

3 STEPS FOR CODE-COMPLIANT USE OF WATER VAPOR RETARDERS and Foam Plastic Insulating Sheathing (FPIS) Continuous Insulation (ci)

This reference guide summarizes key requirements and options in the 2024 International Residential Code (IRC) and 2024 International Building Code (IBC) for design and construction of code-compliant and moisture-resistant frame walls using foam plastic insulating sheathing (FPIS) as continuous insulation (ci). When used in a code-compliant manner, FPIS ci protects walls against the effects of moisture by keeping walls warm to prevent condensation while maximizing drying to the interior with proper vapor retarder specification.

Follow the three steps below for code-compliant water vapor control. The wall assembly design must also be coordinated with minimum energy code insulation requirements. For greater flexibility and to automate the application of this reference guide and energy code compliance, refer to these wall calculators. Various moisture control research reports and other practical guides are also available here.

For a summary of key concepts and principles for moisture control, refer to FACTS: Moisture Control for Wall Assemblies.

STEP 1: KNOW INTERIOR VAPOR RETARDER CLASSES

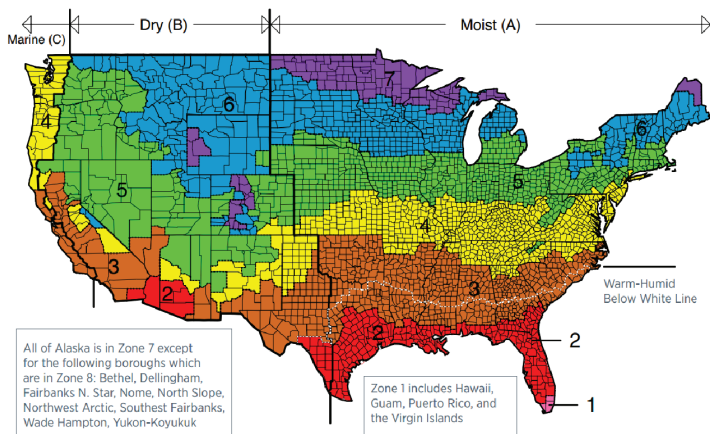
Use the following definitions for water vapor retarder classes when specifying interior vapor retarders in accordance with Steps 2 and 3:

TABLE R702.7(1) VAPOR RETARDER MATERIALS AND CLASSES

CLASS	ACCEPTABLE MATERIALS
I	Sheet polyethylene, nonperforated aluminum foil, or other approved materials with a perm rating of less than or equal to 0.1.
II	Kraft-faced fiberglass batts, vapor retarder paint, or other approved materials applied in accordance with the manufacturer's installation instructions for a perm rating greater than 0.1 and less than or equal to 1.0.
III	Latex paint, enamel paint, or other approved materials applied in accordance with the manufacturer's installation instructions for a perm rating of greater than 1.0 and less than or equal to 10.0.

STEP 2: CONSIDER PERMITTED INTERIOR VAPOR RETARDERS

Select a "permitted" vapor retarder for the interior side of frame walls based on the Climate Zones as outlined in IRC Table R702.7(2), paying attention to footnotes and other table references. In Climate Zones 4-8, no interior vapor retarder is required where complying with Table R702.7(5).



U.S. Climate Zones

RESPONSIVE VAPOR RETARDER is defined as a "material complying with a vapor retarder class of Class I or Class II but which also has a vapor permeance of 1 perm or greater in accordance with ASTM E96, water method (Procedure B)."

TABLE R702.7(2) VAPOR RETARDER OPTIONS

CLIMATE ZONE	VAPOR RETARDER CLASS		
	CLASS I ^a	CLASS II ^a	CLASS III
1, 2	Not Permitted	Not Permitted	Permitted
3, 4 (except Marine 4)	Not Permitted	Permitted ^c	Permitted
Marine 4, 5, 6, 7, 8	Permitted ^b	Permitted ^c	See Table R702.7(3)

- A responsive vapor retarder shall be allowed on the interior side of any frame wall in all climate zones.
- In frame walls, use of a Class I interior vapor retarder that is not a responsive vapor retarder on the interior side with a Class I vapor retarder on the exterior side shall require an approved design.
- Where a Class I or II vapor retarder is used in combination with foam plastic insulating sheathing or insulated siding installed as continuous insulation on the exterior side of frame walls, the continuous insulation shall comply with Table R702.7(4) and the Class I or II vapor retarder shall be a responsive vapor retarder.

