LMDG Building Code Consultants Ltd

CASCADIA WINDOWS & DOORS

Combustible Windows and Combustible Façade Components in Non-Combustible Construction

Testing – Research – Expanding Methods for Compliance

Agenda

- 11:20-11:50 Intro and brief technology update

  Combustible cladding support fire safety

- 11:50-12:30 Lunch

- 12:30- 2:00 Combustible windows in non-combustible construction

CASCADIA
WINDOWS & DOORS

UNIVERSAL SERIES

LIVING BUILDING CHALLENGE℠

DECLARED RED LIST FREE

cool, temperate climate

phB

CERTIFIED COMPONENT

Passive House Institute

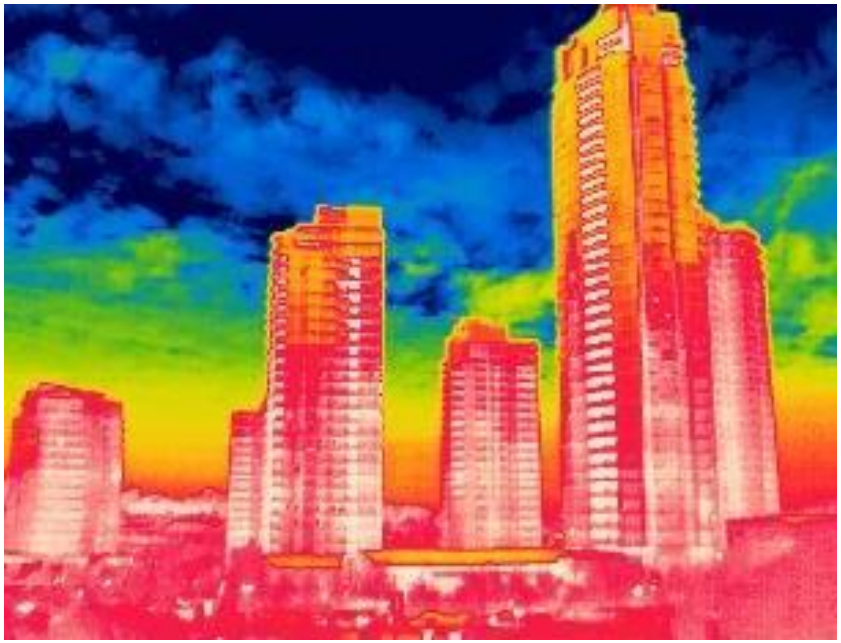
2018

CaGBC GREEN BUILDING PRODUCT OF THE YEAR

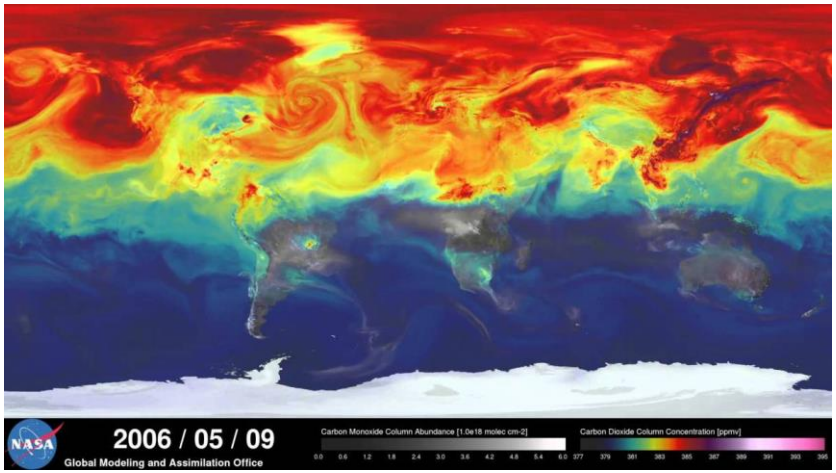
Let’s start with WHY

We’re All Part of a Problem

The buildings that we have designed and constructed are *unnecessarily* a major contributor to excessive energy consumption and related climate change.



=

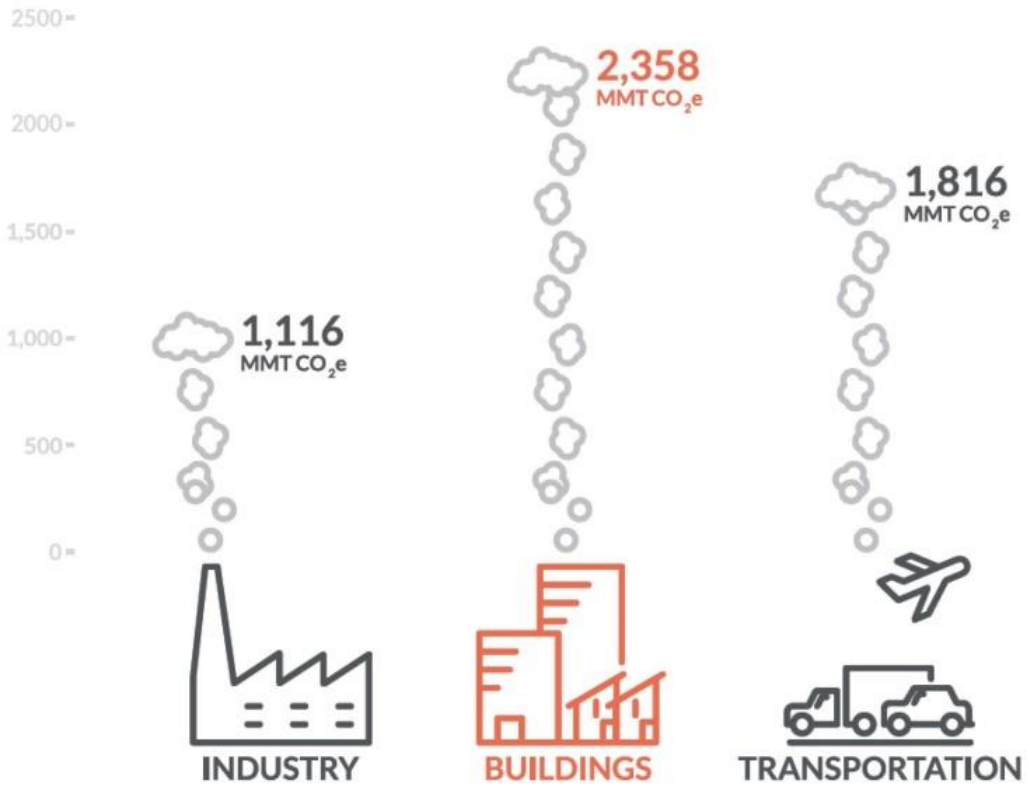


Excessive heat loss from buildings

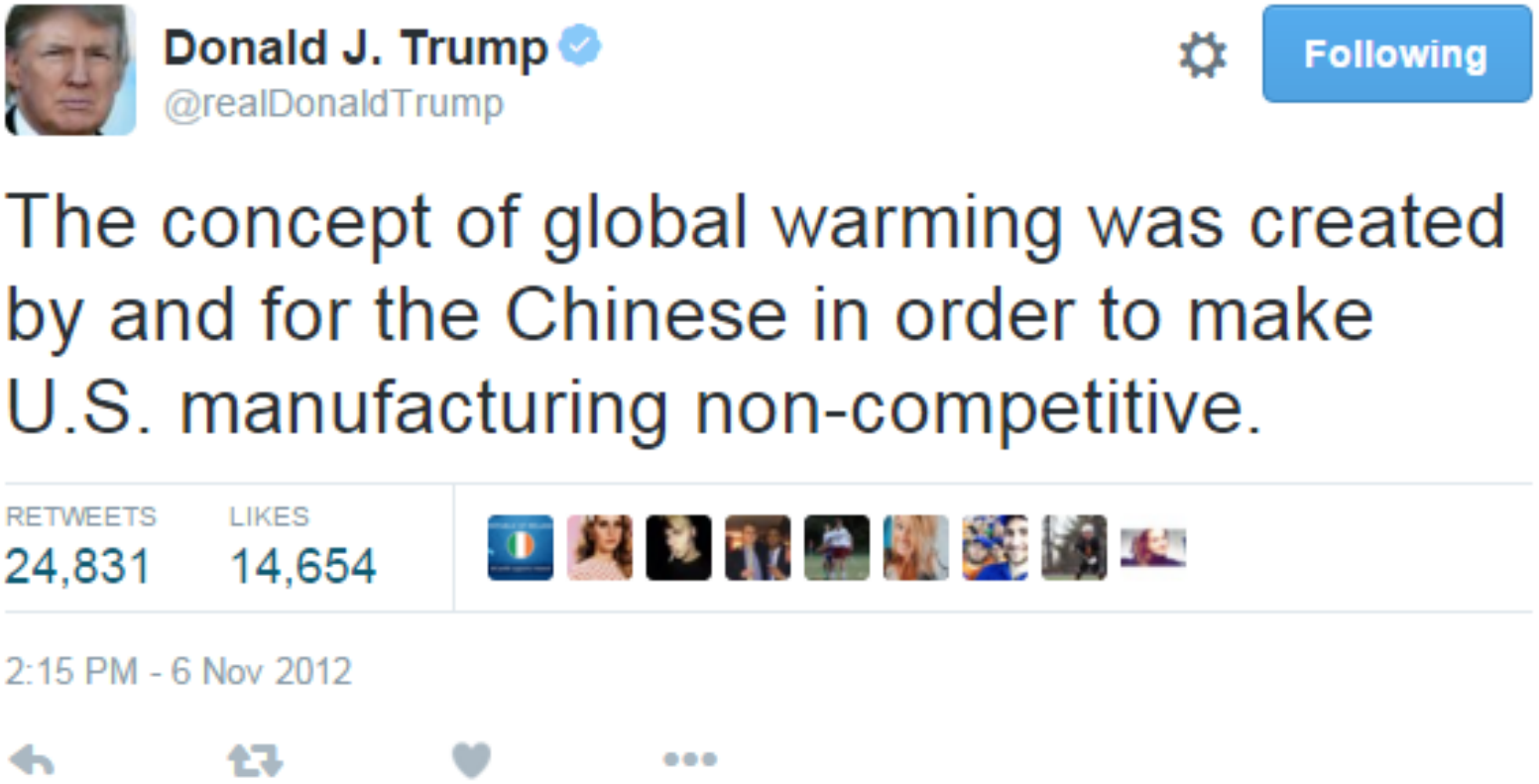
Global warming

Scope of the problem

BUILDINGS ARE
RESPONSIBLE FOR **44.5%**
OF US **CO_2 EMISSIONS.**



Climate Change
Additional Obstacles



I guess not everyone has the same opinion……

Scope of Our Problem in *this* Industry

Why are our buildings consuming so much energy?

R-WHAT!?

1930s

1980s

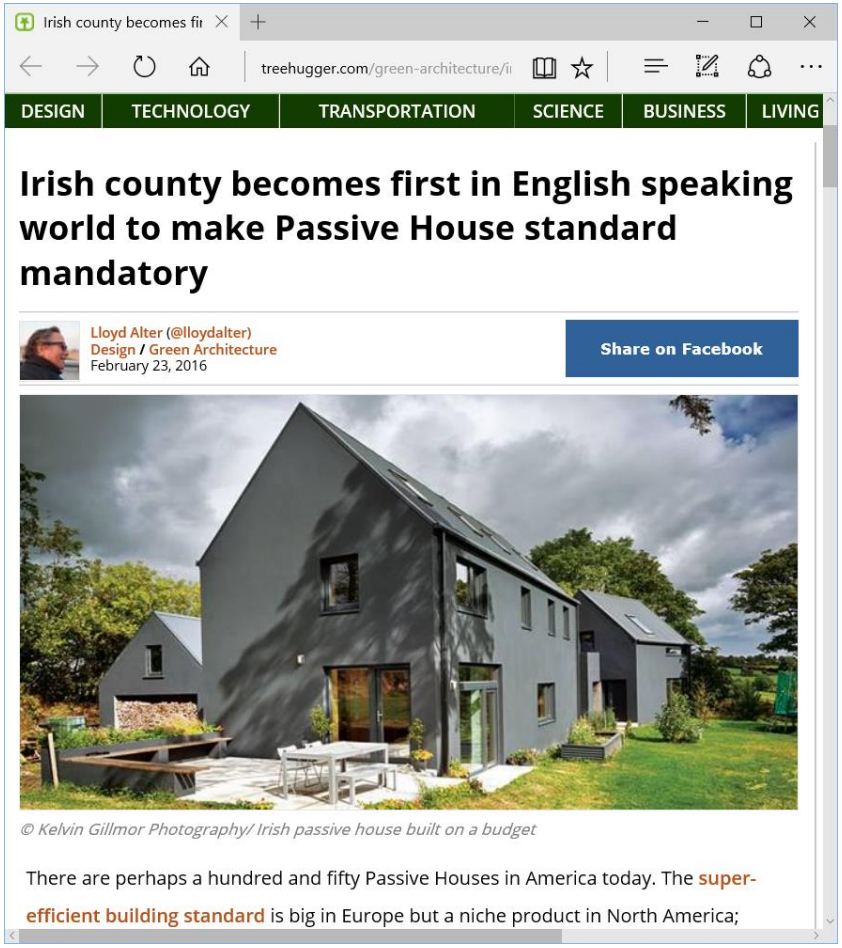
2000s

All three buildings somewhere between R2 and R3.5

The Need for New Tech *and* Regulatory Support

Energy conservation is becoming a real thing in buildings

- Regulatory changes must be based in reality, so…
  - First – you have to have the tech
  - Then – you can change the laws to require higher performance
- But you can't have obsolete rules in the way



CASCADIA
WINDOWS & DOORS

Cladding Support Fire Safety

Agenda

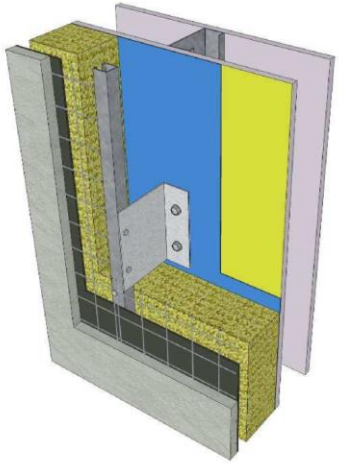
- Fire protection
  - Goal for cladding and insulation
- Product design
- A History of Evaluations
  - Canada
  - USA
- A lens to evaluate

Fire Protection

Fire Protection – Cladding
Big Picture

- To avoid this…

Why a Combustible Spacer?



