
CASCADIA
WINDOWS & DOORS

**NAFS-08**
**&**
**CSA A440S1-09**

Fenestration Standards

Determining Performance Grade & Water Test Pressure

## Introduction to Cascadia

- Manufacturer of fiberglass construction products
  - Fiberglass windows
  - Fiberglass doors
  - Fiberglass cladding support systems
- Manufacturing plant located in Langley, BC
- In operation since 2008
- Main client base:
  - BC, Yukon, Washington, Oregon, California, Alaska

## Background - Mike Battistel

- Glazier/Carpenter – 1990 to 1998
  - Journeyman glazier
  - Journeyman carpenter
- BCIT Building Science Diploma – 1998 to 2000
- Building Envelope Consultant– 2000 to 2008
  - Principal - RDH Building Engineering
- BCIT Part Time Instructor – 2002 to Current
  - Building Envelope Performance Course 3050
  - Building Envelope Solutions Course 1137
  - Construction Materials and Methods 2 – 2050
  - Various others
- Fiberglass Window Manufacturing – 2008 to Current
  - Vice President - Cascadia Windows

## Today's Agenda

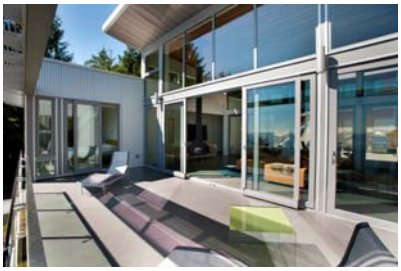
- NAFS and Canadian Supplement Standards Refresher
- How to Confirm Performance Grade using tables
- How to Confirm Performance Grade using online calculators
- Two versions of the Supplement?!
  - CSA A440S1-09 or CSA A440S1-09 Update 1?
- Why do the various online calculators give me different results??!!
- Hills, Escarpments, and Steep Slopes
- NAFS 08 vs NAFS 11?
- Canadian Labeling Requirements
- Composite and Combination Windows
- BCBC 9.36 Maximum U-value

## What is NAFS-08?

- A newer fenestration standard addressing performance and quality requirements of windows, doors and skylights
- Harmonizes Canadian and American fenestration standards:

  **AAMA / WDMA / CSA 101 / I.S.2 / A440-08**, ***NAFS—North American Fenestration Standard****/Specification for windows, doors and skylights*
- Recently adopted for use in the BCBC 2012
- Called the "**Harmonized Standard"** in the Building Code
- In Canada, NAFS-08 must be used in conjunction with the Canadian Supplement - **CSA A440S1-09**

## What Assemblies are covered by NAFS?



## What is NAFS-08?

- NAFS is applicable for testing and rating performance of five primary requirements:
  - Structural Adequacy
  - Resistance to Water Penetration
  - Resistance to Air Leakage
  - Operating Force
  - Forced Entry Resistance

## Other Window & Door Regulations?

- Other standards/acts/code provisions that may affect selection of fenestration products to demonstrate BCBC 2012 compliance include:
  - ASHRAE 90.1
  - BC Energy Efficiency Act
  - Upcoming introduction of BCBC 9.36 Energy Efficiency – Required Thermal Characteristics of Fenestration and Doors (effective December 19th, 2014)
- These other regulations address thermal characteristics exclusively, and are unrelated to NAFS-08.

## NAFS in BCBC Part 9

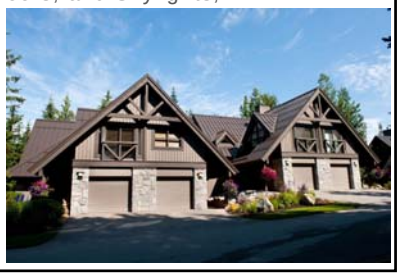
### 9.7.4.2. General

1) Manufactured and pre-assembled windows, doors and skylights and their installation shall conform to

   a) **AAMA/WDMA/CSA 101/I.S.2/A440,** "**NAFS** – North American Fenestration Standard/Specification for Windows, Doors, and Skylights" (Harmonized Standard),

   b) **A440S1, "Canadian Supplement to** AAMA/WDMA/CSA 101/I.S.2/A440, **NAFS** – North American Fenestration Standard/Specification for Windows, Doors, and Skylights,"

Note: Installation was supposed to be regulated by CSA A440.7, but was opted to be excluded from BCBC 2012. NAFS nor the Canadian Supplement regulate installation



## NAFS in BCBC Part 5

### 5.10.2.2. Applicable Standards

1) Windows, doors and skylights shall conform to the requirements in

   a) **AAMA/WDMA/CSA 101/I.S.2/A440**, "**NAFS** – North American Fenestration Standard/Specification for Windows, Doors, and Skylights," and

   b) **CSA A440S1**, "**Canadian Supplement to** AAMA/WDMA/CSA 101/I.S.2/A440, **NAFS** – North American Fenestration Standard/Specification for Windows, Doors, and Skylights."

Continued on Next Page

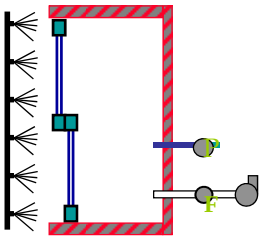
## NAFS in BCBC Part 5

2) Performance grades for windows, doors and skylights shall be selected according to the Canadian Supplement referenced in Clause (1)(b) so as to be appropriate for the conditions and geographic location in which the window, door or skylight will be installed.

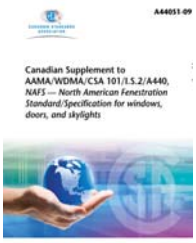
3) Windows, doors and skylights shall conform to the performance grades selected in Sentence (2) when tested in accordance with the Harmonized Standard referenced in Clause (1)(a).

= **NAFS-08**

## Various Lab Tests Are Performed to Confirm Ratings



## Why is There a Canadian Supplement?




Not everything could be harmonized, including:

1. Different maximum water test pressures
2. Different air leakage testing requirements
3. Insect screen serviceability test in Canada
4. Different maximum operating force
5. Canadian labeling requirements ("markings")
6. The Canadian Supplement provides environmental data and simplified methods for determining appropriate performance grades for buildings in Canada.

