

# COMMISSIONING THE BUILDING ENVELOPE FOR AIR LEAKAGE AND THERMAL ANOMALIES



PAT NAUDE TREMPE

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. ...



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## 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"



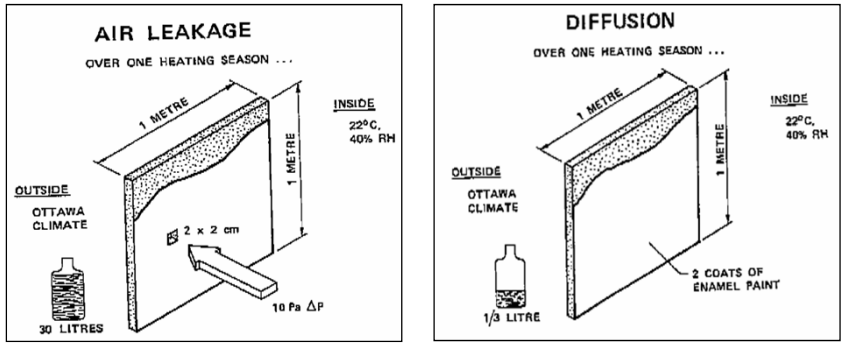
### *Colder in the NORTH !*

Winter in Yellowknife, NT

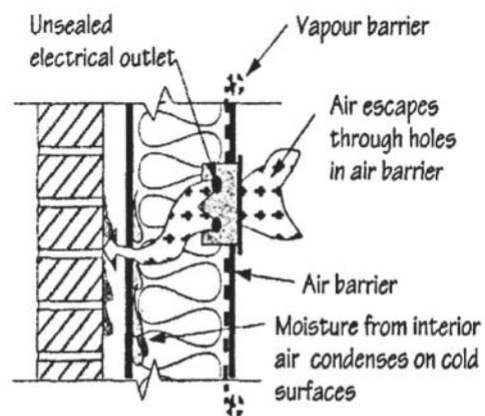
January (2.5%) design temperature: -43°C / -45°F



# AIR LEAKAGE VERSUS VAPOUR DIFFUSION



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Outside temperature: -20°C  
Inside temperature: +21°C

Wall With Discontinuous Air Barrier

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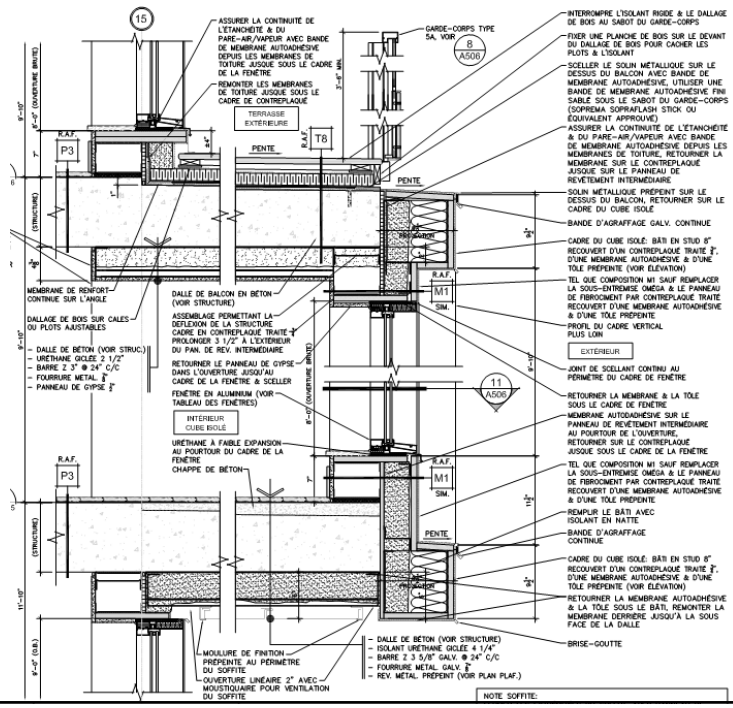


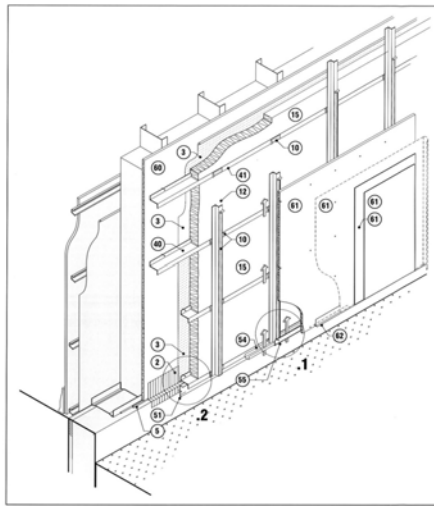
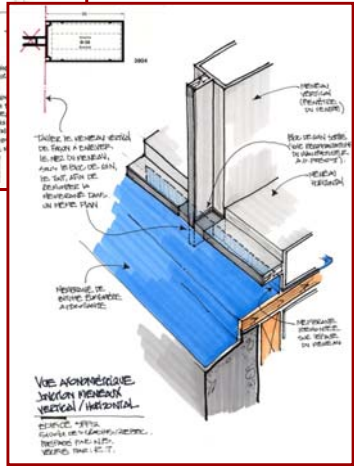
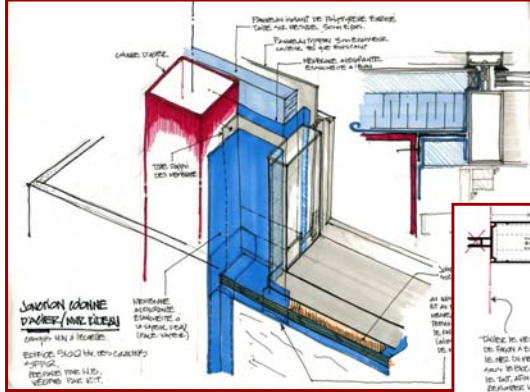
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**Modern air barrier system - coming soon to a building near you !**