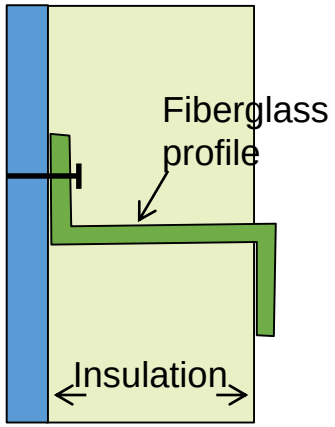
Fiberglass Spacer

- Adjustability happens outboard of the insulation
- Cladding attachment can be a Z-girt or a hat track (stiff profiles)
- Fiberglass spacer matches thickness of insulation
- Fiberglass spacer maintains thermal performance at tight spacing

Metal Clip & Rail Systems

- Adjustable rails (L-angles) can penetrate insulation
- L-angle cladding attachment not as stiff (more likely to deflect)
  - Thermal break is a portion of insulation depth
- Thermal performance relies on large spacing of clips
  - not always possible with various claddings

Why a Non-Combustible Connection?



Fiberglass Spacer

- Screws are directly fastened through the entire clip:
  - Screws reduce thermal performance slightly
  - Screws allow for non-combustible connection
- Tensile connection from screws; fiberglass resists shear and compression

Fully Composite Systems

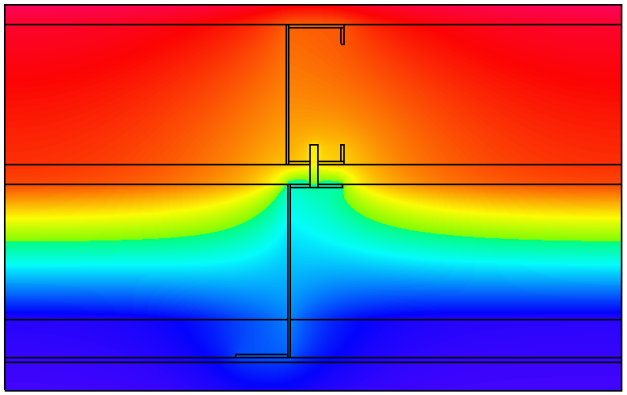
- Best thermal performance
- “Combustible” structural connection
- Generally lower strength than metal
  - Thinner webs mean lower strength
  - Pull-out may be an issue, depending on product design

Product Design

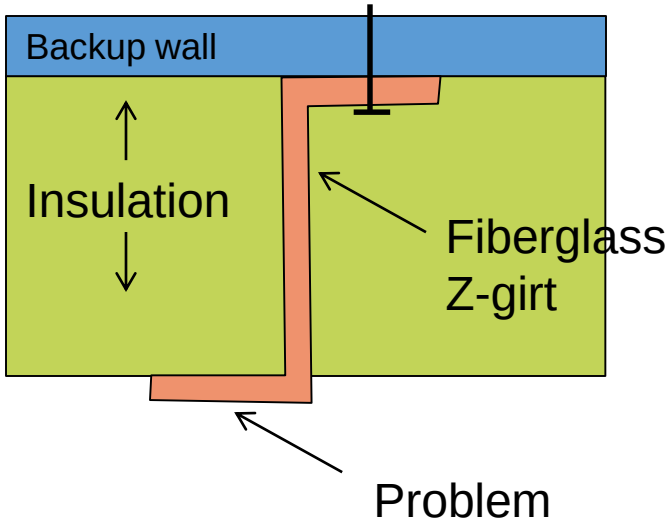
How did the design of the Clip come to be?

Step 1

- OK, so we have a conductivity problem…

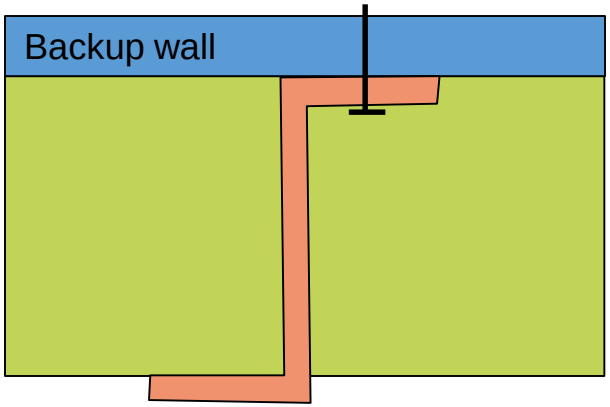


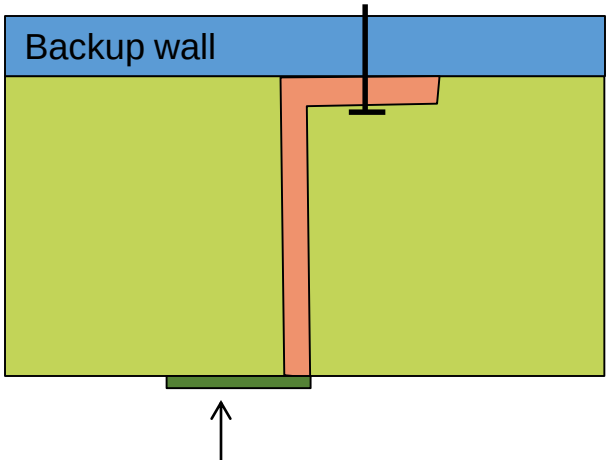
- Let's use a material with very low conductivity – like fiberglass.



Step 2

- Problem:
  - Screw pull-out

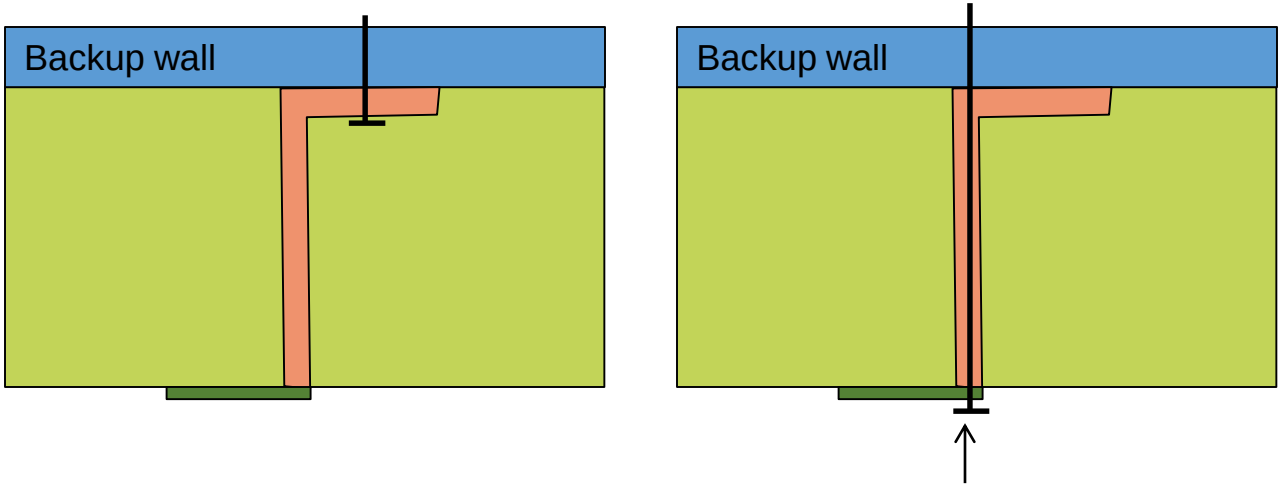




Make this leg steel –
solves pull-out issue.
Connection problem though…

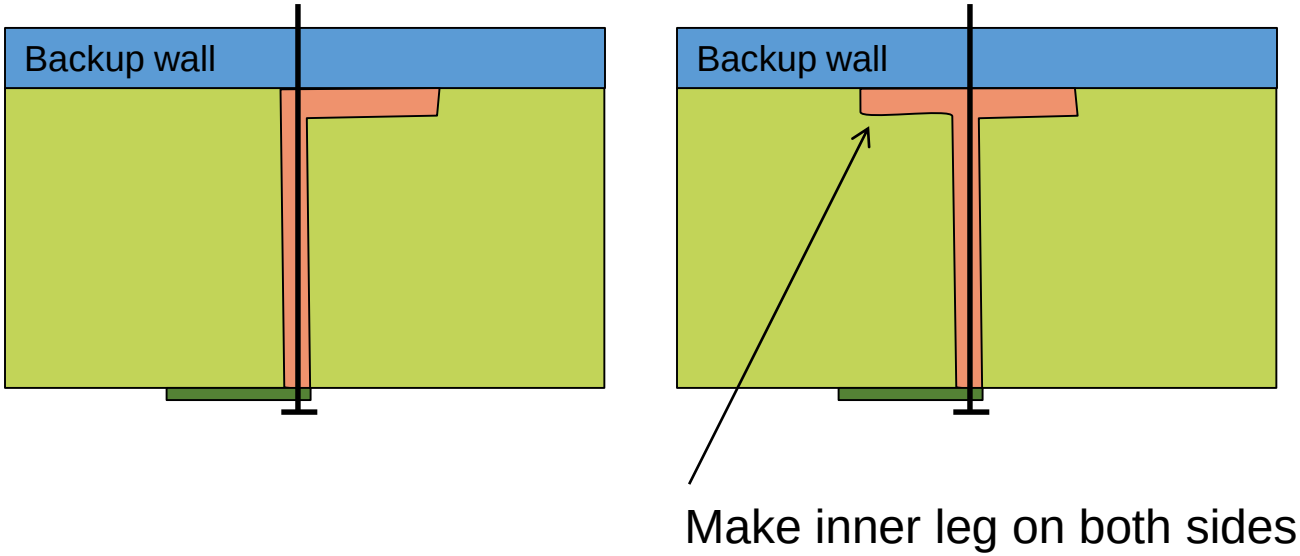
Step 3

- Problem:
  - Combustibility



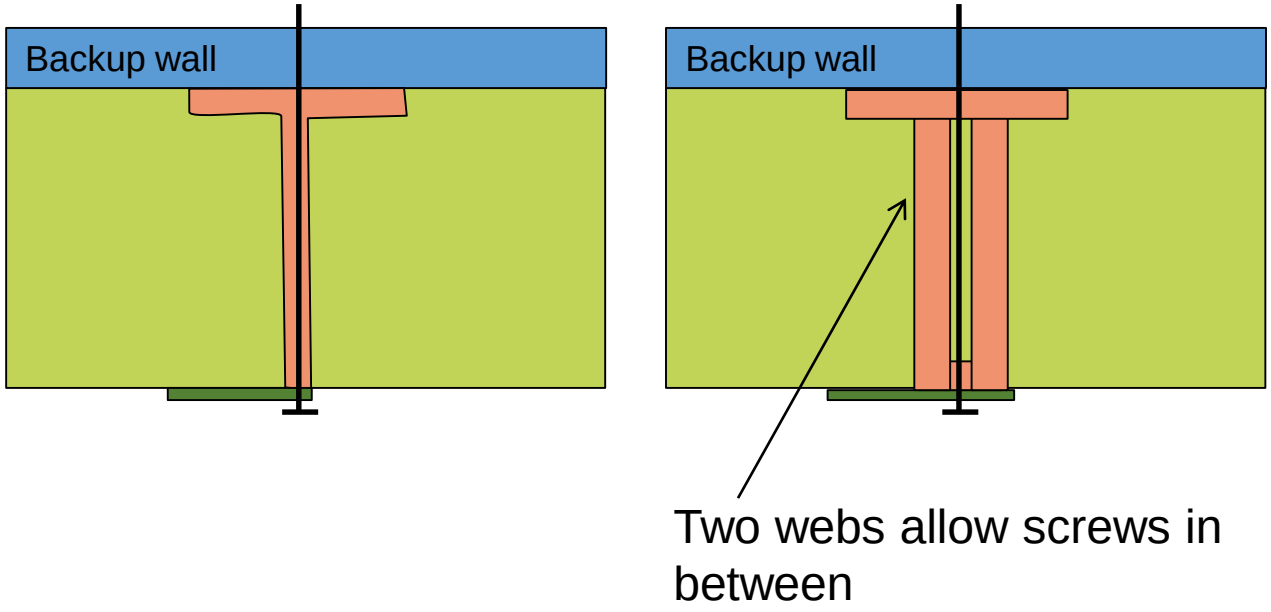
Step 4

- Problem:
  - Rotation at inner leg



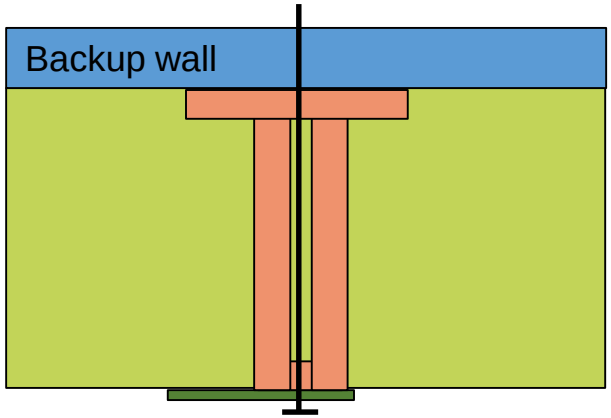
Step 5

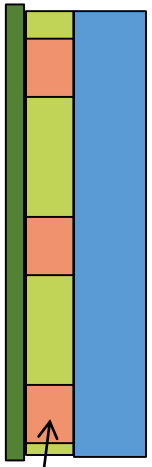
- Problem:
  - Interference between screws and web



