

TECHNICAL BULLETIN SERIES

Selecting Air-Barrier Vapor Permeance in Climate Zone 2

Differentiate hot-humid 2A walls from hot-dry 2B walls before selecting permeance.

APPLICATION
Above-grade exterior wall assemblies

AUDIENCE
Architects, consultants, contractors, and owners

CLIMATE
IECC Zone 2: 2A, 2B

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KEY CONCLUSION Climate Zone 2 does not have one correct exterior perm rating. Zone 2A often benefits from exterior vapor throttling and a vapor-open interior, while Zone 2B generally benefits from a more vapor-permeable, flow-through wall. A moderate-perm exterior air/water barrier is often the most adaptable common starting point.

Climate conditions and drying direction

Zone 2 contains two materially different moisture regimes. In 2A, humid outdoor air and rain-wetted cladding drive moisture toward air-conditioned interiors. In 2B, low outdoor humidity creates strong drying potential, although solar loads and occasional rain still require complete water management. ^[1]

Subzone	Dominant conditions	Primary design emphasis
2A	Hot-humid; cooling dominated	Control inward wetting; preserve inward drying.
2B	Hot-dry; high solar exposure	Favor flow-through drying and avoid unnecessary vapor traps.

Moisture regimes: A = moist, B = dry, C = marine. Climate Zones 7 and 8 do not use a moisture-regime suffix.

Air control and vapor control are different

An air barrier limits airflow through the enclosure; a vapor retarder limits water-vapor diffusion through materials. These are independent properties. A membrane can be highly airtight and still allow vapor diffusion. The 2021 IECC commercial provisions recognize air-barrier materials at an air permeance no greater than 0.004 cfm/ft² at 75 Pa when tested to ASTM E2178. ^[2]

Air leakage can transport substantially more moisture than vapor diffusion. The first priority is therefore a continuous, well-detailed air-control layer. Vapor permeance should then be selected to manage the climate-specific drive without eliminating the wall's intended drying path. ^[3]

Property	What it controls	Typical reporting
Air permeance	Airflow through the membrane itself	ASTM E2178; cfm/ft ² at 75 Pa
Assembly leakage	Airflow through membrane, joints, transitions, and penetrations	ASTM E2357 or project testing

Property	What it controls	Typical reporting
Vapor permeance	Water-vapor diffusion through the material	ASTM E96; identify dry-cup/wet-cup method
Water resistance	Bulk rainwater passing through the membrane	Applicable WRB/water-resistance testing

Series terminology: very low/Class I ≤ 0.1 perm; low/Class II >0.1 to ≤ 1 perm; moderate/Class III >1 to ≤ 10 perms; vapor-open >10 perms. Compare products using the same ASTM E96 procedure and tested thickness.

Why this recommendation fits Climate Zone 2

- **Subzone governs the vapor strategy.** A 2A inward-drying wall and a 2B flow-through wall should not be forced into the same vapor-control prescription. ^[1]
- **Airtightness remains nonnegotiable.** The membrane must control air leakage independently of its vapor permeance; leakage paths can carry far more moisture than diffusion. ^[3]
- **Zone 2A favors inward drying.** Exterior rigid insulation or a vapor-throttling exterior layer can reduce inward vapor from absorptive stucco, while vapor-open interior finishes allow the wall to dry inward. ^[7]
- **Zone 2B favors drying capacity.** A vapor-permeable exterior layer generally supports rapid drying and avoids trapping construction or incidental moisture in dry climates. ^[5]
- **Moderate permeance is flexible.** A middle-range membrane can reduce inward vapor in 2A without eliminating all outward drying and can remain sufficiently open for many 2B assemblies.

