB ON GRADE AND BASEMENT WALK OUT FOUNDATIONS – GENERAL REQUIREMENTS</b>
<ul style="list-style-type: none"> <li>• Must be installed to an R-10. Adding additional insulation to increase R-value or adding additional vapor retarder to foundation wall assemblies is prohibited, except for the installation of R-13 when using fiberglass batt insulation on the interior.</li> <li>• Must 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Must be insulated to an R-10. Adding additional insulation to increase R-value or adding additional vapor retarder to foundation wall assemblies is prohibited, except for the installation of R-13 when using fiberglass batt insulation on the interior.</li> <li>• Insulation must extend to the designed frost line (60-inches here) or to the top of footing, whichever is less.</li> <li>• The top edge of the insulation installed between the exterior wall and the edge of the interior slab can be cut at a 45-degree angle away from the exterior wall.</li> </ul>
<b>LOCATIONS WHERE THE AIR BARRIER MUST BE SEALED:</b>	<b>LOCATIONS WHERE THE AIR BARRIER MUST BE SEALED: (continued)</b>
<ul style="list-style-type: none"> <li>• Walls, floors, ceilings, overhangs, knee-walls, and floor rim joist areas separating conditioned from unconditioned spaces.</li> <li>• At all joints, seams and penetrations of the building thermal envelope.</li> <li>• At all electrical, plumbing, mechanical and other penetrations of the interior air barrier.</li> <li>• At all interconnections in the thermal envelope between concealed vertical and horizontal spaces such as soffits, drop ceilings, cove ceilings and similar locations.</li> </ul>	<ul style="list-style-type: none"> <li>• In concealed spaces between stairs, fireplace framing, partition walls, chases, tubs and showers directly adjacent to the building thermal envelope.</li> <li>• At openings between framing members and window and door frames and jams</li> </ul>

INTEGRAL FOUNDATION INSULATION	RIGID INTERIOR INSULATION	SPRAY-APPLIED INTERIOR INSULATION	SEMI-RIGID INTERIOR INSULATION	UNFACED FIBERGLASS BATT INSULATION
<p>Integral foundation insulation is an engineered poured wall system with a rigid foam core. Each manufacturer will have specific requirements which must be followed.</p>	<ul style="list-style-type: none"> <li>Must comply with ASTM C578 or C1289.</li> <li>Dampproofing, waterproofing, or a water repellent must be applied to the exposed above grade foundation walls or a layer of dampproofing or waterproofing must be installed on the <u>entire inside surface</u> of the foundation wall. Water repellent materials must comply with ASTM E514.</li> <li>Must be in contact with the foundation wall surface.</li> <li>Vertical edges must be sealed with acoustic sealant.</li> <li>All interior joint, edges and penetrations must be sealed against air and water vapor penetration.</li> <li>Horizontally continuous acoustic sealant must be installed between the foundation wall and the insulation at the top of the foundation wall.</li> <li>Horizontally continuous acoustic sealant must be installed between the basement floor and the bottom insulation edge.</li> <li>The insulation must not be penetrated by the placement of utilities or by fasteners or connectors used to install a frame wall.</li> </ul>	<p style="text-align: center;"><b>CLOSED CELL POLYURETHANE</b></p> <ul style="list-style-type: none"> <li>Must comply with ASTM 1029 with a permeance of not greater than 1.</li> <li>Must be sprayed directly onto the foundation wall surface.</li> <li>There must be a 1-inch minimum gap between the foundation wall surface and the framing.</li> <li>The insulation must not be penetrated by the placement of utilities.</li> <li>All through penetrations must be sealed.</li> </ul>	<ul style="list-style-type: none"> <li>Must comply with ASTM C1621 with a maximum permeance of 1.1 per inch.</li> <li>Must have a minimum density of 1.3 pcf and must have a fungal resistance per ASTM C1338.</li> <li>Must be in contact with the foundation wall surface.</li> <li>Vertical edges must be sealed with acoustic sealant.</li> <li>All interior joints, edges and penetrations must be sealed against air and water vapor penetration.</li> <li>Horizontally continuous acoustic sealant must be installed between the foundation wall and the insulation at the top of the foundation wall.</li> <li>Horizontally continuous acoustic sealant must be installed between the basement floor and the bottom insulation edge.</li> </ul>	<ul style="list-style-type: none"> <li>Waterproofing must be applied to the <u>entire inside surface</u> of the foundation wall.</li> <li>The top and bottom plates must be air sealed to the foundation wall surface and the basement floor.</li> <li>An air barrier material and vapor retarder material with a minimum permeance of at least 1 according to ASTM E96 to be installed in the following manner:               <ol style="list-style-type: none"> <li>Must be air sealed to the framing with construction adhesive or equivalent at the top and bottom plates and where the adjacent wall is insulated; and</li> <li>Must be air sealed to utility boxes and other penetrations; and</li> <li>All seams must be overlapped at least 6-inches and sealed with compatible sealing tape or equivalent.</li> </ol> </li> </ul> <p><b>NOTE: This is the only application where exceeding R-10 foundation insulation is permitted. In this application, it is allowable to install up to an R-13 fiberglass batt.</b></p>
		<p style="text-align: center;"><b>½ LB. FREE RISE OPEN CELL FOAM</b></p> <ul style="list-style-type: none"> <li>Must be sprayed directly onto the foundation wall surface.</li> <li>There must be a 1-inch minimum gap between the foundation wall surface and any framing.</li> <li>The insulation must not be penetrated by the placement of utilities.</li> <li>All through penetrations must be sealed.</li> </ul>		

**INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT <sup>(a)</sup>**

Northern Climate Zone	Fenestration <sup>(b)</sup> U-Factor	Skylight U-Factor	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-Value <sup>(f)</sup>	Floor R-Value	Foundation Wall & Rim Joist R-Value	Slab <sup>(c)</sup> R-Value & Depth	Crawl Space Wall R-Value
	<b>0.35</b>	<b>0.60</b>	<b>44</b>	<b>19</b>	<b>15</b>	<b>30 <sup>(d)</sup></b>	<b>10</b>	<b>10, 5 feet</b>	<b>10</b>
Southern Climate Zone	<b>0.35</b>	<b>0.60</b>	<b>38</b>	<b>19 or 13 + 5 <sup>(e)</sup></b>	<b>15</b>	<b>30 <sup>(d)</sup></b>	<b>10</b>	<b>10, 3.5 feet</b>	<b>10</b>

**Footnotes:** (a) R-values are minimums. U-factors are maximums. R-19 shall be permitted to be compressed into a 2 X 6 cavity.

(b) The fenestration U-factor column excludes skylights.

(c) R-5 must be added to the required slab edge R-values for heated slabs.

(d) Or insulation sufficient to fill framing cavity, R-19 minimum.

(e) N/A in Northern Climate

(f) When using log type construction for thermal mass walls, the following will apply: 1) A minimum of a 7-inch diameter log shall be used. 2) The U-value of the fenestration products must be 0.31 overall average, or better.