Step 6

- Problems:
  - Cost of continuous member too high
  - Thermal performance could be better



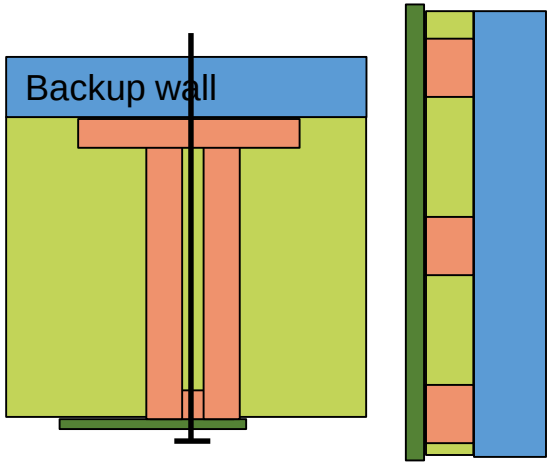


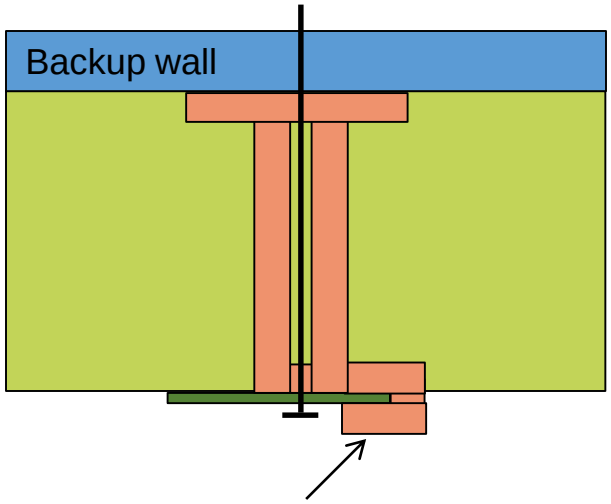
Section

Make pieces intermittent

Step 7

- Problem:
  - Installation is inconvenient – too many pieces

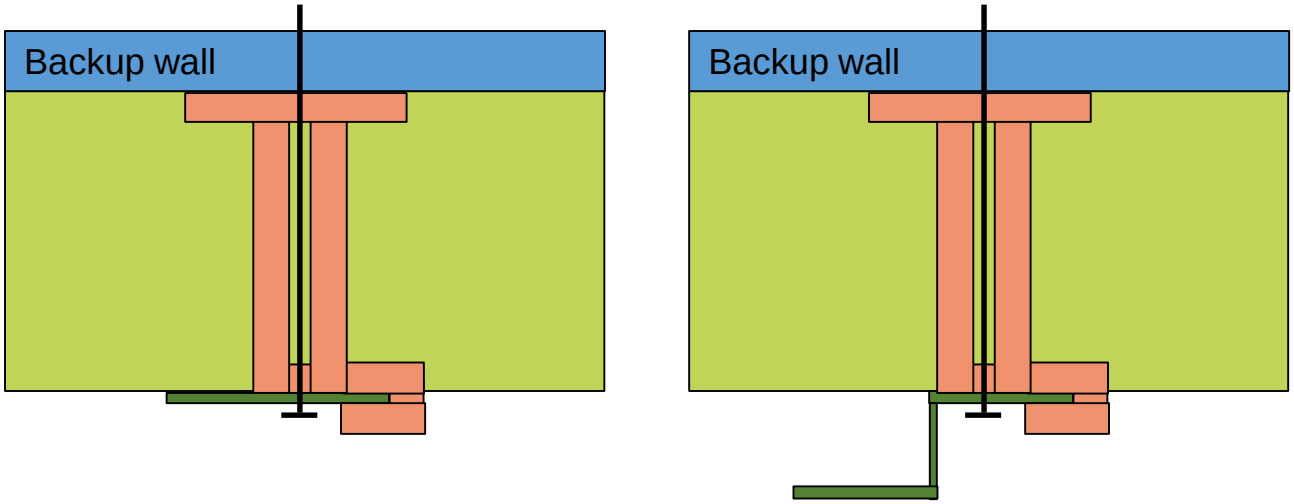




Provide retainer clip to
clip pieces onto continuous steel

Step 8

- Problems:
  - Need exterior drainage cavity
  - Need steel to be more rigid for cladding attachment



Use Z-girt …
Is it done?

A History of Code Evaluations

Analysis and Testing – Fire Performance

- Engineering Analysis – Fire Performance:
  - Spacer is acceptable for use in:
    - A wall required to be built of non-combustible construction
    - Including permitted combustible claddings (metal composite materials)
    - Also, in combustible construction (obviously)
  - Maintains the two code (and common sense) objectives, which are:
    - Cannot alter intended fire performance of non-combustible wall
    - Cladding must stay-in-place even if the component if damaged
  - No.1 is clear by analysis, and can be further supported by testing
  - No.2 is clear by observation – direct fastening

Canadian Code Evaluation / Compliance

- Burnaby
  - Code appeal process
  - BC Building and Safety Standards Branch – published approval

Canadian Code Evaluation
Minor Combustible Component

LMDG
Building Code Consultants Ltd

PROVINCE OF BRITISH COLUMBIA
G. A. GIBSON
ENGINEER

B.R. Thorson Consulting Ltd.
Consulting Structural Engineer • Building Code Consultant
769 Roslyn Blvd, North Vancouver, B.C. V7G 1P4
Tel. 604-929-8520 Fax 604-929-8530 Cell 604-290-6569

Building Code Appeal Board
c/o Building and Safety Standards Branch
PO Box 9844 Stn Prov Govt
Victoria BC V8W 9T2

Canadian Code Evaluation / Compliance

- City of Vancouver
  - Needed it's own "look"
  - Approved by agreeing with Province's decision
- City of Calgary
  - Still an "equal opportunity refuser" (their words)
  - Still "don't know how we'll get there with walls" [to meet NECB] (also their words)
  - Isolated case.

USA Code Evaluation

- ICC-ES
- The plan
  1. What will we prove?
  2. What must we do and test
  3. Do and test (successfully)
  4. Write report
- The failure
  - 1, 2, 3, 1 Wait… that's not the sequence we agreed to.
- The delay
- The switch; enter IAPMO…

IAPMO

- “It’s a washer”
  - Oh yeah… Great!

Code Compliance: IAPMO-UES Report

- Third party certification of the Cascadia Clip
- Approves clip for use in IBC Types I, II, III, IV, and V construction
- ICC-ES equivalent
- Looks at several different aspects of design
- Only clip system with a nationally recognized third party code compliance report

NFPA 285 test results

- Solid pass with MCM panels

For Fire Performance

- Conclusion: The Clip does…
- nothing
- and therefore changes nothing.

Code Evaluation

3.0 PRODUCT USE

3.1 General: Cascadia Clip® Fiberglass Thermal Spacers are cladding supports for use with exterior insulated walls. The Spacer functions as a shim between exterior cladding supports and the structural back-up wall. The Spacers also function as a fiberglass thermal break to assist in the energy performance of the wall system. The Spacers may be used in Types I, II, III, IV and V construction when installed in accordance with Section 3.3 of this report.

Intertek Listing with Roxul

ROXUL Inc.
Design No. RI/MFF 30-01
Mineral Wool Insulation
CAVITYROCK and COMFORTBOARD 110
NFPA 285 – Meets Conditions of Acceptance

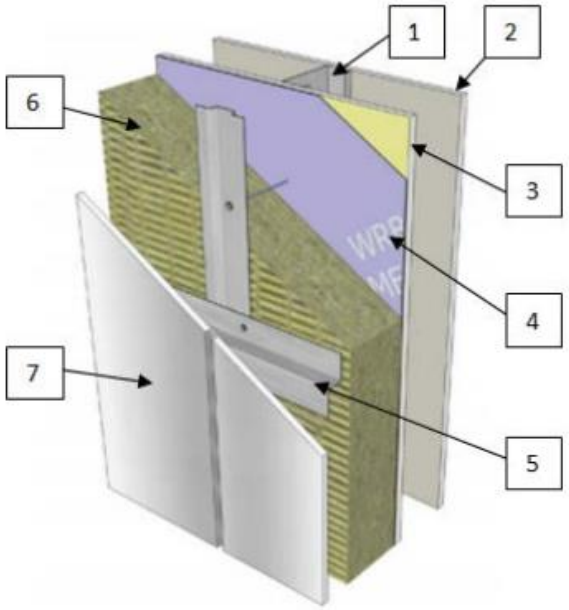


Figure 1: Construction with COMFORTBOARD 110

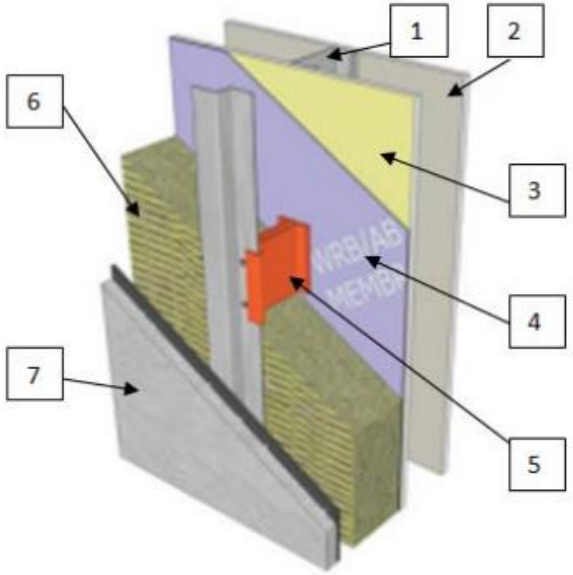


Figure 2: Construction with CAVITYROCK

Intertek

Valued Quality. Delivered.

