

Section 9.13. Damproofing, Waterproofing and Soil Gas Control

9.13.1. General

9.13.1.1. Scope and Application

- 1) This Section presents measures to control the ingress of water, moisture and soil gas.
- 2) Subsection 9.13.2. applies to below-ground walls and floors-on-ground where drainage is provided in accordance with Section 9.14. over and along the entire below-ground portion of the *foundation wall*.
- 3) Subsection 9.13.3. applies to below-ground walls, floors-on-ground and roofs of underground structures that are subject to hydrostatic pressure.
- 4) Subsection 9.13.4. applies to walls, roofs and floors that are in contact with the ground.

9.13.2. Damproofing

9.13.2.1. Required Damproofing

- 1) Except as provided in Article 9.13.3.1., where the exterior finished ground level is at a higher elevation than the ground level inside the *foundation walls*, exterior surfaces of *foundation walls* below ground level shall be damproofed.
- 2) Except as provided in Sentence (3) and Article 9.13.3.1., floors-on-ground shall be damproofed.
- 3) Damproofing required in Sentence (2) need not be provided for
 - a) floors in garages,
 - b) floors in unenclosed portions of *buildings*, or
 - c) floors installed over not less than 100 mm of coarse clean granular material containing not more than 10% of material that will pass a 4 mm sieve.

9.13.2.2. Damproofing Materials

- 1) Materials installed to provide required damproofing shall be
 - a) capable of protecting assemblies against moisture transfer from the ground,
 - b) compatible with adjoining materials, and
 - c) resistant to mechanisms of deterioration that may reasonably be expected, given the nature, function and exposure of the materials.
- 2) Except as otherwise specified in this Section, materials used for exterior damproofing shall
 - a) conform to one of the following standards:
 - i) ASTM D 1227, “Emulsified Asphalt Used as a Protective Coating for Roofing,” Type III, Class I,
 - ii) ASTM D 4479/D 4479M, “Asphalt Roof Coatings – Asbestos-Free,” Type III,
 - iii) CAN/CGSB-51.34-M, “Vapour Barrier, Polyethylene Sheet for Use in Building Construction,” or
 - iv) CAN/CSA-A123.4, “Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems,” or
 - b) have a water vapour permeance of not more than 43 ng/Pa·s·m² when tested in accordance with Procedure A (wet cup) of ASTM E 96/E 96M, “Water Vapor Transmission of Materials,” and consist of one of the following material types:
 - i) a vapour-resistant coating,
 - ii) a cold-fluid-applied or hot-rubberized bituminous damproofing membrane,
 - iii) a liquid-applied or spray-applied asphalt-based emulsion damproofing, or
 - iv) a type III hot-applied asphalt.

9.13.2.3. Preparation of Surface

- 1) The area in which dampproofing is to be carried out shall be kept free of water during the application and curing of the dampproofing system.
- 2) The surface to be dampproofed shall be prepared in accordance with the instructions of the dampproofing material manufacturer.
- 3) Where the dampproofing material is to be applied on insulating concrete form (ICF) walls, the instructions of the ICF wall manufacturer shall be followed.
- 4) Unit masonry walls to be dampproofed shall be parged on the exterior face below ground level with not less than 6 mm of mortar conforming to Section 9.20. covered over the footing.
- 5) Concrete walls to be dampproofed shall have holes and recesses sealed with cement mortar or a mastic or sealant that is suitable for vertical applications and compatible with the dampproofing material.
- 6) The surface required to be dampproofed shall be clean and dry and free of ice, snow, frost, dust, dirt, oil, grease, cracks, projections and depressions, loose particles and debris that could be detrimental to the performance of the material to be applied.

9.13.2.4. Application of Dampproofing Material

- 1) Exterior dampproofing shall be applied from finished ground level to the top of the exterior of the footing.
- 2) Unless otherwise stated in this Subsection, dampproofing shall be installed in accordance with the manufacturer's instructions with regard to
 - a) surface priming,
 - b) conditions during application,
 - c) application quantity and rate, and
 - d) curing times.
- 3) Joints, cracks and penetrations shall be sealed to maintain the continuity of the dampproofing, where the dampproofing material is not capable of bridging such discontinuities.

9.13.2.5. Moisture Protection for Interior Finishes

(See Note A-9.13.2.5.)

- 1) The interior surface of *foundation* walls below ground level shall be protected by means that minimize the ingress of moisture from the *foundation* wall into interior spaces, where
 - a) a separate interior finish is applied to a concrete or unit masonry wall that is in contact with the *soil*, or
 - b) wood members are placed in contact with such walls for the installation of insulation or finish.
- 2) Except as provided in Sentence (3), where the protection of interior finishes required in Sentence (1) consists of membranes or coatings,
 - a) the membrane or coating shall extend from the *basement* floor surface up to the highest extent of the interior insulation or finish, but not higher than the exterior finished ground level, and
 - b) no membrane or coating with a permeance less than 170 ng/(Pa·s·m²) shall be applied to the interior surface of the *foundation* wall above ground level between the insulation and the *foundation* wall.
- 3) Where insulation functions as both moisture protection for interior finishes and as a *vapour barrier* in accordance with Subsection 9.25.4., it shall be applied over the entire interior surface of the *foundation* wall.