## Key performance ratings

- NAFS and Canadian Supplement:
  - **Performance CLASS:** R, LC, CW, AW
  - **Performance GRADE**: PG 15, PG720(metric)
  - **Size tested**
  - **Air infiltration / exfiltration**: Fixed, A2, A3
  - **Water penetration test pressure** in: Pa (Pascals)
  - **Design Pressure: + and - test pressure** in: Pa (Pascals)

## Performance Class

| R | LC | CW | AW |
|---|---|---|---|
| PG 15 | PG 25 | PG30 | PG40 |

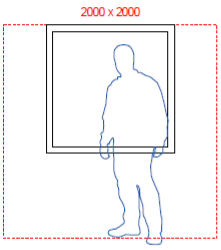
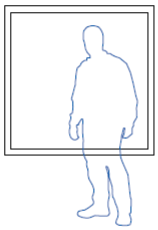
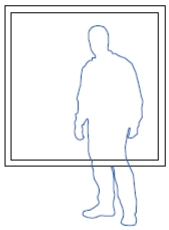
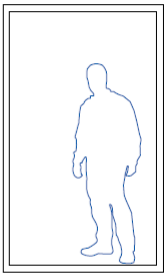



## Performance Class

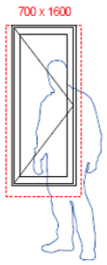
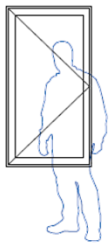
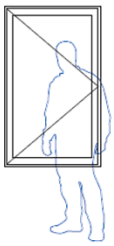
| Designation | NAFS Application |
|---|---|
| **R** | One and Two family dwellings |
| **LC** | Low-rise and mid-rise multifamily dwellings |
| **CW** | Low-rise and mid-rise buildings with heavy use and deflection limits |
| **AW** | Mid-rise and high-rise buildings, where frequent and extreme use is expected |

- All that's needed based on the prescriptive requirements of the 2012 Building Code for Part 9 buildings is Class R.
- Classes have related *guidance* to designers for typical application and exposure (not a mandate)

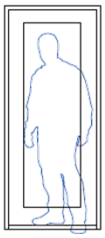
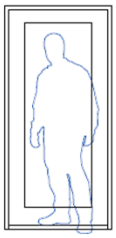
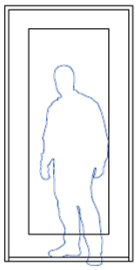
## Performance Class vs Minimum Size

| R | LC | CW | AW |
|---|---|---|---|
| PG 720 | PG 1200 | PG 1440 | PG 1920 |
| 1200 x 1200 | 1400 x 1400 | 1500 x 1500 | 1500 x 2500 |
|   |  |  |  |
| Min DP: 720 Pa | Min DP: 1200 Pa | Min DP: 1440 Pa | Min DP: 1920 Pa |
| Defl: Report Only | Defl: Report Only | Defl: L/175 | Defl: L/175 |
| Min Struct: 1080 Pa | Min Struct: 1800 Pa | Min Struct: 2160 Pa | Min Struct: 2880 Pa |
| Min Water Test: 140 Pa (15% DP) | Min Water Test: 180 Pa (15% DP) | Min Water Test: 220 Pa (15% DP) | Min Water Test: 390 Pa (20% DP) |
| Air Leakage: 1.5 L/s*m2 @ 75Pa | Air Leakage: 1.5 L/s*m2 @ 75Pa | Air Leakage: 1.5 L/s*m2 @ 75Pa | Air Leakage: 0.5 L/s*m2 @ 300 Pa |

## C Casement Window classes

| R | LC | CW | AW |
|---|---|---|---|
| PG 15 | PG 25 | PG30 | PG40 |
| 600 x 1500 | 800 x 1500 | 800 x 1500 | 900 x 1500 |
|   |  |  |  |
| Min DP: 720 Pa | Min DP: 1200 Pa | Min DP: 1440 Pa | Min DP: 1920 Pa |
| Defl: Report Only | Defl: Report Only | Defl: L/175 | Defl: L/175 |
| Min Struct: 1080 Pa | Min Struct: 1800 Pa | Min Struct: 2160 Pa | Min Struct: 2880 Pa |
| Min Water Test: 140 Pa (15% DP) | Min Water Test: 180 Pa (15% DP) | Min Water Test: 220 Pa (15% DP) | Min Water Test: 390 Pa (20% DP) |
| Air Leakage: 1.5 L/s*m2 @ 75Pa | Air Leakage: 1.5 L/s*m2 @ 75Pa | Air Leakage: 1.5 L/s*m2 @ 75Pa | Air Leakage: 0.5 L/s*m2 @ 300 Pa |

## SHD Side Hinged Door classes

| R | LC | CW | AW |
|---|---|---|---|
| PG 15 | PG 25 | PG30 | PG40 |
| **900 x 2000** | **900 x 2100** | **1000 x 2100** | **1200 x 2400** |
|  |  |  |  |
| Min DP: 720 Pa | Min DP: 1200 Pa | Min DP: 1440 Pa | Min DP: 1920 Pa |
| Defl: Report Only | Defl: Report Only | Defl: L/175 | Defl: L/175 |
| Min Struct: 1080 Pa | Min Struct: 1800 Pa | Min Struct: 2160 Pa | Min Struct: 2880 Pa |
| Min Water Test: 140 Pa (15% DP) | Min Water Test: 180 Pa (15% DP) | Min Water Test: 220 Pa (15% DP) | Min Water Test: 390 Pa (20% DP) |
| Air Leakage: 1.5 L/s*m2 @ 75Pa | Air Leakage: 1.5 L/s*m2 @ 75Pa | Air Leakage: 1.5 L/s*m2 @ 75Pa | Air Leakage: 0.5 L/s*m2 @ 300 Pa |

