Air Barrier construction requirements
From National Building Code-2019 Alberta Edition (NBC(AE)) Division B
9.36.2. Building Envelope
9.36.2.9. Airtightness

1) The leakage of air into and out of conditioned spaces shall be controlled by constructing
a) a continuous air barrier system in accordance with Sentences (2) to (6), Subsection 9.25.3. and Article 9.36.2.10.,
b) a continuous air barrier system in accordance with Sentences (2) to (6) and Subsection 9.25.3. and a building assembly having an air leakage rate not greater than 0.20 L/(s·m2) (Type A4) when tested in accordance with CAN/ULC-S742, "Air Barrier Assemblies – Specification," at a pressure differential of 75 Pa, or
c) a continuous air barrier system in accordance with Sentences (2) to (6) and Subsection 9.25.3. and a building assembly having an air leakage rate not greater than 0.20 L/(s·m2) when tested in accordance with ASTM E 2357, "Determining Air Leakage of Air Barrier Assemblies," where
i) the building will not be subjected to sustained wind loads calculated based on a 1-in-50 hourly wind pressure that exceed 0.65 kPa, and
ii) the air barrier assembly is installed on the warm side of the thermal insulation of the opaque building assembly.

A-9.36.2.9.(1) Controlling air leakage.
Airtightness Options

9.36.2.9.(1) presents 3 options for achieving an airtight building envelope: a prescriptive option (a), and two testing options, (b),(c).

Air Barrier Assembly Testing

Air barrier assemblies are subjected to structural loading due to mechanical systems, wind pressure and stack effect. In addition, they may be affected by physical degradation resulting from thermal and structural movement. Both CAN/ULC-S742, "Air Barrier Assemblies – Specification," and ASTM E 2357, "Determining Air Leakage of Air Barrier Assemblies," outline testing limits for such issues, which can compromise the performance of the air barrier assembly. Where local climatic data and building conditions
exceed these limits, the maximum building height and sustained 1-in-50 hourly wind pressure values covered in Table 1 of CAN/ULC-S742 are permitted to be extrapolated beyond the listed ranges to apply to any building height, in any location, provided the air barrier assembly in question has been tested to the specific building site and design parameters. However, air barrier assemblies tested to ASTM E 2357 are not subjected to temperature variations during testing, and there is no indication that testing data is permitted to be extrapolated beyond the 0.65 kPa limit.

Air Barrier System Approaches

For an air barrier system to be effective, all critical junctions and penetrations addressed in Articles 9.36.2.9. and 9.36.2.10. must be sealed using either an interior or exterior air barrier approach or a combination of both.
The following are examples of typical materials and techniques used to construct an interior air barrier system:

- airtight-drywall approach
- sealed polyethylene approach
- joint sealant method
- rigid panel material (i.e. extruded polystyrene)
- spray-applied foams
- paint or parging on concrete masonry walls or cast-in-place concrete

Where the air barrier and vapour barrier functions are provided by the same layer, it must be installed toward the warm (in winter) side of the assembly or, in the case of mass walls such as those made of cast-in place concrete, provide resistance to air leakage through much of the thickness of the assembly. Where these functions are provided by separate elements, the vapour barrier is required to be installed toward the interior of the assembly while the airtight element can be installed toward the interior or exterior depending on its vapour permeance.
The following are examples of typical materials and techniques used to construct an exterior air barrier system:

- rigid panel material (i.e. extruded polystyrene)
- housewraps
- peel-and-stick membranes
- liquid-applied membranes

When designing an exterior air barrier system, consideration should be given to the strength of the vapour barrier and expected relative humidity levels as well as to the climatic conditions at the building's location and the properties of adjoining materials.