COMMISSIONING THE BUILDING ENVELOPE FOR AIR LEAKAGE AND THERMAL ANOMALIES

Mario Gonçalves, Eng.
President

DEFINITION:
The building envelope is the skin of the building that prevents air, moisture and heat from flowing freely in or out. ...
**CANADIAN CONTEXT**

*Cold in the SOUTH ...*

Climate of Montréal, Québec

- **January (2.5%) design temperature:** -23°C / -9°F
- **July design temperature:** +30°C / +86°F
- **Annual total precipitation:** 1,025 mm / 40”

*Winter in Yellowknife, NT*

- **January (2.5%) design temperature:** -43°C / -45°F

**Colder in the NORTH!**
AIR LEAKAGE VERSUS VAPOUR DIFFUSION

AIR LEAKAGE
OVER ONE HEATING SEASON...

DIFFUSION
OVER ONE HEATING SEASON...

Unsealed electrical outlet.

Vapour barrier

Air escapes through holes in air barrier

Air barrier

Moisture from interior air condenses on cold surfaces

Outside temperature
-20°C

Inside temperature
+21°C

Wall With Discontinuous Air Barrier
Modern air barrier system - coming soon to a building near you!
LABORATORY MOCK-UP TESTING
FIELD MOCK-UP TESTING
Infrared Thermography
Conditions for Air Leakage inspection

- Minimum 41°F (5°C) \( \Delta T \) inside to outside for exterior inspections
- A localized pressure difference across the inspection point is required
- Pressure should be consistent in the direction of flow

EXTERIOR INSPECTIONS
INTERIOR INSPECTIONS

Positive Pressure

Negative Pressure

Thermal Expression Types

Conductive heat loss

Convective heat loss

Air leakage

Presence of moisture
CASE STUDY EXAMPLE
Thank you for helping make our buildings *Smoke free*