Approvals and Resources

Resources

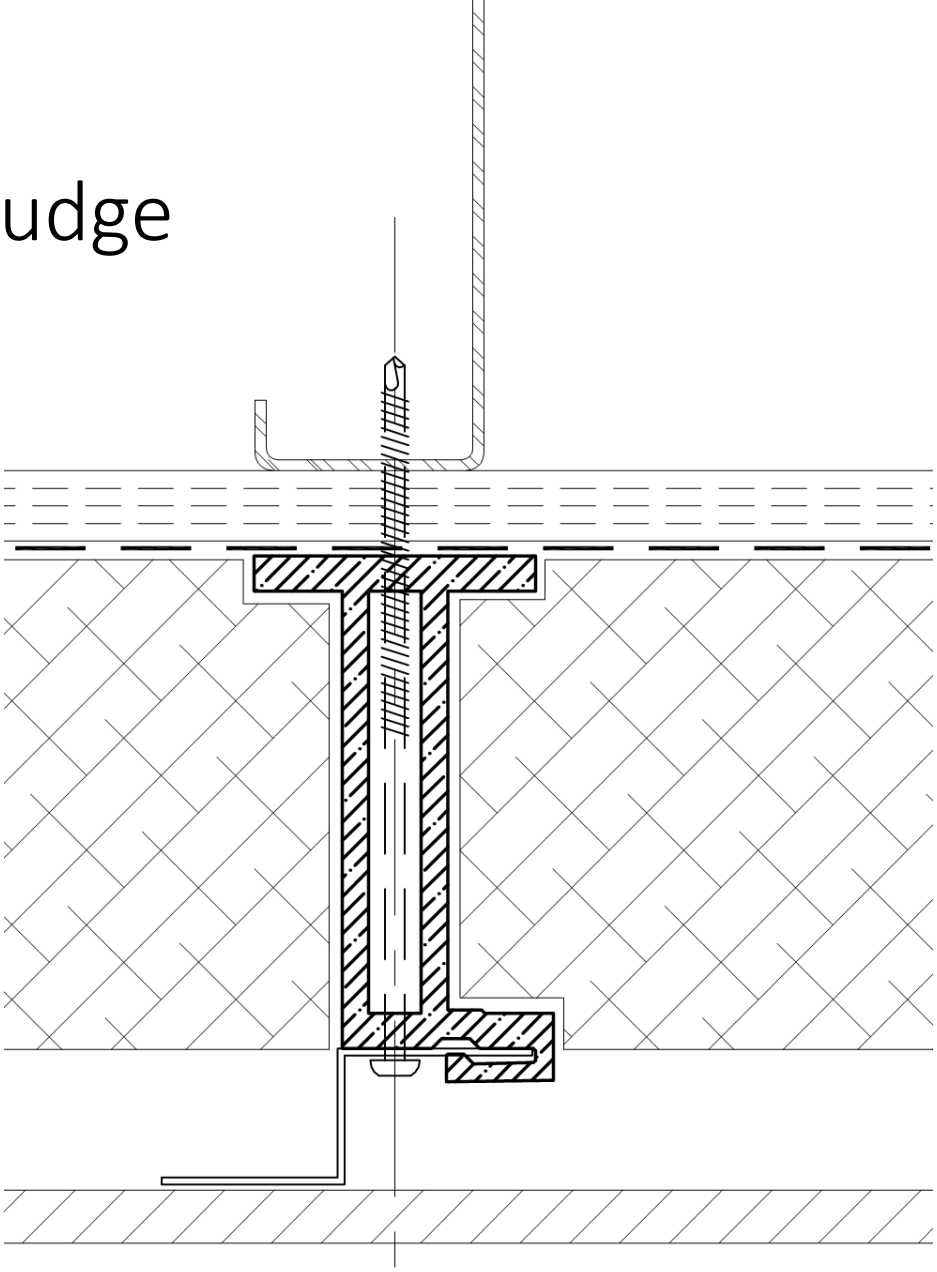
USA

- IAPMO Code Evaluation
  - Testing
  - Engineering Analysis
- Intertek blanket NFPA 285 certification with Roxul

Canada

- BC Governmental code approval
- Code evaluation letters for provinces

A Lens to Judge



LUNCHTIME

After Lunch:

Combustible Windows in Non-Combustible Construction

A code consultant's take

Dave Steer, LMDG

A sneak peak at some ongoing research

Michael Bousfield, Cascadia Windows

LMDG
Building Code Consultants Ltd

FIRE PROTECTION & LIFE SAFETY SOLUTIONS

Noncombustible Construction

COMBUSTIBILITY: EXTERIOR WALLS & WINDOWS

BEC/EGBC Luncheon, Thursday, June 21, 2018

Presented by: David Steer, M.Eng., P.Eng., CP

LMDG Building Code Consultants Ltd.

- Building Code consultants with offices in Vancouver & Toronto
- Staff of 38 with 6 professional engineers
- Certified Professional Services
- Fire & Egress Modelling to support performance-based alternative solutions

Control Fuel/Combustion Process

- Combustibility – meet one of the following:
  - noncombustible (CAN-ULC-S114)
  - limited combustible (Cone calorimeter ULC-S315)
    - to exempt certain combustible materials from the application of Sentence 3.1.5.1.(1) if certain conditions are met, on the basis that the materials are deemed to insignificantly contribute to the growth and spread of fire
    - layer of materials and cumulative emissions
  - comply with one of the exemptions

Noncombustible – Functional Statement Control Fuel/Combustion Process

- To limit the severity and effects of fire or explosions (F02)
  - clarify what constitutes noncombustible construction
  - limit the probability that construction materials will contribute to the growth and spread of fire, which could lead to harm to persons or damage to building (OS1.2/OP1.2)
  - limit severity
    - prevent ignition
    - manage fire spread

Noncombustible Construction

PERMITTED COMBUSTIBLE COMPONENTS

Control Fuel

- To permit the use of certain combustible materials, on the basis that they are deemed to insignificantly contribute to fire growth and spread
  - Minor combustible components [3.1.5.1]
  - Roofing [3.1.5.3]
  - Combustible glazing and skylights [3.1.5.4]
  - Cladding [3.1.5.5]
  - .
  - .
  - Combustible insulation [3.1.5.12]

Noncombustible Construction

EXTERIOR CLADDING

Combustible Cladding Systems [3.1.5.5.]

1) Except ❮as required in Sentence (2)❯, an exterior non-*loadbearing* wall assembly that includes a *combustible* cladding system is permitted to be used in a *building* required to be of *noncombustible construction* provided

a) the *building* is

i) not more than 3 *storeys* in *building height*, or

ii) *sprinklered* throughout,

b) the interior surfaces of the wall assembly are protected by a thermal barrier conforming to Sentence 3.1.5.12.(3), and

c) the wall assembly satisfies the criteria of Sentences (3) and (4) when subjected to testing in conformance with CAN/ULC-S134, "Fire Test of Exterior Wall Assemblies."

(See Appendix A.)

2) ❮Except as permitted by Articles 3.2.3.10. and 3.2.3.11., where the *limiting distance* in Tables 3.2.3.1.B to E permits an area of *unprotected openings* of not more than 10 ❴per cent❵ of the *exposing building face*, the *construction* requirements of Table 3.2.3.7. shall be met.❯

3) Flaming on or in the wall assembly shall not spread more than 5 m above the opening during or following the test procedure referenced in Sentence (1). (See Appendix A.)

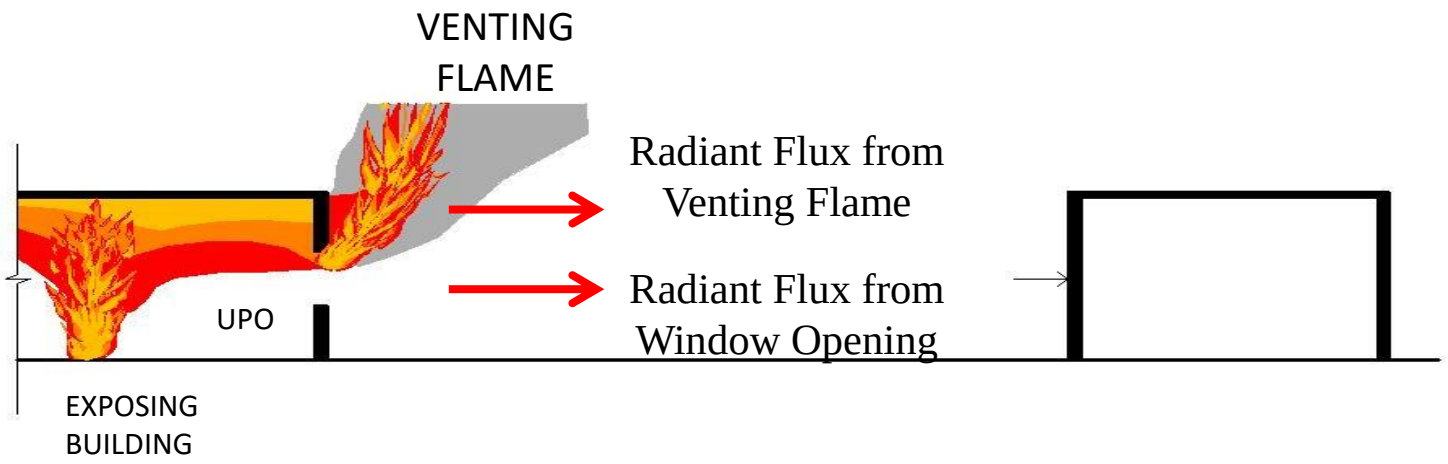
4) The heat flux during the flame exposure on a wall assembly shall be not more than 35 kW/m^2 measured 3.5 m above the opening during the test procedure referenced in Sentence (1). (See Appendix A.)

5) A wall assembly permitted by Sentence (1) that includes *combustible* cladding of *fire-retardant-treated wood* shall be tested for fire exposure after the cladding has been subjected to an accelerated weathering test as specified in ASTM D 2898, "Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing."

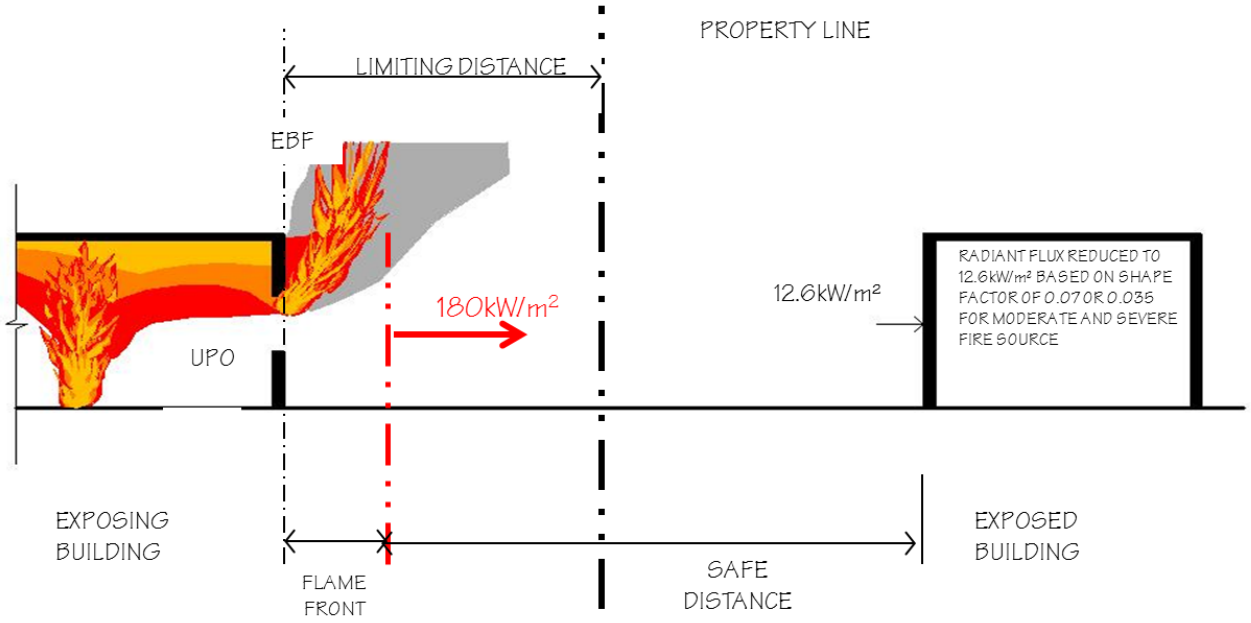
Combustible Cladding Systems [3.1.5.5.]