## Performance Grade (PG)

- A single numeric designation based on design pressure but representing a number of performance attributes:
  - Uniform load tests (structural tests)
  - Air and water penetration tests
  - 21 categories of auxiliary tests applied to specific products:
    - 3 Ease of operation tests
    - Forced entry resistance tests
    - Fabrication quality tests
    - 9 Frame and sash stiffness and stress tests
    - 4 Hardware load tests
    - Operation / cycling and durability tests

## Performance Grade (PG)

- Performance Grades are based on design pressure as determined using Canadian Supplement by:
  - Part 9 = Designer
    - Verified by AHJ as a prescriptive solution for code compliance
  - Part 5 = Architect/Engineer
    - Verification is typically provided through letters of assurance, as a performance based solution
    - Letters of assurance do not take the place of complying with NAFS, but rather provide verification that the standard is being met
- Grades range from 720-4800 Pa (15-100 psf in US)
- Grades reported in increments of 240 Pa (5 psf US)

## Gateway Requirements for Performance Classes

- Gateway requirements
  - Each Performance Class has:
    - A minimum Performance Grade
    - A minimum test specimen size
    - May be subject to additional auxiliary requirements
  - Each Product Type may be rated for one or more Performance Classes
  - **Products may be tested to sizes and performance grades greater than the minimum for a Performance Class!**

## Gateway Requirements

**Table 1**
**Gateway requirements**
(See Clauses 0.2.1, 0.2.6.1, 4.2.1, 4.4.2.3, 4.4.3.2–4.4.3.4, 5.3.3.1, 5.3.4.2, and 5.3.4.3.)

| Product performance class | Minimum performance grade (PG) | Minimum design pressure (DP), Pa (psf) | Minimum structural test pressure (STP), Pa (psf) | Minimum water resistance test pressure, Pa (psf) |
|---|---|---|---|---|
| Windows and doors | | | | |
| R | 15 | 720 (15.0) | 1080 (22.5) | 140 (2.90) |
| LC | 25 | 1200 (25.0) | 1800 (37.5) | 180 (3.75) |
| CW | 30 | 1440 (30.0) | 2160 (45.0) | 220 (4.50) |
| AW | 40 | 1920 (40.0) | 2880 (60.0) | 390 (8.00) |
| Unit skylights, tubular daylighting devices, and roof windows | | | | |
| R | 15 | 720 (15.0) | 1440 (30.0) | 140 (2.90) |
| CW | 30 | 1440 (30.0) | 2880 (60.0) | 220 (4.5) |

## Optional Performance Grades

**Table 3**
**Canada (only) optional performance grades (PG)**
(See Clauses 0.2.6.1, 4.3.2.2, 4.4.3.2–4.4.3.4, 5.3.3.1, 5.3.4.2, and 5.3.4.3.)

| Performance class and optional performance grade (PG) | | | | Design pressure (DP) | | Structural test pressure (STP) | | Water penetration resistance test pressure | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | R, LC, CW | | AW | |
| R | LC | CW | AW | Pa | (psf) | Pa | (psf) | Pa | (psf) | Pa | (psf) |
| 20 | — | — | — | 960 | (20.00) | 1 440 | (30.00) | 150 | (3.00) | — | — |
| 25 | — | — | — | 1 200 | (25.00) | 1 800 | (37.50) | 180 | (3.75) | — | — |
| 30 | 30 | — | — | 1 440 | (30.00) | 2 160 | (45.00) | 220 | (4.50) | — | — |
| 35 | 35 | 35 | — | 1 680 | (35.00) | 2 520 | (52.50) | 260 | (5.25) | — | — |
| 40 | 40 | 40 | — | 1 920 | (40.00) | 2 880 | (60.00) | 290 | (6.00) | — | — |
| 45 | 45 | 45 | 45 | 2 160 | (45.00) | 3 240 | (67.50) | 330 | (6.75) | 440 | (9.00) |
| 50 | 50 | 50 | 50 | 2 400 | (50.00) | 3 600 | (75.00) | 360 | (7.50) | 480 | (10.00) |
| 55 | 55 | 55 | 55 | 2 640 | (55.00) | 3 960 | (82.50) | 400 | (8.25) | 530 | (11.00) |
| 60 | 60 | 60 | 60 | 2 880 | (60.00) | 4 320 | (90.00) | 440 | (9.00) | 580 | (12.00) |

## Table 27—Detailed Gateway Requirements

- 6 pages of tables for product types
- Lists all applicable classes and grades for each product type
- Indicates which tests are required

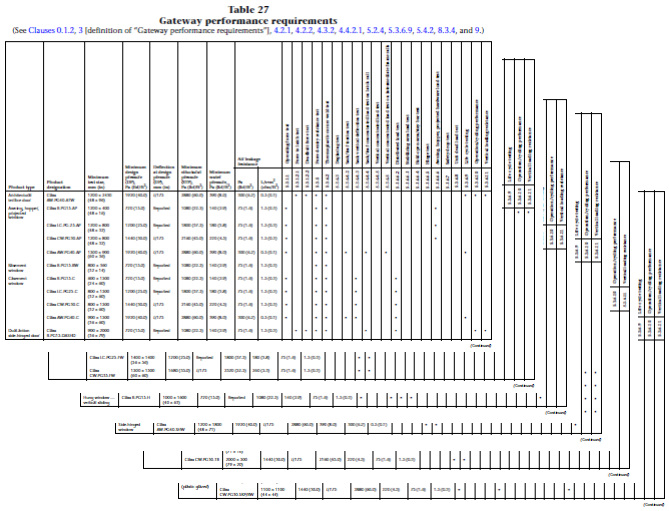


**Table 27**
**Gateway performance requirements**
(See Clauses 0.1.2, 3 [definition of "Gateway performance requirements"], 4.2.1, 4.2.2, 4.3.2, 4.4.2.1, 5.2.4, 5.3.6.9, 5.4.2, 8.3.4, and 9.)