9.13.2.6. Dampproofing of Floors-on-Ground

- 1) Where dampproofing is installed below the floor, it shall consist of
 - a) polyethylene not less than 0.15 mm thick with joints lapped not less than 100 mm,
 - b) type S roll roofing with joints lapped not less than 100 mm, or

- c) rigid extruded/expanded polystyrene with sealed or ship-lapped joints that has
 - i) sufficient compressive strength to support the floor assembly, and
 - ii) a water vapour permeance complying with Clause 9.13.2.2.(2)(a).
- 2) Where dampproofing is installed between a floor-on-ground and a finished floor, it shall consist of
 - a) rigid extruded/expanded polystyrene with sealed or ship-lapped joints that has
 - i) sufficient compressive strength to support the floor assembly, and
 - ii) a water vapour permeance complying with Clause 9.13.2.2.(2)(b), or
 - b) polyethylene not less than 0.05 mm thick with joints lapped not less than 100 mm.

9.13.3. Waterproofing

9.13.3.1. Required Waterproofing

- 1) Where hydrostatic pressure occurs, waterproofing is required for assemblies separating interior space from the ground to prevent the ingress of water into *building* assemblies and interior spaces.
- 2) Waterproofing is required for roofs of underground structures to prevent the ingress of water into *building* assemblies and interior spaces.

9.13.3.2. Waterproofing Materials

- 1) Materials installed to provide required waterproofing shall be
 - a) compatible with adjoining materials, and
 - b) resistant to mechanisms of deterioration that may reasonably be expected, given the nature, function and exposure of the materials.
- 2) Materials used for exterior waterproofing shall conform to
 - a) ASTM D 1227, “Emulsified Asphalt Used as a Protective Coating for Roofing,” in which case, they shall be installed in accordance with Sentence 9.13.3.3.(3),
 - b) ASTM D 3019, “Lap Cement Used with Asphalt Roll Roofing, Non-Fibered, Asbestos-Fibered, and Non-Asbestos-Fibered,” where non-fibered and non-asbestos-fibered types (I and III) asphalt roll roofing is permitted.
 - c) ASTM D 4479/D 4479M, “Asphalt Roof Coatings – Asbestos-Free,” in which case, they shall be installed in accordance with Sentence 9.13.3.3.(3) and with reinforcing material,
 - d) ASTM D 4637/D 4637M, “EPDM Sheet Used In Single-Ply Roof Membrane,”
 - e) ASTM D 4811/D 4811M, “Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing,”
 - f) ASTM D 6878/D 6878M, “Thermoplastic Polyolefin Based Sheet Roofing,”
 - g) CGSB 37-GP-9Ma, “Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing,” where a primer is required,
 - h) CAN/CGSB-37.50-M, “Hot-Applied, Rubberized Asphalt for Roofing and Waterproofing,”
 - i) CAN/CGSB-37.54, “Polyvinyl Chloride Roofing and Waterproofing Membrane,”
 - j) CGSB 37-GP-56M, “Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing,”
 - k) CAN/CGSB-37.58-M, “Membrane, Elastomeric, Cold-Applied Liquid, for Non-Exposed Use in Roofing and Waterproofing,”
 - l) CAN/CSA-A123.2, “Asphalt-Coated Roofing Sheets,”
 - m) CAN/CSA-A123.4, “Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems,” in which case, they shall be installed with reinforcing material, or
 - n) CSA A123.17, “Asphalt Glass Felt Used in Roofing and Waterproofing.”

9.13.3.3. Preparation of Surface

- 1) Surfaces to be waterproofed shall be prepared in accordance with the instructions of the waterproofing material manufacturer.
- 2) Where the waterproofing material is to be applied on ICF walls, the instructions of the ICF wall manufacturer shall be followed.
- 3) Unit masonry walls that are to be waterproofed shall be parged on exterior surfaces below ground level with not less than 6 mm of mortar conforming to Section 9.20. covered over the footing.
- 4) Concrete walls that are to be waterproofed shall have all holes and recesses sealed with mortar or waterproofing material.
- 5) Surfaces required to be waterproofed shall be clean and dry and free of ice, snow, frost, dust, dirt, oil, grease, cracks, projections and depressions, loose particles and debris that could be detrimental to the performance of the waterproofing material.