- max building height of three storeys or sprinklered building
- thermal barrier (e.g., GWB) to protect against fire spread from adjacent space
- cladding test to CAN/ULC-S134, demonstrates fire will not spread beyond the level immediately above fire floor
- will not spread to adjacent building (building exposure)
- Fire-retardant treated wood required to perform after weathering

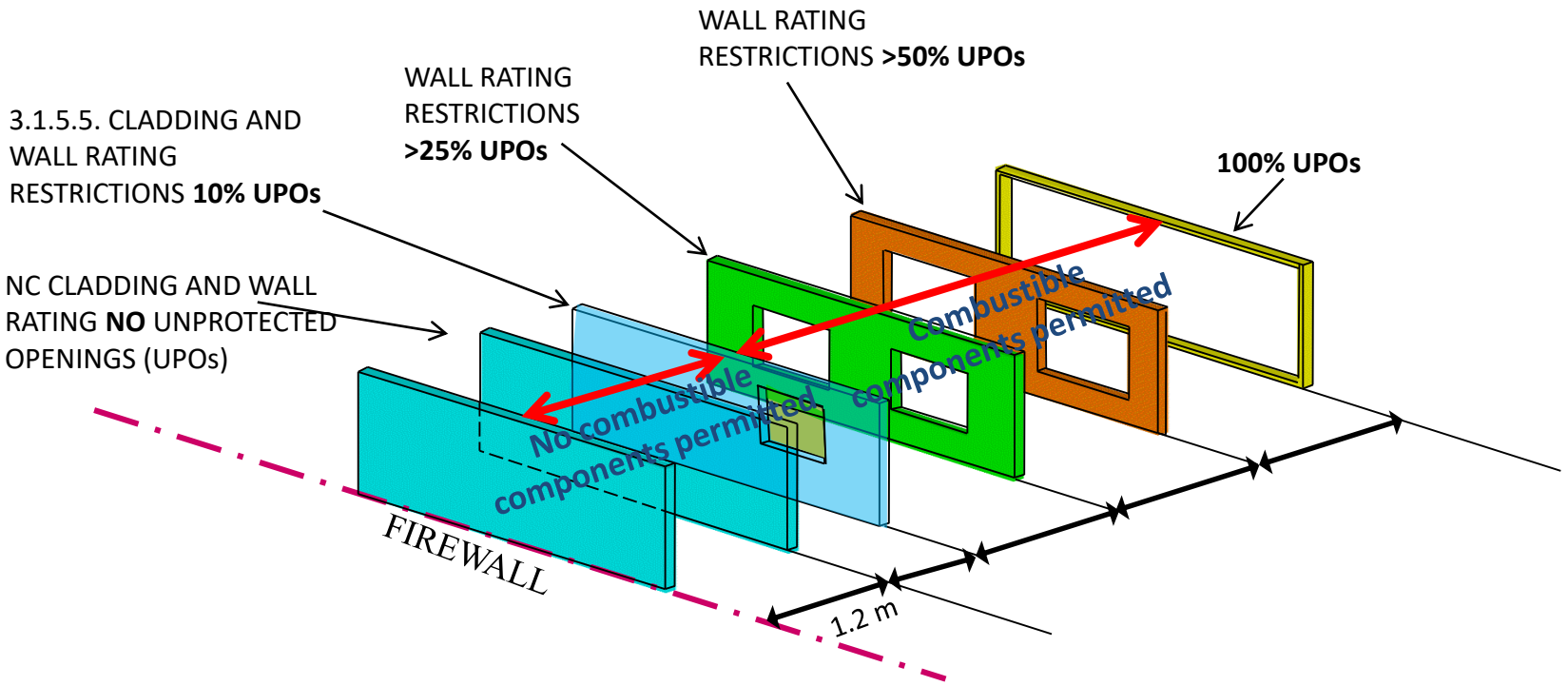
Code Concept of Building Exposure

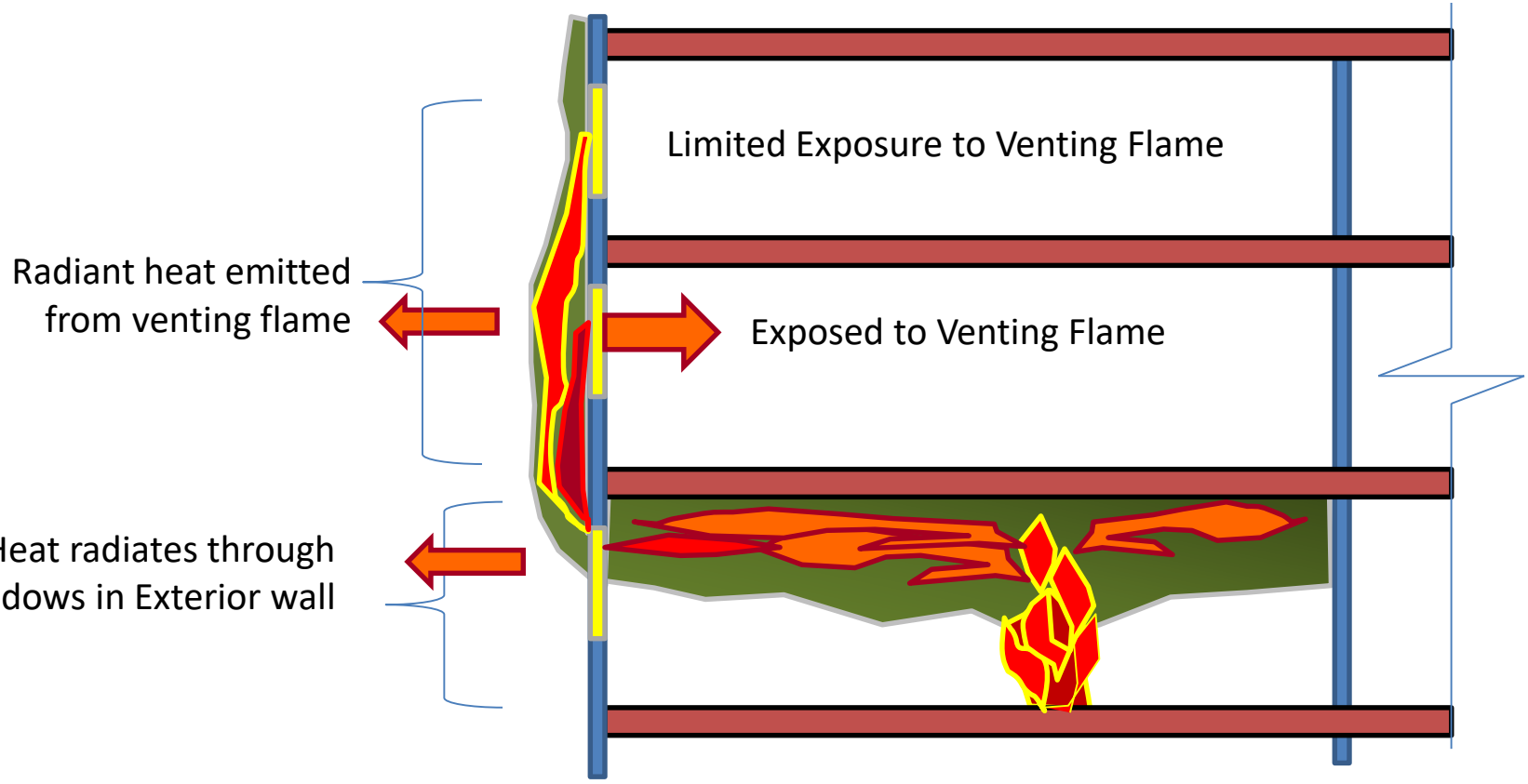


Code Concept of Building Exposure



Spatial Separation and Exterior Wall Construction Concept




Limited Exposure to Venting Flame
Radiant heat emitted from venting flame
Exposed to Venting Flame
Heat radiates through windows in Exterior wall

CAN/ULC S134 (3.1.5.5)

LMDG Building Code Consultants Ltd

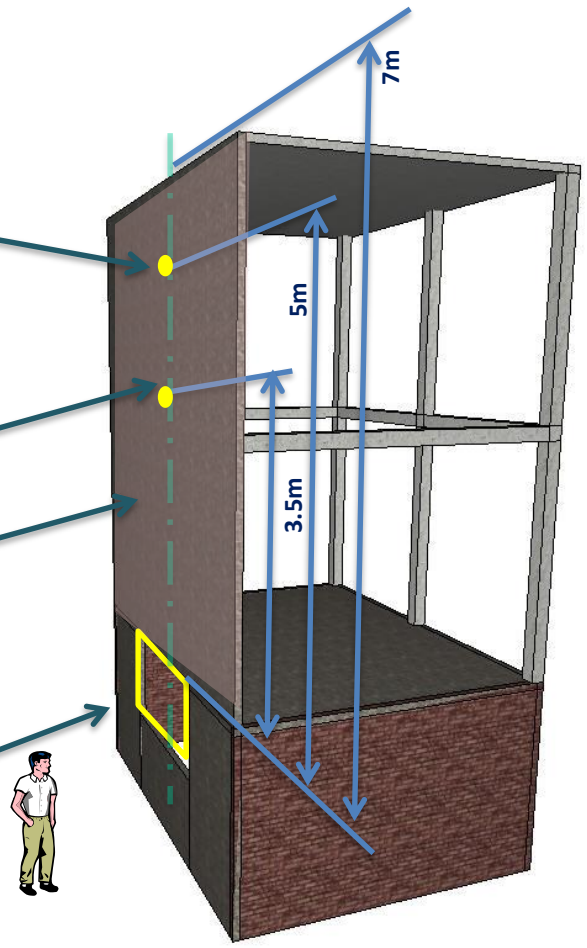
FIRE PROTECTION & LIFE SAFETY SOLUTIONS

No flaming at 5m above opening

Incident heat flux < 35kW/m^2 at 3.5m

Exterior wall with cladding to be tested (3 storeys)

Gas Burner Furnace with window opening (2.5 m w x 1.4 m h, 1.4 m AFF)

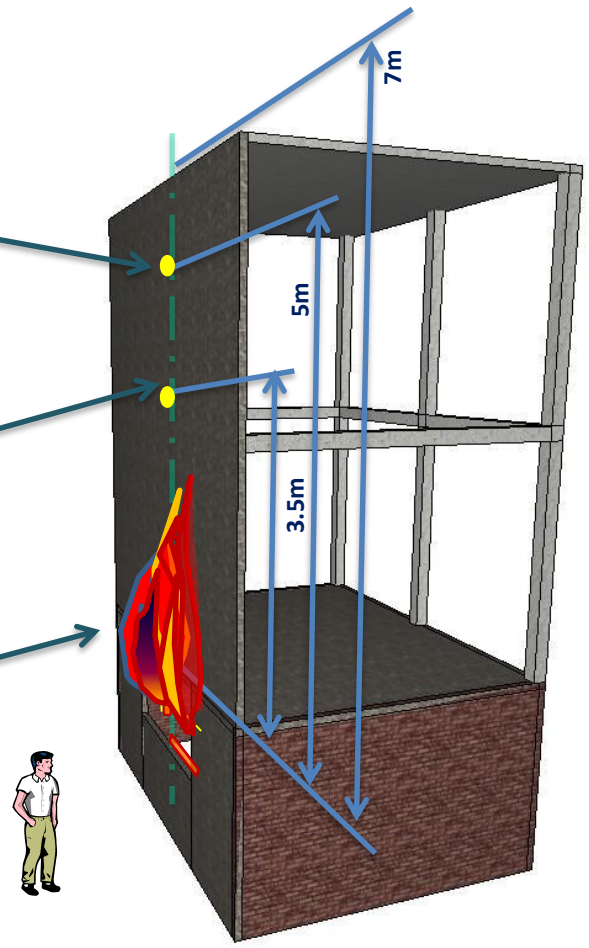


CAN/ULC S134 (3.1.5.5)

No flaming at 5m above opening

Incident heat flux < 35kW/m^2 at 3.5m

Venting Flame

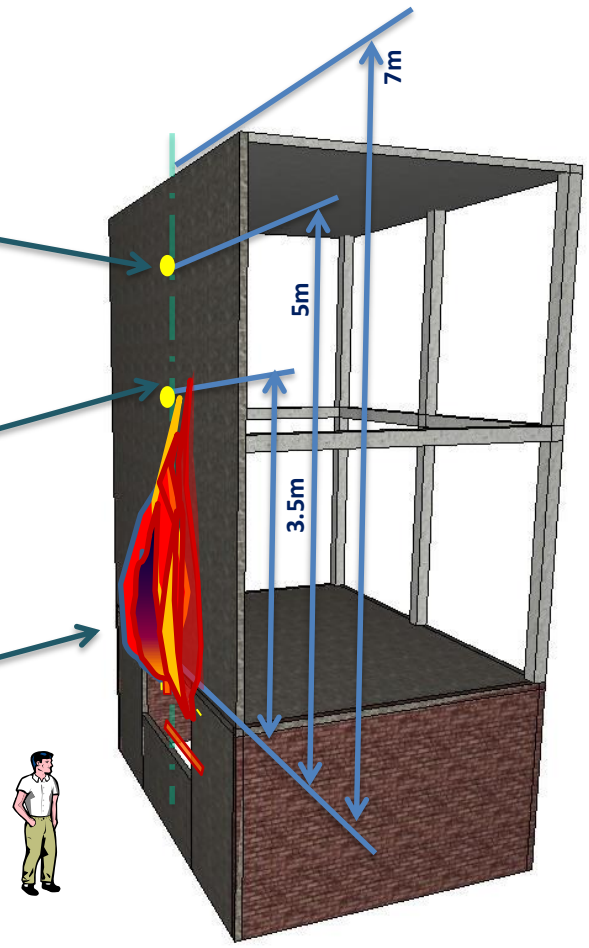


CAN/ULC S134 (3.1.5.5)

No flaming at 5m above opening

Incident heat flux < 35kW/m^2 at 3.5m

Venting Flame

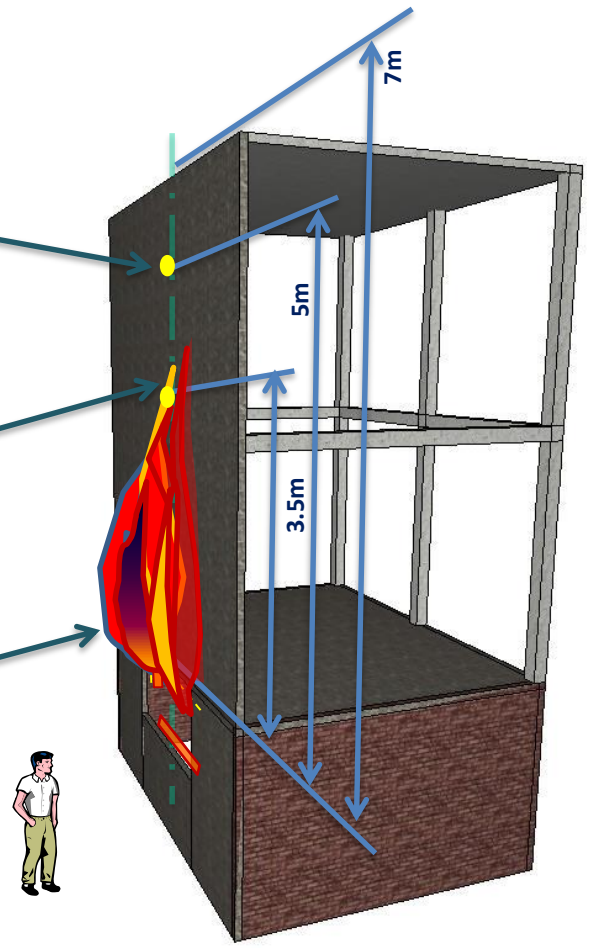


CAN/ULC S134 (3.1.5.5)