## Product Specific Ratings

**Table 5**
**Product types**
(See Clauses 4.4.2.1, 4.4.2.2, 8.1, and 8.3.2.)

| | | | | | |
|---|---|---|---|---|---|
| AP | = | Awning, hopper, projected window | LW SHD | = | Limited water side-hinged door |
| ATD | = | Architectural terrace door | RW | = | Roof window |
| BW | = | Basement window | SD | = | Sliding door |
| C | = | Casement window | SHD | = | Side-hinged door |
| DASHD | = | Dual-action side-hinged door | SHW | = | Side-hinged (inswinging) window |
| DAW | = | Dual-action window | SKG | = | Unit skylight — glass glazed |
| FD | = | Fixed door | SKP | = | Unit skylight — plastic glazed |
| FW | = | Fixed window | SLT | = | Side lite |
| GH | = | Greenhouse window | SP | = | Specialty product |
| H | = | Hung window | TA | = | Tropical awning window |
| HE | = | Hinged rescue window | TDD | = | Tubular daylighting device |
| HP | = | Horizontally pivoted window | TH | = | Top-hinged window |
| HS | = | Horizontal sliding window | TR | = | Transom |
| J | = | Jalousie window | VP | = | Vertically pivoted window |
| JA | = | Jal-awning window | VS | = | Vertical sliding window |
| LW DASHD | = | Limited water dual-action side-hinged door | | | |

## NAFS-08 Exclusions

- Interior windows and doors
- Vehicular access doors
- Sloped glazing other than unit skylights
- Curtainwall and Storefront
- Storm windows and doors
- Commercial entrance systems
- Sunrooms
- Revolving doors
- Site built door systems
- Commercial steel doors

## How to specify/determine performance grade

- Simplified Method
  - Canadian Supplement – **Table Method**
  - Canadian Supplement – **Calculation Method**
  - It is anticipated that Building Code officials are using the Table Method for a standard building application, while a Designer/Engineer would use the Calculation method for a more complex building application.
  - Note that in some cases the calculation method results in a lower performance grade than the Table Method due to less rounding up of values.
- Detailed Method
  - Detailed engineering calculations per **Part 4 of Code** – the most precise
  - This sometimes results in lower performance grades than the Simplified Methods.

## Example Building
## Calculating Performance Grade and Water Resistance Test Pressure Using Table Method

Objective

- Determine the performance requirements for a 30m high multifamily building in Abbotsford located in open terrain with large casement windows
- Objective:
  - Performance Grade
  - Water resistance test pressure

## CSA A440S1-09

- Canadian Supplement inputs:
  - Geographic location
  - Terrain
  - Building height
- Supplement has environmental data, simplified methods to determine:
  - Design pressure
  - Driving Rain Wind Pressure (DRWP)

**1. Building information**

Location (see Table A.1): _____

Terrain: Open / Rough

Height _____ m

Importance factor (see Clause 4.2.3) ($I_w$): 0.75

DRWP (see Table A.1, Column A) _____ Pa

HWP (see Table A.1, Column B) _____ Pa

Snow load (see Table A.1, Column C) $S_s$ _____ Pa; $S_r$ _____ Pa

JDT (see Table A.1, Column D) _____ °C

**2. Summary — Required performance levels**

**Note:** *Use the following Steps 3 to 10, as applicable, to complete the summary table.*

Windows, doors, and unit skylights for the location and application shall conform to the criteria as noted in summary table below:

| | | | |
|---|---|---|---|
| Airtightness level | _____(Step 3) | Design pressure — Negative | _____Pa (Step 8) |
| Specified DRWP | _____Pa (Step 4) | Specified wind load — Negative | _____kPa (Step 8) |
| Specified wind load — Positive | _____kPa (Step 5) | Condensation resistance | _____ (Step 9) |
| Specified snow load | _____Pa (Step 6) | Other | _____ (Step 10) |
| Design pressure — Positive | _____Pa (Step 7) | | |

**3. Air infiltration/exfiltration**

(a) Choose the appropriate level of airtightness performance (for operable windows and unit skylights only) in accordance with Clause 5.3.2.2 and Table 9 of AAMA/WDMA/CSA 101/I.S.2/A440, as follows:
- A2 — 1.5 L/(s•m²) or 0.5 L/(s•m²) for AW compression seal products
- A3 — 0.5 L/(s•m²)
- Fixed — 0.2 L/(s•m²)

(b) Insert the performance level in the summary table in Step 2.

**4. Water penetration resistance**

(a) Use Table 1 for open terrain or Table 2 for rough terrain.
(b) Using the location DRWP (round up) and the height of the window, door, or unit skylight, determine the $p_f$ value.
(c) Insert the resultant specified DRWP in the summary table in Step 2.

**5. Positive pressure — Wind load**

(a) Use Table 3 for open terrain or Table 4 for rough terrain.
(b) Using the HWP for the building location (round up) and the height of the window, door, or unit skylight, determine the $p$ value.
(c) Insert the resultant specified wind load in the summary table in Step 2.

**6. Positive pressure — Snow load**

(a) For unit skylights whose entire roof width does not exceed 4.3 m, multiply the ground snow load ($S_s$) by 0.45 and add the associated rain load ($S_r$); for all other roofs, multiply $S_s$ by 0.55 and add the associated $S_r$.
(b) Insert the resultant specified snow load in the summary table in Step 2. For windows and doors, enter zero.

**Figure A.1**
**Checklist for selecting performance levels for windows, doors, and unit skylights**
(See Clause A.4.4.)

See page 21 of Supplement

## Terrain?

- Open Terrain = level terrain with relatively few buildings, trees, or obstructions, ~~and relatively little~~ water or shoreline
- Rough Terrain = suburban, urban, or wooded terrain which extends upwind from a building and is uninterrupted for minimum of 1km, or 10 times the building height, whichever is greater.