9.13.3.4. Application of Waterproofing Membranes

- 1) Unless otherwise stated in this Subsection, waterproofing shall be installed in accordance with the manufacturer's instructions with regard to
 - a) surface priming,
 - b) conditions during application,
 - c) the required number of layers of reinforcing fabric on *foundation*, footings, floors, walls and structural slabs,
 - d) application quantity and rate, and
 - e) curing times.
- 2) Waterproofing shall be continuous across joints and at junctions between different *building* elements.
- 3) The waterproofed surface shall be protected with a suitable material to minimize mechanical damage during backfilling.
- 4) The area in which the waterproofing is to be carried out shall be kept free of water during the application and curing of the waterproofing system.

9.13.3.5. Floor Waterproofing System

- 1) *Basement* floors-on-ground to be waterproofed shall have a system of membrane waterproofing provided between 2 layers of concrete, each of which shall be not less than 75 mm thick, with the floor membrane made continuous with the wall membrane to form a complete seal.

9.13.4. Soil Gas Control

(See Note A-9.13.4.)

9.13.4.1. Application and Scope

- 1) This Subsection applies to
 - a) wall, roof and floor assemblies separating *conditioned space* from the ground, and
 - b) the rough-in of a radon vent pipe to allow the future protection of *conditioned space* that is separated from the ground by a wall, roof or floor assembly.
- 2) This Subsection addresses the leakage of *soil* gas from the ground into the *building*.

9.13.4.2. Protection from Soil Gas Ingress

- 1) All wall, roof and floor assemblies separating *conditioned space* from the ground shall be protected by an *air barrier system* conforming to Subsection 9.25.3.

2) Except as permitted by Sentence (4), unless the space between the *air barrier system* and the ground is designed to be accessible for the future installation of a subfloor depressurization system, *dwelling units* and *buildings* containing *residential occupancies* shall be provided with the rough-in for a radon extraction system conforming to Article 9.13.4.3.

3) Except as permitted by Sentence (4) or (5), where *buildings* are used for *occupancies* other than those described in Sentence (2) and are intended to be occupied on average for greater than 4 hours within a 24 hour period, protection from radon ingress and the means to address high radon concentrations in the future shall conform to

- a) Article 9.13.4.3., or
- b) Parts 5 and 6 (see Article 5.4.1.1. and 6.2.1.1.).

(See Note A-9.13.4.2.(3).)

4) [Locations requiring radon rough-ins shall be determined in accordance with Article 1.1.3.3. of Division B.](#)

5) *Buildings* described in Clause 9.16.2.1.(2)(b) need not conform to Sentence (3).

9.13.4.3. Rough-in for a Subfloor Depressurization System

(See Note A-9.13.4.3.)

1) Floors-on-ground shall be provided with a rough-in for subfloor depressurization consisting of

- a) a gas-permeable layer and a radon vent pipe as described in Sentence (2), or
- b) a gas-permeable layer consisting of coarse clean granular material and a radon vent pipe as described in Sentence (3).

2) Where a rough-in referred to in Clause (1)(a) is provided, the rough-in shall include

- a) a gas-permeable layer installed in the space between the *air barrier system* and the ground to allow the depressurization of that space,
- b) reserved, and
- c) a radon vent pipe that
 - i) has one or more inlets that allow for the effective depressurization of the gas-permeable layer (see Notes A-9.13.4.3.(2)(c)(i) and (3)(b)(i)),
 - ii) terminates outside the *building* in a manner that does not constitute a hazard, and
 - iii) is clearly labeled "RADON VENT PIPE".

3) Where a rough-in referred to in Clause (1)(b) is provided, the rough-in shall include

- a) a gas-permeable layer, consisting of not less than 100 mm of clean granular material containing not more than 10% of material that will pass a 4 mm sieve, installed below the floor-on-ground, and
- b) a radon vent pipe not less than 100 mm in diameter that is constructed so as to be airtight and installed through the floor-on-ground, such that
 - i) it opens into each contiguous area of the granular layer required by Clause (a) and not less than 100 mm of granular material projects beyond the terminus of the pipe measured along its axis (see Note A-9.13.4.3.(2)(c)(i) and (3)(b)(i)),
 - ii) it terminates not less than 1 m above and not less than 3.5 m in any other direction from any air inlet, door or openable window,
 - iii) it terminates not less than 2 m above and not less than 3.5 m in any other direction from a roof that supports an *occupancy*,
 - iv) it terminates not less than 1.8 m from a property line,
 - v) it is shielded from the weather in accordance with Sentence [6.3.2.9.\(4\)](#),
 - vi) it is protected from frost closure by insulating the pipe or by some other manner, if subject to frost closure,
 - vii) the accumulation of moisture in the pipe is prevented, and
 - viii) it is clearly labelled "RADON VENT PIPE" every 1.2 m and at every change in direction.

(See Note A-9.13.4.3.(3))