No flaming at 5m above opening

Incident heat flux < 35kW/m^2 at 3.5m

Venting Flame

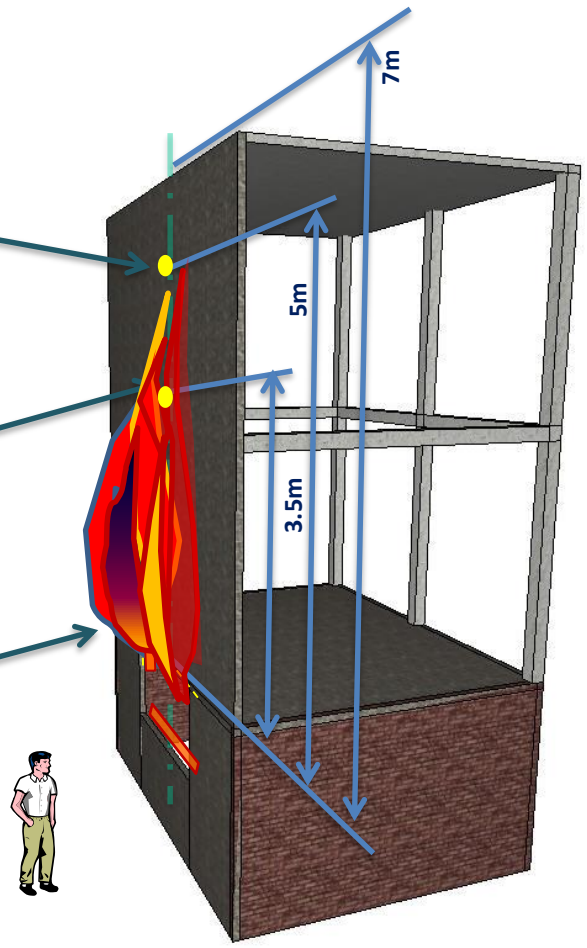


CAN/ULC S134 (3.1.5.5)

No flaming at 5m above opening

Incident heat flux < 35kW/m^2 at 3.5m

Venting Flame

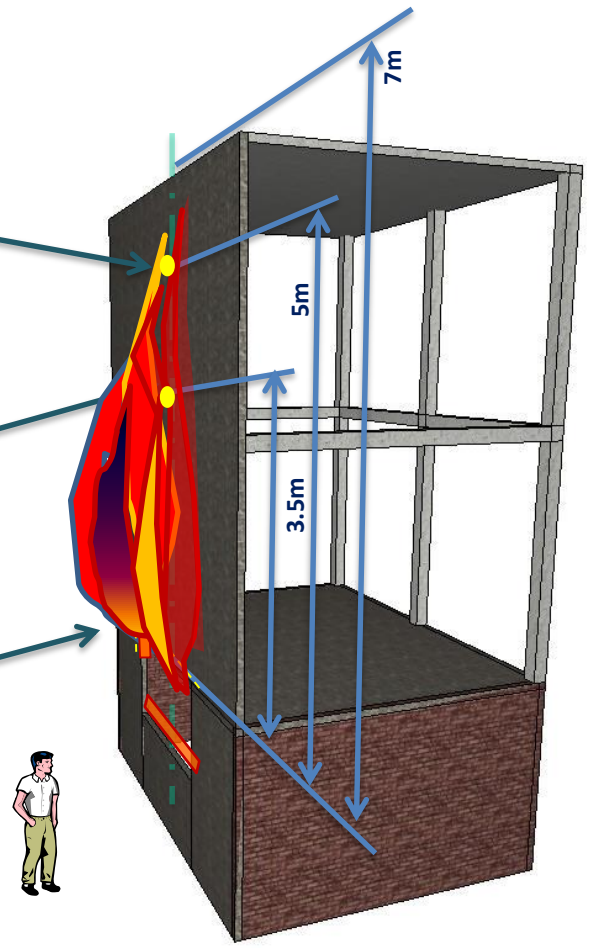


CAN/ULC S134 (3.1.5.5)

No flaming at 5m above opening

Incident heat flux < 35kW/m^2 at 3.5m

Venting Flame

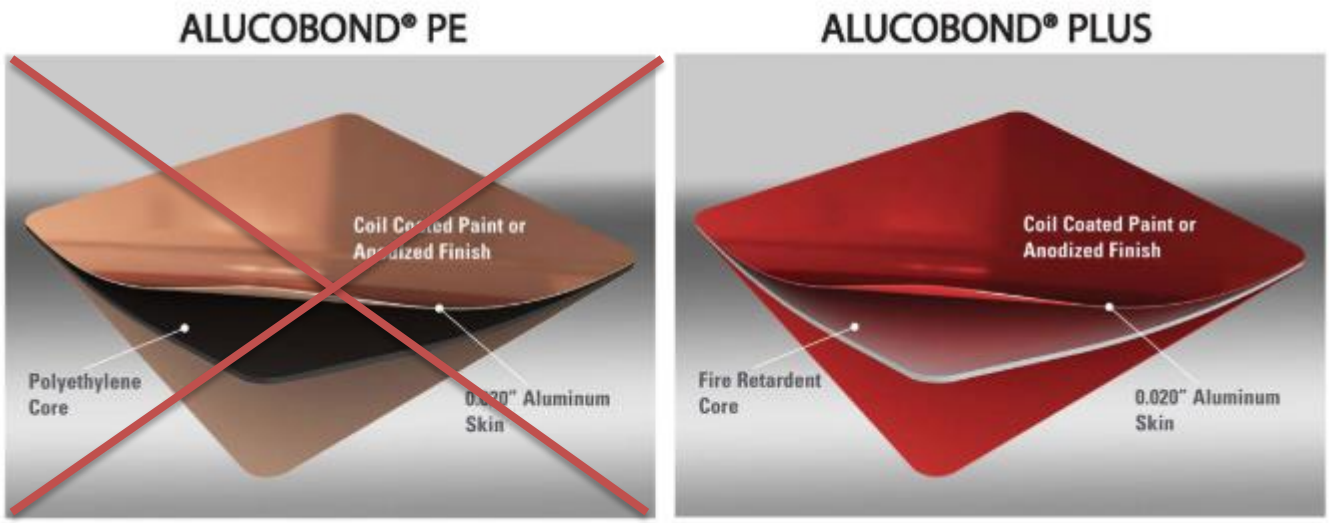


CAN/ULC S134

- 60 min. test duration with steady state heat flux maintained for 15 min., 5 min. ramp up/down, and panel burning continued to be monitored for 35 min. to satisfy test condition
- Testing agency will provide listing confirming flame height < 5 m, heat flux < 35 kW/m² @ 3.5 m above opening
- Listing only valid for tested assembly

Common Products

- Aluminum composite panels
- Steel skinned panels with foam plastic core



Further Information

- See Combustible Exterior Wall Construction by Tavis McAuley http://vancouver.ca/files/cov/tavis-mcauley-presentation-combustible-exterior-wall.pdf

Noncombustible Construction

COMBUSTIBLE INSULATION

Combustible Insulation in Exterior Walls – Foamed Plastic [3.1.5.12]

1) *Combustible* insulation, other than foamed plastics, is permitted in a *building* required to be of *noncombustible construction* provided that it has a *flame-spread rating* not more than 25 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, where the insulation is not protected as described in Sentences (3) and (4).

2) Foamed plastic insulation having a *flame-spread rating* not more than 25 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in a *building* required to be of *noncombustible construction* provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a thermal barrier consisting of

a) not less than 12.7 mm thick gypsum board mechanically fastened to a supporting assembly independent of the insulation,

b) lath and plaster, mechanically fastened to a supporting assembly independent of the insulation,

c) masonry,

d) concrete, or

e) any thermal barrier that meets the requirements of classification B when tested in conformance with CAN/ULC-S124, "Test for the Evaluation of Protective Coverings for Foamed Plastic" (see Appendix A).

3) *Combustible* insulation having a *flame-spread rating* more than 25 but not more than 500 on an exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in the exterior walls of a *building* required to be of *noncombustible construction*, provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a thermal barrier as described in Sentence (2), except that in a *building* that is not *sprinklered* throughout and is more than 18 m high, measured between *grade* and the floor level of the top *storey*, the insulation shall be protected by a thermal barrier consisting of

a) gypsum board not less than 12.7 mm thick, mechanically fastened to a supporting assembly independent of the insulation and with all joints either backed or taped and filled,

b) lath and plaster, mechanically fastened to a supporting assembly independent of the insulation,

c) masonry or concrete not less than 25 mm thick, or

d) any thermal barrier that, when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," will not develop an average temperature rise more than 140°C or a maximum temperature rise more than 180°C at any point on its unexposed face within 10 min (see also Article 3.2.3.7.).

Combustible Insulation in Exterior Walls – Foamed Plastic [3.2.3.8]

1) Except as permitted by Sentence (3) and in addition to the requirements of Sentences 3.2.3.7.(1) and (2) ❮and where the maximum permitted area of *unprotected openings* is greater than 10 ❲per cent❳ of the *exposing building face*❯, foamed plastic insulation used in an exterior wall of a *building* more than 3 *storeys* in *building height* shall be protected on its exterior surface by

a) concrete or masonry not less than 25 mm thick, or

b) *noncombustible* material that complies with the criteria for testing and the conditions of acceptance stated in Sentence (2) when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

HC

2) The criteria for testing and the conditions of acceptance for a wall assembly to satisfy the requirements of Clause (1)(b) are that

a) the fire exposed area of the wall assembly shall be not less than 9.3 m^2 and have no dimension less than 2.75 m,

b) the exposed surface shall include typical vertical and horizontal joints,

c) the test shall be continued for not less than 15 min and the standard time/temperature curve of the referenced standard shall be followed,

d) the *noncombustible* protective material must remain in place and no through openings should develop that are visible when viewed normal to the face of the material, and

e) the *noncombustible* protective material should not disintegrate in a manner that would permit fire to propagate along the surface of the test assembly.

3) The requirements of Sentence (1) are waived for wall assemblies that comply with the requirements of Article 3.1.5.5. (See A-3.2.3.7.(5) in Appendix A.)

Combustible Insulation in Exterior Walls – Foamed Plastic [3.2.3.8]

- FSR < 25 Low flame spread, does not contribute significantly to fire spread, no protection required.
- Foam plastic with FSR < 25, thermal barrier
- Combustible insulation 25 < FSR < 500, more substantial thermal barrier, unless sprinklered
- will not spread to adjacent building (building exposure)
- Exterior barrier protection to limit involvement in exterior fire spread
  - 25 mm of concrete, other barrier with min FRR, or
  - Cladding tested to S134.

Noncombustible Construction

COMBUSTIBLE WINDOW FRAMES & SASHES

Combustible Window Frames and Sashes [3.1.5.4.(5)]

5) *Combustible* window sashes and frames are permitted in a *building* required to be of *noncombustible construction* provided

a) each window in an exterior wall face is an individual unit separated by *noncombustible* wall *construction* from every other opening in the wall,

b) windows in exterior walls in contiguous *storeys* are separated by not less than 1 m of *noncombustible construction*, and

c) the aggregate area of openings in an exterior wall face of a *fire compartment* is not more than 40 [per cent] of the area of the wall face.

No restriction on building height or sprinkler protection

Combustible Window Frames and Sashes [3.1.5.4.(5)]

- Individual unit separation….. no parameters provided except N/C construction,
- Vertical separation (1 m) to limit exposure to window frame above by N/C construction
- the area of opening is restricted to 40%, intent is unclear

  - no reference to suppression (building height, sprinklered, etc.)
  - no reference to combustibility of material (flames spread rating, performance criteria)
  - no reference to thermal barrier
  - no refer to spread to adjacent building

Why 40%? response from NRC:

Your question:

Why is the aggregate areas of openings in an exterior wall face of a fire compartment restricted to not more than 40% of the area of the wall face, as opposed to 50% or 60%?