**AXONO**

**RICHARD TREMPE**  
 RICHARD TREMPE  
 RICHARD TREMPE  
 RICHARD TREMPE

**CONTACT**  
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**AXONOMETRIE**  
**ASSEMBLAGE TYPE**

Dessiné par: JDB  
 Vérifié par: P.T.  
 Date: 21/02/08  
 Echelle: Assure  
 Dessiné par: A.001.1190  
 Vérifié par: Faubert S.

# LABORATORY MOCK-UP TESTING

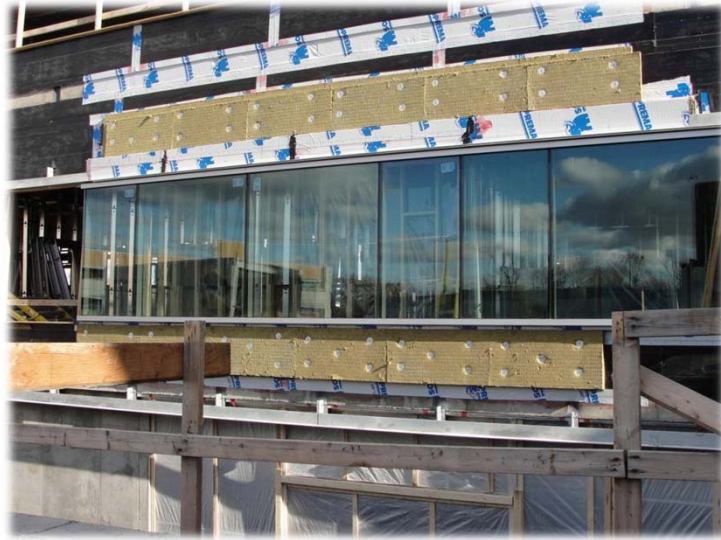


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## FIELD MOCK-UP TESTING



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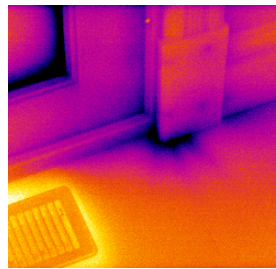


## Infrared Thermography

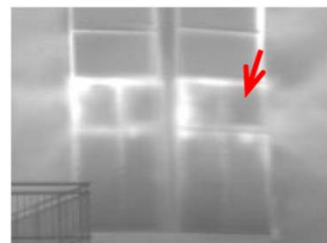


## Conditions for Air Leakage inspection

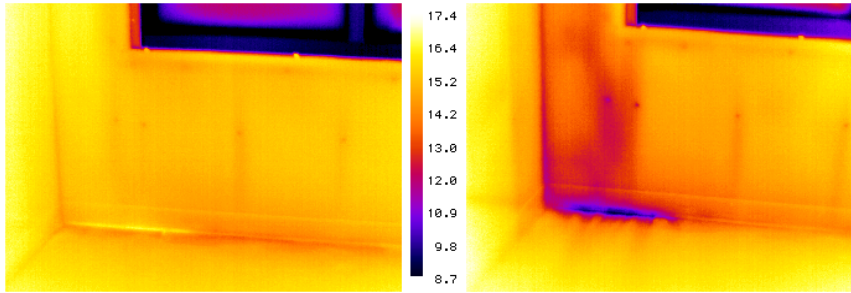
- Minimum 41°F (5°C)  $\Delta T$  inside to outside for exterior inspections
- A localized pressure difference across the inspection point is required
- Pressure should be consistent in the direction of flow



## EXTERIOR INSPECTIONS



## INTERIOR INSPECTIONS

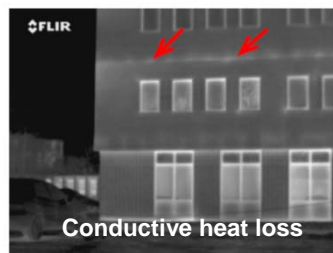


Positive Pressure

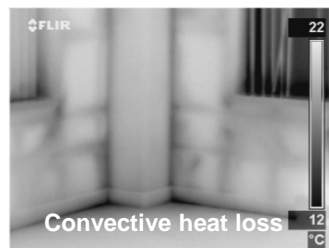
Negative Pressure

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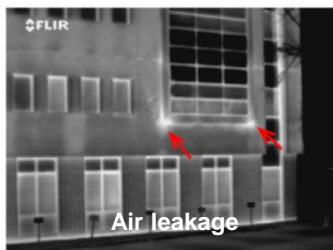
## Thermal Expression Types



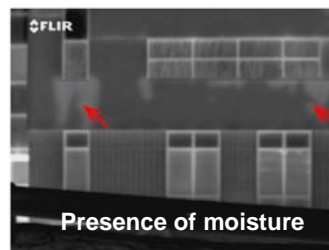
Conductive heat loss



Convective heat loss



Air leakage



Presence of moisture

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## CASE STUDY EXAMPLE



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Thank you for helping make our buildings  
*Smoke free*