## Example step 1

- Step 1: fill in building information

**1. Building information**

Location (see Table A.1): Abbotsford

Terrain: Open / Rough

Height: 30 m

Importance factor (see Clause 4.2.3) ($I_w$): 0.75

DRWP (see Table A.1, Column A): 200 Pa

HWP (see Table A.1, Column B): 620 Pa

Snow load (see Table A.1, Column C): $S_s$ 2000 Pa, $S_r$ 300 Pa

JDT (see Table A.1, Column D): ____ °C

**Table A.1**
**Climate design data for selected locations in Canada**
(See Clauses 4.1, A.4.1, A.4.2.1, A.4.2.2, and A.4.2.4 and Figure A.1.)

| | Column A | Column B | Column C | | Column D |
|---|---|---|---|---|---|
| Location | Driving rain wind pressure (DRWP), Pa, 1/10 | Hourly wind pressure (HWP), kPa, 1/50 | Snow load, kPa, 1/50 Ground snow load, $S_s$ | Associated rain load, $S_r$ | January design temp. (JDT), °C, 2.5% |
| **British Columbia** | | | | | |
| Abbotsford | 200 | 0.62 | 2.0 | 0.3 | –10 |

## Example step 2

- Step 2 is actually the summary, completed after the other steps

**2. Summary — Required performance levels**

**Note:** *Use the following Steps 3 to 10, as applicable, to complete the summary table.*

Windows, doors, and unit skylights for the location and application shall conform to the criteria as noted in summary table below:

| | | | |
|---|---|---|---|
| Airtightness level | _____(Step 3) | Design pressure — Negative | _____Pa (Step 8) |
| Specified DRWP | _____Pa (Step 4) | Specified wind load — Negative | _____kPa (Step 8) |
| Specified wind load — Positive | ____kPa (Step 5) | Condensation resistance | _____ (Step 9) |
| Specified snow load | _____Pa (Step 6) | Other | _____ (Step 10) |
| Design pressure — Positive | _____Pa (Step 7) | | |

## Example step 3

- Choose air infiltration/exfiltration level
  - At specifier's discretion
  - Keep available product performance in mind
  - Fixed level applies to non-operable windows only

**3. Air infiltration/exfiltration**

(a) Choose the appropriate level of airtightness performance (for operable windows and unit skylights only) in accordance with Clause 5.3.2.2 and Table 9 of AAMA/WDMA/CSA 101/I.S.2/A440, as follows:

- A2 — 1.5 L/(s•m$^2$) or 0.5 L/(s•m$^2$) for AW compression seal products
- A3 — 0.5 L/(s•m$^2$)
- Fixed — 0.2 L/(s•m$^2$)

(b) Insert the performance level in the summary table in Step 2.

## Example step 3

- Add air tightness level to Summary

**2. Summary — Required performance levels**
**Note:** *Use the following Steps 3 to 10, as applicable, to complete the summary table.*
Windows, doors, and unit skylights for the location and application shall conform to the criteria as noted in summary table below:

| | | | |
|---|---|---|---|
| Airtightness level | A2 (Step 3) | Design pressure — Negative | Pa (Step 8) |
| Specified DRWP | Pa (Step 4) | Specified wind load — Negative | kPa (Step 8) |
| Specified wind load — Positive | kPa (Step 5) | Condensation resistance | (Step 9) |
| Specified snow load | Pa (Step 6) | Other | (Step 10) |
| Design pressure — Positive | Pa (Step 7) | | |

## Example step 4

- Determine Driving Rain Wind Pressure (DRWP)

**4. Water penetration resistance**
(a) Use Table 1 for open terrain or Table 2 for rough terrain.
(b) Using the location DRWP (round up) and the height of the window, door, or unit skylight, determine the $p_r$ value.
(c) Insert the resultant specified DRWP in the summary table in Step 2.

## Example step 4



**Table A.1**
**Climate design data for selected locations in Canada**
(See Clauses 4.1, A.4.1, A.4.2.1, A.4.2.2, and A.4.2.4 and Figure A.1.)

| Location | Column A: Driving rain wind pressure (DRWP), Pa, 1/10 | Column B: Hourly wind pressure (HWP), kPa, 1/50 | Column C: Snow load, kPa, 1/50 — Ground snow load, $S_s$ | Column C: Snow load, kPa, 1/50 — Associated rain load, $S_r$ | Column D: January design temp. (JDT), °C, 2.5% |
|---|---|---|---|---|---|
| **British Columbia** | | | | | |
| Abbotsford | 200 | 0.62 | 2.0 | 0.3 | –10 |

**Table 1**
**Specified DRWP ($p_r$) for open terrain**
(See Clauses 4.2.1 and A.4.2.1 and Figure A.1.)

| | $p_r$, Pa | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/10 DRWP, Pa | | | | | | | | | | | | | | | | | | | |
| Height, m | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 |
| 10 | 49 | 73 | 98 | 122 | 146 | 171 | 195 | 220 | 244 | 268 | 293 | 317 | 342 | 366 | 427 | 488 | 549 | 610 | 671 | 732 | 793 |
| 15 | 53 | 79 | 106 | 132 | 159 | 185 | 212 | 238 | 265 | 291 | 318 | 344 | 370 | 397 | 463 | 529 | 595 | 662 | 728 | 794 | 860 |
| 20 | 56 | 84 | 112 | 140 | 168 | 196 | 224 | 252 | 280 | 308 | 336 | 364 | 392 | 420 | 490 | 561 | 631 | 701 | 771 | 841 | 911 |
| 25 | 59 | 88 | 117 | 147 | 176 | 205 | 234 | 264 | 293 | 322 | 352 | 381 | 410 | 440 | 513 | 586 | 659 | 733 | 806 | 879 | 952 |
| 30 | 61 | 91 | 122 | 152 | 182 | 213 | 243 | 273 | 304 | 334 | 365 | 395 | 426 | 456 | 532 | 608 | 684 | 760 | 836 | 912 | 988 |

## Example step 4

- Add Specified Driving Rain Wind Pressure to Summary

**2. Summary — Required performance levels**
**Note:** *Use the following Steps 3 to 10, as applicable, to complete the summary table.*
Windows, doors, and unit skylights for the location and application shall conform to the criteria as noted in summary table below:

| | | | |
|---|---|---|---|
| Airtightness level | A2 (Step 3) | Design pressure — Negative | _____Pa (Step 8) |
| Specified DRWP | 304 Pa (Step 4) | Specified wind load — Negative | _____kPa (Step 8) |
| Specified wind load — Positive | _____kPa (Step 5) | Condensation resistance | _____ (Step 9) |
| Specified snow load | _____Pa (Step 6) | Other | _____ (Step 10) |
| Design pressure — Positive | _____Pa (Step 7) | | |

## Example step 5

- Determine positive pressure

**5. Positive pressure — Wind load**
(a) Use Table 3 for open terrain or Table 4 for rough terrain.
(b) Using the HWP for the building location (round up) and the height of the window, door, or unit skylight, determine the *p* value.
(c) Insert the resultant specified wind load in the summary table in Step 2.