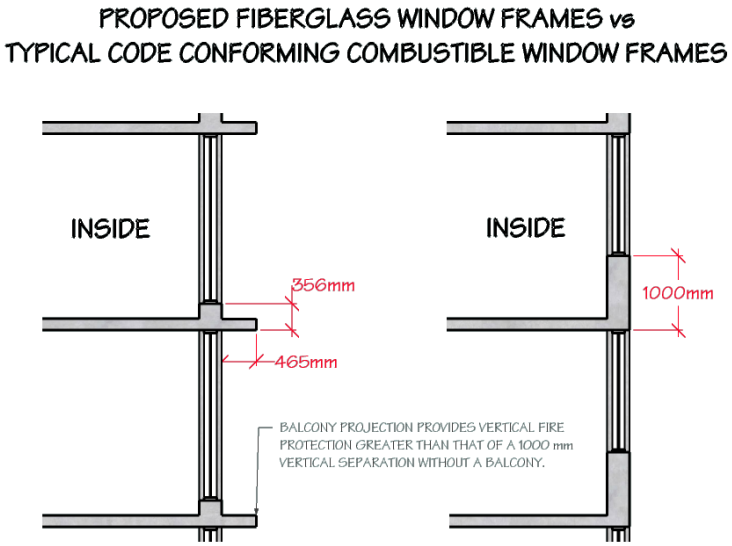
Codes Canada response:

Based on our archived information, there is no available rationale behind the selection of the 40% stated in Clause 3.1.5.4.(5)(c) of Division B of the National Building Code (NBC).

The 40% referenced in Clause 3.1.5.4.(5)(c) of Division B was introduced in the NBC 1965. The wording of the provision has been modified since NBC 1965, however, the 40% limitation has been retained.

The original proposed revision modifying the provisions of the NBC 1960 was based on 30% of the area of the wall face. It is speculated that the original value of 30% was based in part on a traditional "punch hole" exterior wall treatment where 25% of the exterior wall has openings. However, after discussion by the Standing Committee on Use and Egress regarding this provision, the percentage of openings was increased to 40%. Unfortunately, information on the discussion is not available.

1 m vertical Separation
Examples that do not meet 3.1.5.4.(5)



Vertical Separation of Windows Using Projections

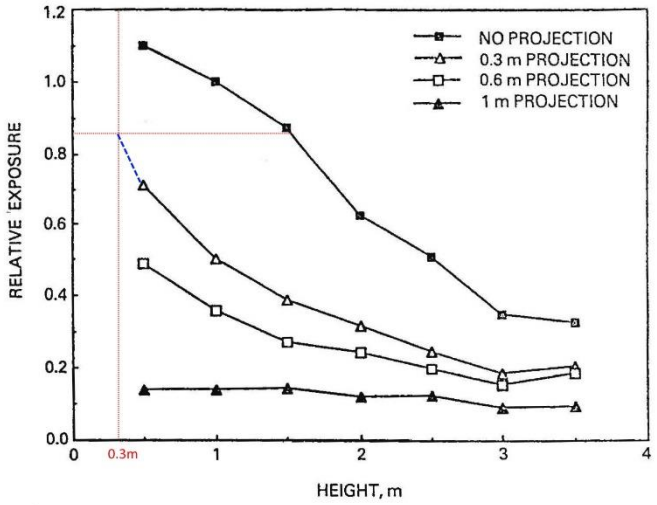


Figure 4: Heat flow data for various depths of projection, normalized by readings at 1 m above opening, with no projection.

Oleskiewicz, Fire Technology, Nov. 91

Intent and Objective

- F02 – to limit the severity and effects of fire or explosions
- OP1.2/OS1.2 – limit probability that as a result of the use of combustible window frames:
  - the building will be exposed to unacceptable risk of damage due to fire,
  - a person will be exposed to unacceptable risk of injury due to fire, and
  - what risks? due to spread of fire via frame or collapse of frame causing damage or injury.
- Opportunity to address via alternative solution

Alternative Solution

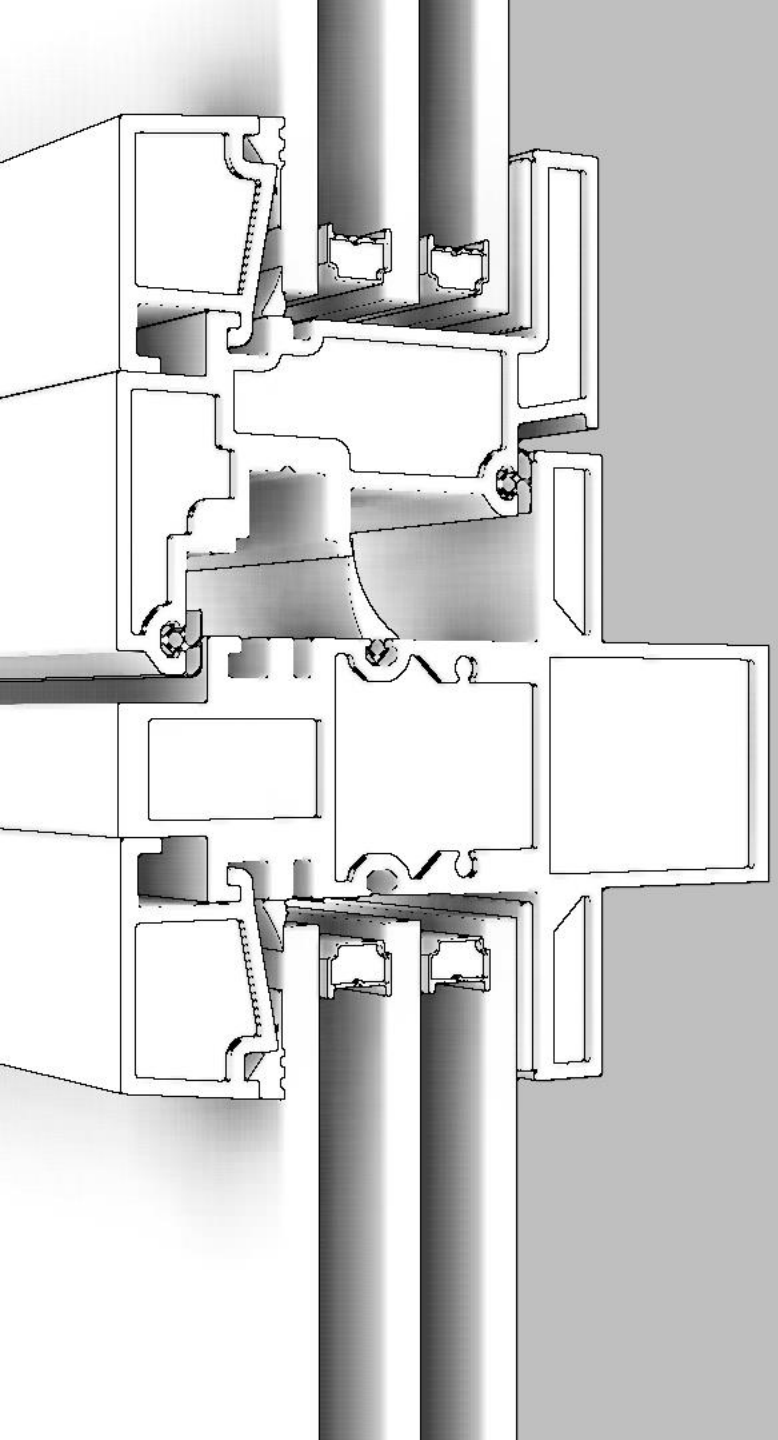
- Objective-based code system
  - must demonstrate the alternative solution will perform, as well as, a design that would satisfy the acceptable solution via the attributed functional and objective statements.
- Level of performance
  - where several design are acceptable, not all provide the same level of performance; therefore, the design providing the lowest level of performance is considered to establish the minimum acceptable level.
- Challenge
  - objective-based codes do not identify quantitative measures, with some exceptions, such as CAN/ULC S134.

Alternative Solution

- Possible Solution
  - demonstrate combustible window frames provide the same level of performance as combustible cladding system with noncombustible window frames and
  - demonstrate combustible window frames do not pose any increased risk to the building or occupants as noncombustible window frames (i.e., aluminum).

- Existing high rise building proposed window replacement program
- alternative solution accepted to permit use of Cascadia fibreglass window frame and sliding doors.
- S134 testing of “window wall” demonstrate, window frame did not contribute significantly to spread of fire & did not collapse.

End of Presentation



Now:

A Sneak Peak at Latest and Ongoing Industry Research

Combustible Windows in Non-Combustible Construction

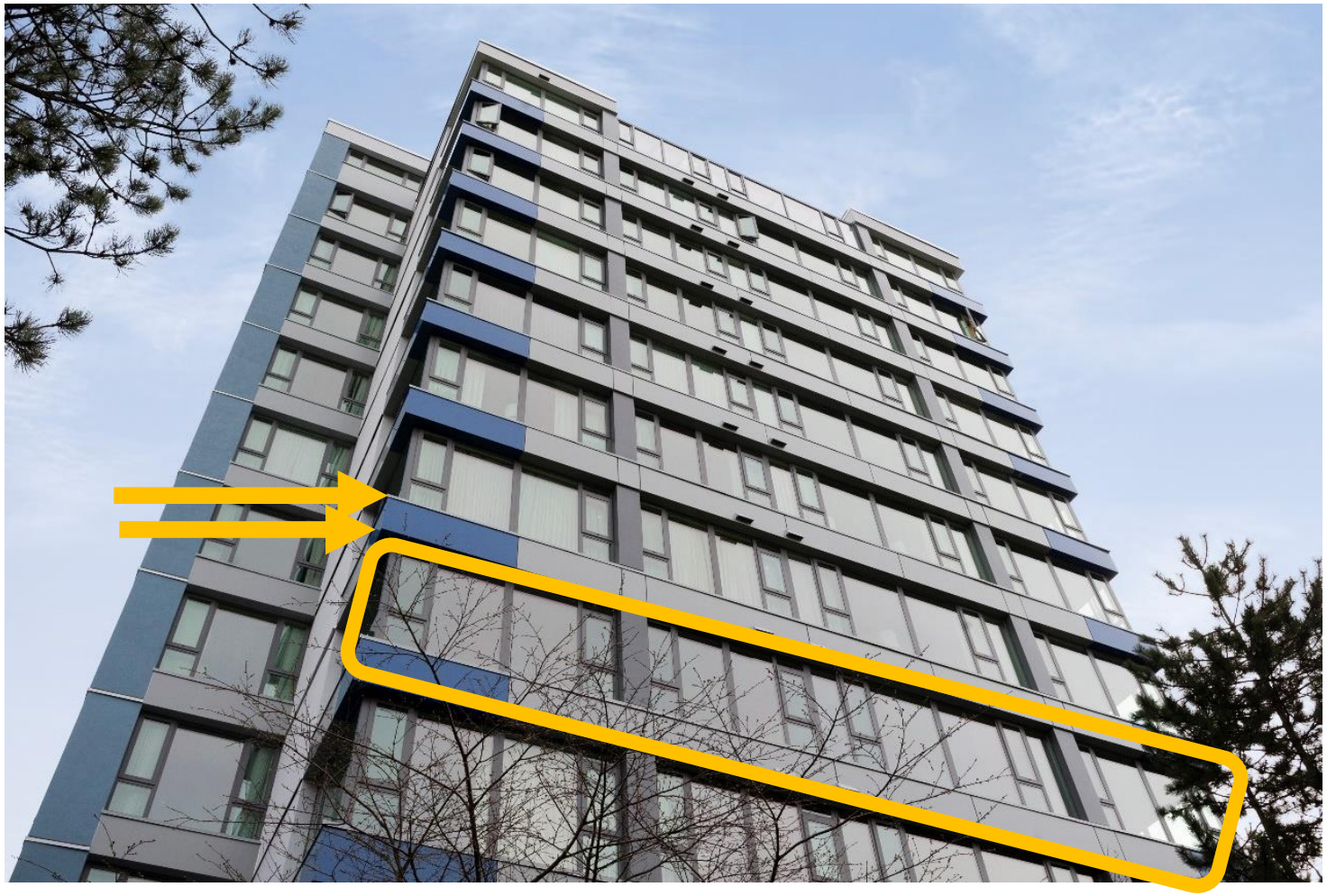
Code Clauses: When the old clashes with the new

Agenda

- Non-combustible Buildings / Combustible windows
- Restrictions
- What is a “combustible” or “non-combustible window” now?
- Early code clauses vs. modern energy efficiency requirements
- Summary of a current research program
- What may become the New Normal?

The Code

- Building code sentence 3.1.5.4.(5) (from BCBC, VBBL, and NBC) limits the use of combustible windows in buildings that are required to be built of non-combustible construction; it contains three requirements:
  - each window in an exterior wall face is an individual unit separated by noncombustible wall construction from every other opening in the wall,
  - windows in exterior walls in contiguous storeys are separated by not less than 1 m of noncombustible construction, and
  - the aggregate area of openings in an exterior wall face of a fire compartment is not more than 40% of the area of the wall face.