STEP 3: DETERMINE MINIMUM R-VALUE REQUIREMENTS FOR CI

For use of FPIS ci with Class I, II or III interior vapor retarders (per Step 2), determine the minimum ci R-value required to control water vapor using IRC Tables R702.7(3) or R702.7(4) as applicable. For use of FPIS without any interior vapor retarder, refer to Table R702.7(5) and its footnotes. The ci and cavity insulation amounts provided must also comply with local energy code.

TABLE R702.7(3) CLASS III VAPOR RETARDERS
(only requirements for ci are shown)

CLIMATE ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:
4 Marine	ci with R-value ≥ 2.5 over 2 x 4 wall
	ci with R-value ≥ 3.75 over 2 x 6 wall
5	ci with R-value ≥ 5 over 2 x 4 wall
	ci with R-value ≥ 7.5 over 2 x 6 wall
6	ci with R-value ≥ 7.5 over 2 x 4 wall
	ci with R-value ≥ 11.25 over 2 x 6 wall
7	ci with R-value ≥ 10 over 2 x 4 wall
	ci with R-value ≥ 15 over 2 x 6 wall
8	ci with R-value ≥ 12.5 over 2 x 4 wall
	ci with R-value ≥ 20 over 2 x 6 wall

TABLE R702.7(4) CONTINUOUS INSULATION (ci) WITH CLASS I or II RESPONSIVE VAPOR RETARDER

CLIMATE ZONE	PERMITTED CONDITIONS
3	ci with R-value ≥ 2
4, 5, 6	ci with R-value ≥ 3 over 2 x 4 wall
	ci with R-value ≥ 5 over 2 x 6 wall
7	ci with R-value ≥ 5 over 2 x 4 wall
	ci with R-value ≥ 7.5 over 2 x 6 wall
8	ci with R-value ≥ 7.5 over 2 x 4 wall
	ci with R-value ≥ 10 over 2 x 6 wall

TIP: While not required, using more than the code minimum ci R-values shown above will further improve water vapor control and protection of the building envelope.

TABLE R702.7(5) CONTINUOUS INSULATION (ci) ON WALLS WITHOUT A CLASS I, II OR III INTERIOR VAPOR RETARDER^a

CLIMATE ZONE	PERMITTED CONDITIONS ^{b,c}
4	ci with R-value ≥ 4.5
5	ci with R-value ≥ 6.5
6	ci with R-value ≥ 8.5
7	ci with R-value ≥ 11.5
8	ci with R-value ≥ 14


- The total insulating value of materials to the interior side of the exterior continuous insulation, including any cavity insulation, shall not exceed R-5. Where the R-value of materials to the interior side of the exterior continuous insulation exceeds R-5, an approved design shall be required.
- A water vapor control material layer having a permeance not greater than 1 perm in accordance with ASTM E96 Procedure A (dry cup) shall be placed on the exterior side of the wall and to the interior side of the exterior continuous insulation. The exterior continuous insulation shall be permitted to serve as the vapor control layer where, as its installed thickness or with a facer on its interior face, the exterior continuous insulation is a Class I or II vapor retarder.
- The requirements in this table apply only to insulation used to control moisture in order to allow walls without a Class I, II or III interior vapor retarder. The insulation materials used to satisfy this option also contribute to but do not supersede the thermal envelope requirements of the *International Energy Conservation Code*.

NOTE: When using a Class I or II interior vapor retarder, it must comply with the “smart” or responsive vapor retarder requirements of footnote ‘c’ of IRC Table R702.7(2) above (e.g., coated kraft paper facer is a Class II responsive vapor retarder; Class I responsive vapor retarders are typically proprietary films or membranes). Responsive vapor retarders prevent OUTWARD moisture movement into walls in the winter and become vapor permeable for increased INWARD drying potential in the summer, which complements the “warm wall” water vapor control provided by FPIS ci. A Class III interior vapor retarder is sufficiently vapor permeable at all times such that it is not required to be a “smart” vapor retarder but it requires more FPIS ci (i.e., a warmer wall) to prevent condensation in the winter.

YOU'RE DONE! For additional guidance on details and options for code-compliant moisture control, refer to [this wall assembly illustration](#).

DISCLAIMER While reasonable effort has been made to ensure the accuracy of the information presented, the actual design, suitability and use of this information for any particular application is the responsibility of the user. Where used in the design of buildings, the design, suitability, and use of this information for any particular building is the responsibility of the Owner or the Owner's authorized agent. The information contained herein is provided “as is.”

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