## Example step 5



**Table A.1**
**Climate design data for selected locations in Canada**
(See Clauses 4.1, A.4.1, A.4.2.1, A.4.2.2, and A.4.2.4 and Figure A.1.)

| Location | Column A: Driving rain wind pressure (DRWP), Pa, 1/10 | Column B: Hourly wind pressure (HWP), kPa, 1/50 | Column C: Snow load, kPa, 1/50 — Ground snow load, $S_s$ | Column C: Snow load, kPa, 1/50 — Associated rain load, $S_r$ | Column D: January design temp. (JDT), °C, 2.5% |
|---|---|---|---|---|---|
| **British Columbia** | | | | | |
| Abbotsford | 200 | 0.62 | 2.0 | 0.3 | –10 |

**Table 3**
**Specified wind load (*p*) for windows, doors, and positive loads on unit skylights — Open terrain**
(See Clauses 4.2.2 and A.4.2.2 and Figure A.1.)

| | *p*, kPa | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/50 Hourly wind pressure, kPa | | | | | | | | | | | | | | | | | | | | |
| Height, m | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.50 | 0.55 | 0.60 | 0.65 | 0.70 | 0.75 | 0.80 | 0.85 | 0.90 | 0.95 | 1.00 | 1.05 | 1.10 | 1.15 | 1.20 | 1.25 |
| 10 | 0.56 | 0.70 | 0.84 | 0.98 | 1.13 | 1.27 | 1.41 | 1.55 | 1.69 | 1.83 | 1.97 | 2.11 | 2.25 | 2.39 | 2.53 | 2.67 | 2.81 | 2.95 | 3.09 | 3.23 | 3.38 | 3.52 |
| 15 | 0.61 | 0.76 | 0.92 | 1.07 | 1.22 | 1.37 | 1.53 | 1.68 | 1.83 | 1.98 | 2.14 | 2.29 | 2.44 | 2.59 | 2.75 | 2.90 | 3.05 | 3.20 | 3.36 | 3.51 | 3.66 | 3.81 |
| 20 | 0.65 | 0.81 | 0.97 | 1.13 | 1.29 | 1.45 | 1.62 | 1.78 | 1.94 | 2.10 | 2.26 | 2.42 | 2.58 | 2.75 | 2.91 | 3.07 | 3.23 | 3.39 | 3.55 | 3.72 | 3.88 | 4.04 |
| 25 | 0.68 | 0.84 | 1.01 | 1.18 | 1.35 | 1.52 | 1.69 | 1.86 | 2.03 | 2.20 | 2.36 | 2.53 | 2.70 | 2.87 | 3.04 | 3.21 | 3.38 | 3.55 | 3.72 | 3.88 | 4.05 | 4.22 |
| 30 | 0.70 | 0.88 | 1.05 | 1.23 | 1.40 | 1.58 | 1.75 | 1.93 | 2.10 | 2.28 | 2.45 | 2.63 | 2.80 | 2.98 | 3.15 | 3.33 | 3.50 | 3.68 | 3.85 | 4.03 | 4.20 | 4.38 |

## Example step 5

- Add Specified wind load to Summary

**2. Summary — Required performance levels**

**Note:** *Use the following Steps 3 to 10, as applicable, to complete the summary table.*
Windows, doors, and unit skylights for the location and application shall conform to the criteria as noted in summary table below:

| | | | |
|---|---|---|---|
| Airtightness level | A2 (Step 3) | Design pressure — Negative | Pa (Step 8) |
| Specified DRWP | 304 Pa (Step 4) | Specified wind load — Negative | kPa (Step 8) |
| Specified wind load — Positive | 2·28 kPa (Step 5) | Condensation resistance | (Step 9) |
| Specified snow load | Pa (Step 6) | Other | (Step 10) |
| Design pressure — Positive | Pa (Step 7) | | |

- Snow load and negative pressure apply only to skylights
- Condensation resistance outside scope of example
- Other: frame material, finish, etc.

## Determine PG and water test pressure

Specified Wind Load = 2·28 kPa

Specified DRWP = 304 Pa

| Performance class and optional performance grade (PG) | | | | Design pressure (DP) | | Structural test pressure (STP) | | Water penetration resistance test pressure | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | R, LC, CW | | AW | |
| R | LC | CW | AW | Pa | (psf) | Pa | (psf) | Pa | (psf) | Pa | (psf) |
| 20 | — | — | — | 960 | (20.00) | 1 440 | (30.00) | 150 | (3.00) | — | — |
| 25 | — | — | — | 1 200 | (25.00) | 1 800 | (37.50) | 180 | (3.75) | — | — |
| 30 | 30 | — | — | 1 440 | (30.00) | 2 160 | (45.00) | 220 | (4.50) | — | — |
| 35 | 35 | 35 | — | 1 680 | (35.00) | 2 520 | (52.50) | 260 | (5.25) | — | — |
| 40 | 40 | 40 | — | 1 920 | (40.00) | 2 880 | (60.00) | 290 | (6.00) | — | — |
| 45 | 45 | 45 | 45 | 2 160 | (45.00) | 3 240 | (67.50) | 330 | (6.75) | 440 | (9.00) |
| 50 | 50 | 50 | 50 | 2 400 | (50.00) | 3 600 | (75.00) | 360 | (7.50) | 480 | (10.00) |
| 55 | 55 | 55 | 55 | 2 640 | (55.00) | 3 960 | (82.50) | 400 | (8.25) | 530 | (11.00) |
| 60 | 60 | 60 | 60 | 2 880 | (60.00) | 4 320 | (90.00) | 440 | (9.00) | 580 | (12.00) |
| 65 | 65 | 65 | 65 | 3 120 | (65.00) | 4 680 | (97.50) | 470 | (9.75) | 630 | (13.00) |
| 70 | 70 | 70 | 70 | 3 360 | (70.00) | 5 040 | (105.00) | 510 | (10.50) | 680 | (14.00) |

But . . . water penetration test pressure cannot be lower than required for PG (it CAN however be higher, which is why it is specified separately from PG!)