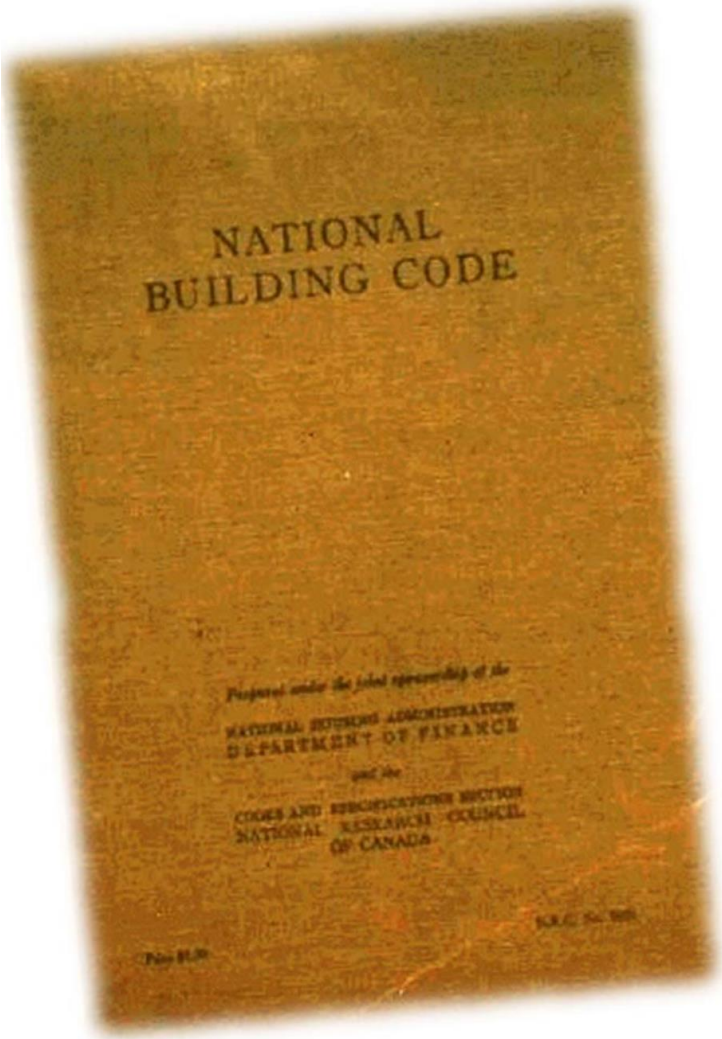


Code Restrictions

- BCBC (and NBC) sentence 3.1.5.4.(5) places restrictions on the overall area and spacing of windows framed with materials the code deems to be combustible.
- These restrictions have the effect of severely limiting the use of non-metal framing materials such as vinyl and fiberglass in large buildings in Canada.

Code Restrictions – Where else?

- This is a situation that does not exist in other advanced western countries
- Non-metal windows are widely used in large and tall buildings of non-hazardous occupancy due to their relative economy and superior energy efficiency.


NATIONAL
BUILDING CODE
Prepared under the joint sponsorship of the
NATIONAL HOUSING ADMINISTRATION
DEPARTMENT OF FINANCE
and the
CODES AND SPECIFICATIONS SECTION
NATIONAL RESEARCH COUNCIL
OF CANADA

Why is this clause so restrictive?

- Classification of window framing materials on the basis of "*combustibility"* is problematic
- It does not distinguish :
  - ignite readily?
  - Does fire spread or diminish?
  - a lot of fuel vs. a little bit.

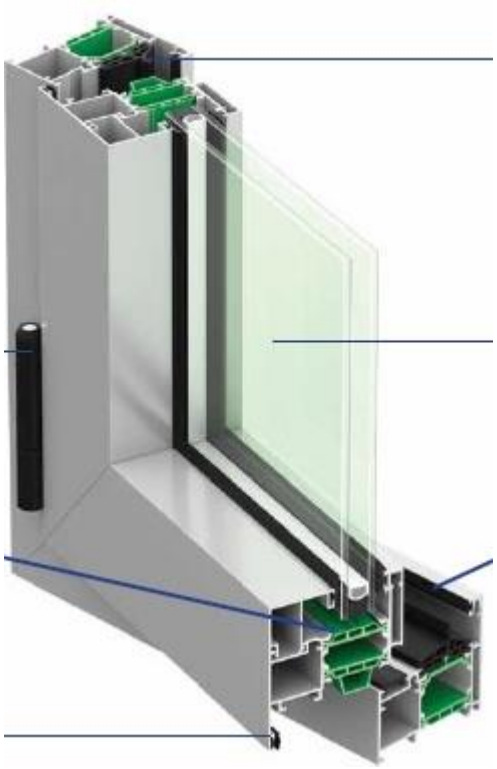
restrictive…

No other western jurisdiction classifies the fire performance of window framing materials on criteria as narrow as CAN/ULC-S114.

What about Thermal Breaks in Aluminum?

- For several decades, code requires thermal breaks in metal windows
  - to improve energy performance
- All thermal break materials are combustible
  - All thermal breaks are incapable of passing CAN/ULC-S114
- On the basis of this test, all window framing materials in use today are combustible or incorporate significant combustible elements.

Can You Spot the Code-Compliant Window?



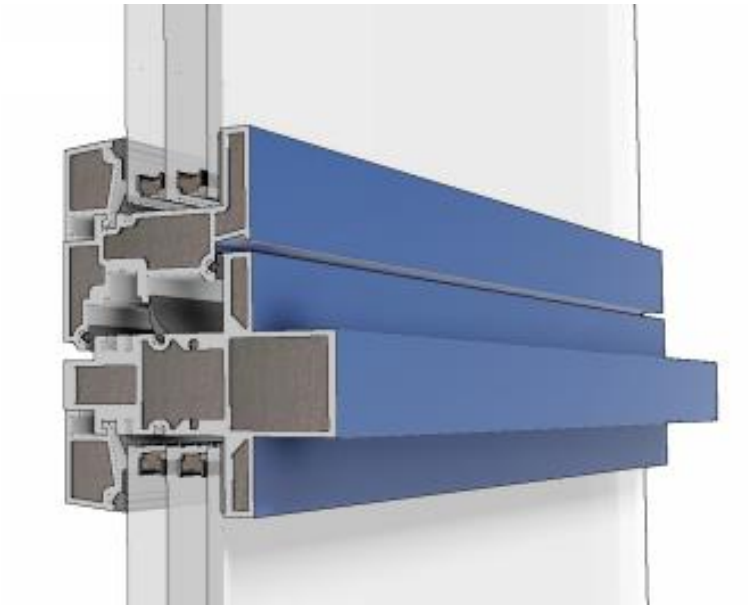
Is this a real problem?

- More sophisticated products need more sophisticated evaluation criteria.
- The most energy efficient fenestration products manufactured in Canada today are predominantly or wholly framed of materials such as PVC and Fiberglass.

- This code provision causes hardship to manufacturers of products with superior energy performance who face a market barrier that was created during earlier times, with simpler products.

Is This Clause Unnecessarily Limiting Widespread Innovation?

- The area and spacing limitations in the code limit innovation in window technology in Canada.
- Today there is *almost* no market for very large and continuous window framing systems framed with materials other than metal.



Conflicts with Energy Code Advancement

- Code clause creates a point of diminishing effectiveness for energy conservation programs and incentives to have real effect.

- Need to modernize the code

- Replace clauses that limit innovation with evidence-based criteria.

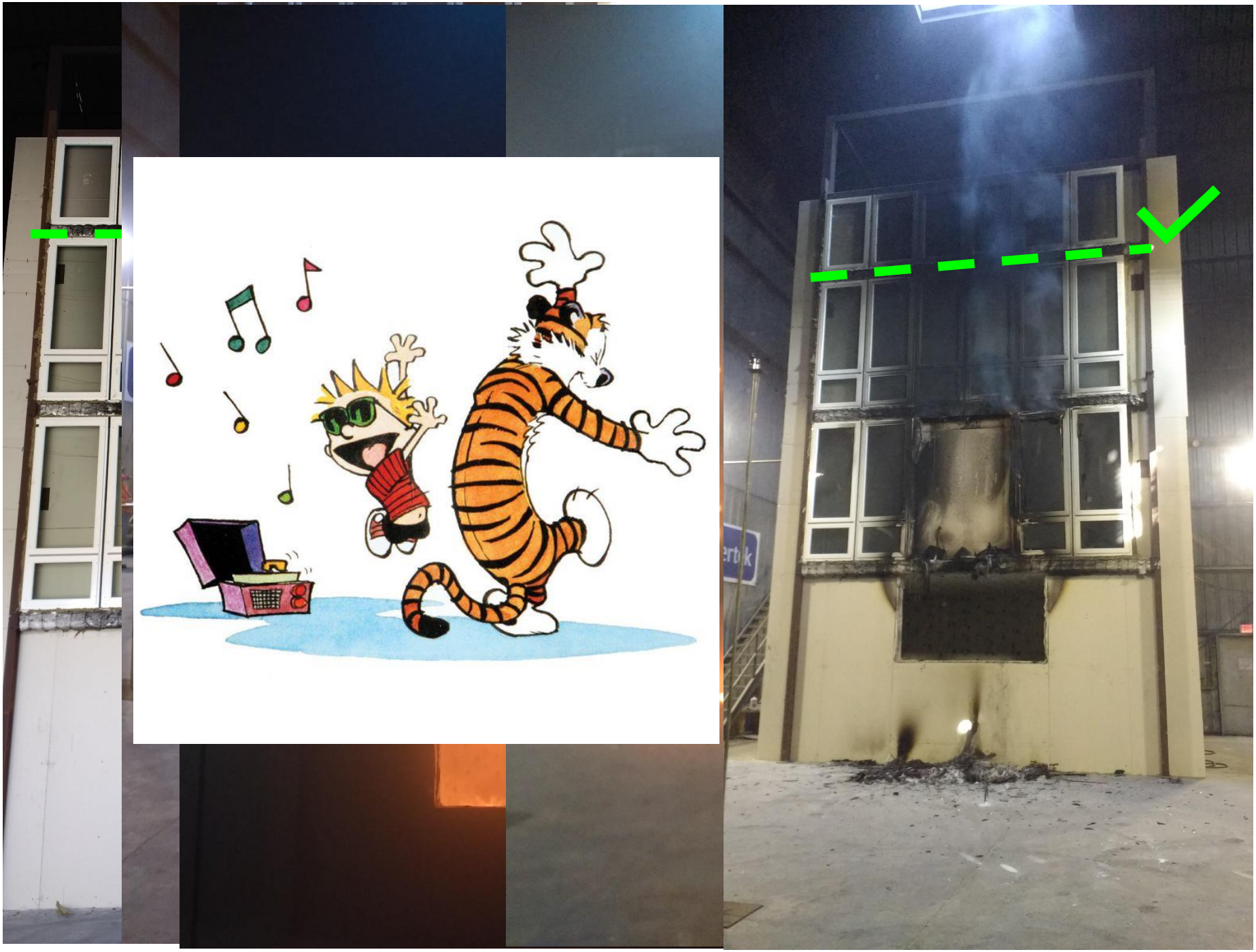
Research: Exploring a Code Change

- National Research Canada has partnered with 10 window manufacturers to study combustible windows.
  - Lot's of fire testing
  - Including S134… three storey high
  - Substantial testing results now support optimism

Government of Canada Gouvernement du Canada

Natural Resources Canada

No specimen burning; just the test fuel.



Aluminum, Fiberglass Both Pass; Both Safe

Test 4 Aluminum

Test 5 FR Fiberglass

What does this mean?

intertek
Total Quality. Assured.

Issue Date: November 2, 2017

Michael Bousfield
Cascadia Windows Ltd.
#101 – 5350B 27th Street
Langley, BC V4W 0C1

Overall Results (Performance Criteria #1 and #2)

CAN/ULC-S134 RESULTS	MEASURED	MAXIMUM ALLOWED	MET PERFORMANCE CRITERIA?
Peak heat flux (one minute avg.)	26.15	35 kW/m^2	Yes
Maximum flame spread (height above opening)	3.5 m	5.0 m	Yes

- In Canada: LMDG comfortable preparing alternate solution reports for window wall type configurations of the Cascadia product, based on this test

In the Interim

- It is also anticipated by manufactures and NRCan that…
- Authorities having jurisdiction will likely recognize methods based on those utilized in the NRC test program to qualify acceptable solutions in the interim between:
  - an accepted code change (if this occurs), and
  - when the new code becomes adopted (with the change)

Timeline – Road to The New Normal (Hopefully)

- Up until now
  - Alternate solutions
    - varying success, depending on jurisdiction
    - give-and-take approach on technical items
- Now (before a code change)
  - Alternate solutions become standardized for some suppliers and should be more widely/easily accepted
- If code-change is accepted for a future code version (2020 code)
  - Alternate solutions just reference future code conformance (even simpler)
- After NBC 2020 adoption in provinces
  - Canada catches up to the rest of the world

Contact for More Information:

David Steer, M.Eng, P.Eng, CP
Principal
dsteer@LMDG.com

Michael Bousfield
Technical Director
mbousfield@cascadiawindows.com

LMDG
Building Code Consultants Ltd

CASCADIA
WINDOWS & DOORS