Interior Class I layers are usually counterproductive. Especially in 2A, low-perm interior finishes can collect inward-driven moisture at the cold side of the wall. ^[7]

Performance comparison

Design issue	Vapor-permeable exterior	Low-perm exterior
2A inward-vapor control	Requires stronger cladding drainage and interior drying.	Can throttle exterior vapor when placed correctly.
2B drying potential	Preserves useful bidirectional drying.	May unnecessarily restrict outward drying.
Incidental wetting	More forgiving when drying conditions return.	More dependent on one intentional drying direction.
Reservoir cladding	Use a ventilated cavity and consider moderate permeance.	Can reduce solar vapor but must be paired with drainage.
Best-fit use	Most 2B walls and selected 2A flow-through assemblies.	Deliberately inward-drying 2A assemblies.

Comparison assumes equivalent air-barrier continuity, water resistance, adhesion, and durability. Vapor permeance alone does not determine wall performance.

Important design limits

DO NOT SPECIFY BY PERM RATING ALONE The complete wall—not one membrane—determines moisture performance. Cladding, insulation location, interior humidity, orientation, exposure, and adjacent material layers all affect wetting and drying.

- **Confirm whether the project is 2A or 2B.** The moisture regime is more consequential than the shared zone number. ^[1]
- **Avoid interior vapor traps in 2A.** Vinyl wallpaper and low-perm coatings can cause condensation in air-conditioned walls. ^[7]
- **Do not use permeance as a substitute for drainage.** Stucco, brick, and adhered masonry need flashings, weeps, and a cavity or drainage space appropriate to exposure.
- **Account for exterior foam.** Foam type and thickness may dominate the vapor profile even when the air-barrier membrane itself is permeable.
- **Model unusual conditions.** Cold interiors, high ventilation loads, negative pressure, and mass masonry can reverse ordinary expectations.

Recommended design and specification approach

For conventional above-grade walls in Climate Zone 2, the design team should select the air/water barrier only after confirming the intended drying direction and the vapor resistance of every adjacent layer. Submittal review should address:

- Air permeance at the installed thickness, including ASTM E2178 data and continuity details at joints, openings, penetrations, and transitions.
- Water-vapor permeance under the stated ASTM E96 procedure; do not compare dry-cup and wet-cup results as if they were equivalent.
- Compatibility with sheathing, exterior insulation, flashings, sealants, primers, transition membranes, and cladding attachments.
- A continuous drainage plane, integrated flashings, and a drainage/ventilation cavity appropriate to the cladding and exposure.
- A wall-section review confirming at least one reliable drying direction for each moisture-sensitive layer.
- Hygrothermal analysis where the wall includes reservoir cladding, low-perm layers on both sides, unusual interior humidity, mass masonry, steel framing, or atypical insulation.

Bottom line

The correct Zone 2 choice is subzone-specific. A moderate-perm exterior air/water barrier is a practical baseline; move lower in 2A only when inward drying is protected, and move higher in 2B when added drying capacity improves resilience.

RECOMMENDED POSITION Use a moderate-perm exterior air/water barrier as the common baseline. Tune lower for verified inward-drying 2A walls and higher for vapor-open 2B walls.

References

- [1] [PNNL Building America Solution Center - IECC Climate Zone Map.](#)
- [2] [International Code Council - 2021 IECC, Commercial Energy Efficiency, air-leakage provisions.](#)
- [3] [U.S. Department of Energy, Building America - Managing the Drivers of Air Flow and Water Vapor Transport.](#)
- [4] [U.S. Department of Energy, Building America - Water Management of Non-Insulating and Insulating Sheathings.](#)
- [5] [Building Science Corporation - Vapor Barriers and Wall Design.](#)
- [6] [International Code Council - 2021 IRC, Section R702.7, Vapor Retarders.](#)
- [7] [PNNL Building America Solution Center - 2021 IECC Climate Zone 2A wall assembly notes.](#)

TECHNICAL DISCLAIMER General guidance only. The design professional must confirm the complete assembly, locally adopted code, project conditions, and product compatibility. Air-barrier permeance does not correct air leaks, water leaks, inadequate flashing, or missing drainage.