## Determine PG and water test pressure

Specified Wind Load = 2·28 kPa

Specified DRWP = 304 Pa

| Performance class and optional performance grade (PG) | | | | Design pressure (DP) | | Structural test pressure (STP) | | Water penetration resistance test pressure | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | R, LC, CW | | AW | |
| R | LC | CW | AW | Pa | (psf) | Pa | (psf) | Pa | (psf) | Pa | (psf) |
| 20 | — | — | — | 960 | (20.00) | 1 440 | (30.00) | 150 | (3.00) | — | — |
| 25 | — | — | — | 1 200 | (25.00) | 1 800 | (37.50) | 180 | (3.75) | — | — |
| 30 | 30 | — | — | 1 440 | (30.00) | 2 160 | (45.00) | 220 | (4.50) | — | — |
| 35 | 35 | 35 | — | 1 680 | (35.00) | 2 520 | (52.50) | 260 | (5.25) | — | — |
| 40 | 40 | 40 | — | 1 920 | (40.00) | 2 880 | (60.00) | 290 | (6.00) | — | — |
| 45 | 45 | 45 | 45 | 2 160 | (45.00) | 3 240 | (67.50) | 330 | (6.75) | 440 | (9.00) |
| 50 | 50 | 50 | 50 | 2 400 | (50.00) | 3 600 | (75.00) | 360 | (7.50) | 480 | (10.00) |
| 55 | 55 | 55 | 55 | 2 640 | (55.00) | 3 960 | (82.50) | 400 | (8.25) | 530 | (11.00) |
| 60 | 60 | 60 | 60 | 2 880 | (60.00) | 4 320 | (90.00) | 440 | (9.00) | 580 | (12.00) |
| 65 | 65 | 65 | 65 | 3 120 | (65.00) | 4 680 | (97.50) | 470 | (9.75) | 630 | (13.00) |
| 70 | 70 | 70 | 70 | 3 360 | (70.00) | 5 040 | (105.00) | 510 | (10.50) | 680 | (14.00) |

Minimum Performance Grade PG50 (PG2400 metric), water test pressure 360 Pa

## Example step 6

- Add Performance Grade and water test pressure to Summary

**2. Summary — Required performance levels**

**Note:** *Use the following Steps 3 to 10, as applicable, to complete the summary table.*

Windows, doors, and unit skylights for the location and application shall conform to the criteria as noted in summary table below:

| | | | |
|---|---|---|---|
| Airtightness level | A2 (Step 3) | Design pressure — Negative | Pa (Step 8) |
| Specified DRWP | 304 Pa (Step 4) | Specified wind load — Negative | kPa (Step 8) |
| Specified wind load — Positive | 2·28 kPa (Step 5) | Condensation resistance | (Step 9) |
| Specified snow load | Pa (Step 6) | Other | (Step 10) |
| Design pressure — Positive | Pa (Step 7) | PG50 (PG2400 metric), water 360 Pa | |

- Snow load and negative pressure apply only to skylights
- Condensation resistance outside scope of example
- Other: optional information specifier may use

## Conclusion: Using the Canadian Supplement

Minimum Performance Grade PG50 (PG2400 metric), water test pressure 360 Pa.

Performance Class is up to designer/specifier for Part 5!
R Class minimum for code compliance for Part 9.

Manufacturer name – series/model of product

**Class __ – PG50: Size Tested 800 x 1500 mm – Type C**
Positive Design Pressure (DP) 2400
Negative Design Pressure (DP) 2400 Pa
Water Penetration Resistance Test Pressure 360 Pa
Canadian Air Infiltration/Exfiltration A2 Level

Tested to AAMA/WDMA/CSA 101/I.S.2/A440-08 and CSA A440S1-09

*Temporary label example*

## Online Calculators

- **Cascadia Windows**
- **QAI**
- **Fenestration Canada**

www.cascadiawindows.com

## CSA A440S1-09 or CSA A440S1-09 Update 1?

- The climatic data in the Canadian Supplement was updated in August 2013.
- However, unfortunately, the BCBC recognizes versions of referenced standards published no later than 30 September 2009.
- Therefore, this more current data is available but not yet authorized by the BC Minister to be used.
- Various new cities have also been added to the updated data.
- There is a pending ministerial order to adopt the more current climatic data.
- The newer climatic data results in lower performance grades and water test pressures in many locations

## Why do the calculators give me different results??!!

- **Cascadia Windows** has options for **Current Climatic Data and Pending Climatic Data**:
  - It uses the **table method**
- **QAI** uses the **Pending Climatic Data**:
  - It uses the **calculation method**
- **Fenestration Canada** uses the **Pending Climatic Data**:
  - It uses the **table method**

www.cascadiawindows.com

## Current Climatic Data vs Pending Climatic Data

**NAFS - 08 - Minimum Performance Grade**

| | CASCADIA 2009 CLIMATIC DATA | | CASCADIA 2013 CLIMATIC DATA | |
|---|---|---|---|---|
| | LESS THAN 10M | | LESS THAN 10M | |
| **LOCATION** | PERFORMANCE CLASS = R | | PERFORMANCE CLASS = R | |
| | *OPEN TERRAIN* | *ROUGH TERRAIN* | *OPEN TERRAIN* | *ROUGH TERRAIN* |
| Abbotsford | PG-40; 290 Pa | PG-30; 220 Pa | PG-30; 260 Pa | PG-20; 180 Pa |
| Burnaby | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-25; 220 Pa |
| Chilliwack | PG-45; 330 Pa | PG-35; 260 Pa | PG-30; 260 Pa | PG-25; 180 Pa |
| Cloverdale | PG-30; 260 Pa | Pg-25; 180 Pa | PG-30; 260 Pa | PG-20; 180 Pa |
| Coquitlam | ND | ND | ND | ND |
| Haney | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Hope | PG-40; 290 Pa | PG-30; 220 Pa | PG-40; 290 Pa | PG-30; 220 Pa |
| Kelowna | PG-30; 220 Pa | PG-25; 180 Pa | PG-25; 180 Pa | PG-20; 150 Pa |
| Ladner | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-25; 220 Pa |
| Langley | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Maple Ridge | ND | ND | ND | ND |
| Mission City | PG-45; 330 Pa | PG-30; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| New Westminster | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| North Vancouver City | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Richmond | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Surrey | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Tofino | PG-45; 440 Pa | PG-30; 330 Pa | PG-45; 440 Pa | PG-30; 330 Pa |
| Vancouver (Granville & 41st) | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Victoria | PG-40; 330 Pa | PG-30; 260 Pa | PG-40; 330 Pa | PG-25; 260 Pa |
| West Vancouver | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-25; 220 Pa |

## Why do the calculators give me different results??!!

**NAFS - 08 - Minimum Performance Grade**

| | CASCADIA 2013 CLIMATIC DATA | | QAI **CSA A44051-09** (Pub July 2013) | | FENESTRATION CANADA **CSA A44051-09** w/update No.1 | |
|---|---|---|---|---|---|---|
| | LESS THAN 10M | | LESS THAN 10M | | LESS THAN 10M | |
| **LOCATION** | PERFORMANCE CLASS = R | | PERFORMANCE CLASS = R | | PERFORMANCE CLASS = R | |
| | *OPEN TERRAIN* | *ROUGH TERRAIN* | *OPEN TERRAIN* | *ROUGH TERRAIN* | *OPEN TERRAIN* | *ROUGH TERRAIN* |
| Abbotsford | PG-30; 260 Pa | PG-20; 180 Pa | PG-30; 260 Pa | PG-20; 180 Pa | PG-30; 260 Pa | PG-20; 180 Pa |
| Burnaby | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-25; 220 Pa |
| Chilliwack | PG-30; 260 Pa | PG-25; 180 Pa | PG-30; 260 Pa | PG-20; 180 Pa | PG-30; 260 Pa | PG-25; 180 Pa |
| Cloverdale | PG-30; 260 Pa | PG-20; 180 Pa | PG-30; 260 Pa | PG-20; 180 Pa | PG-30; 260 Pa | PG-20; 180 Pa |
| Coquitlam | ND | ND | ND | ND | ND | ND |
| Haney | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Hope | PG-40; 290 Pa | PG-30; 220 Pa | PG-40; 290 Pa | PG-30; 220 Pa | PG-40; 290 Pa | PG-30; 220 Pa |
| Kelowna | PG-25; 180 Pa | PG-20; 150 Pa | PG-25; 180 Pa | PG-20; 150 Pa | PG-25; 180 Pa | PG-20; 150 Pa |
| Ladner | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-25; 220 Pa |
| Langley | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Maple Ridge | ND | ND | ND | ND | ND | ND |
| Mission City | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| New Westminster | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| North Vancouver City | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Richmond | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Surrey | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Tofino | PG-45; 440 Pa | PG-30; 330 Pa | PG-40; 440 Pa | PG-30; 330 Pa | PG-45; 440 Pa | PG-30; 330 Pa |
| Vancouver (Granville & 41st) | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa |
| Victoria | PG-40; 330 Pa | PG-25; 260 Pa | PG-35; 330 Pa | PG-25; 260 Pa | PG-40; 330 Pa | PG-25; 260 Pa |
| West Vancouver | PG-30; 290 Pa | PG-25; 220 Pa | PG-30; 290 Pa | PG-20; 220 Pa | PG-30; 290 Pa | PG-25; 220 Pa |

## Hills, Escarpments, and Steep Slopes

- The simplified methods for determining Performance Grades apply to buildings on level ground, having a slope no greater than 10%
- The performance grades in these cases need to be calculated by other means:
  - Using the Part 4 NBC Structural Commentary 1
  - Measuring the height of the building from the bottom of the hill?

## NAFS 08 vs NAFS 11?

- There is an updated version of NAFS (NAFS 11). However, this standard is not referenced in the BCBC.
- There are various moderate differences between the two standards, so they should not be used interchangeably.
- An example of a difference between the two versions of the standard is folding doors. It is exempt in the 2011 version, but classified as a specialty product in the 2008 version.

## Canadian Labeling Requirements

Canadian Supplement section 6.4 requires:

- A permanent label identifying manufacturer
- A temporary label declaring the product's:
  - conformance to NAFS-08 and the Canadian Supplement
  - the primary designator
  - the secondary designator

## Canadian Temporary Label Elements

Window Inc. XXXX Series Window

AAMA/WDMA/CSA 101/I.S.2/A440-08 *and CSA A440S1-09*

**Primary** — Class CW – PG1440: Size Tested 800 x 1500 mm – Type C

**Secondary**

| | |
|---|---|
| Positive Design Pressure (DP) | 2400 Pa |
| Negative Design Pressure (DP) | 2400 Pa |
| Water Penetration Resistance Test Pressure | 360 Pa |
| Canadian Air Infiltration/Exfiltration | A3 Level |

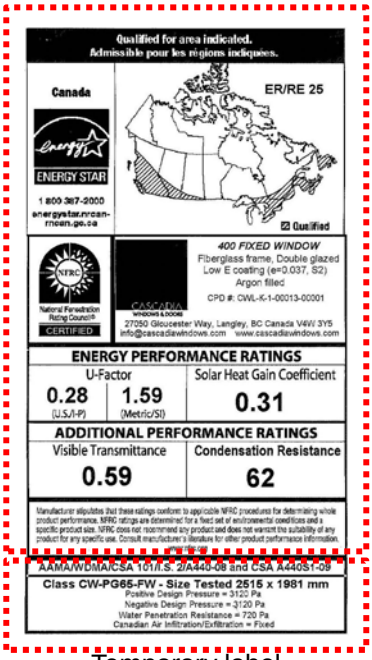
Both primary and secondary designators must appear on Canadian NAFS performance labels

## Various Labeling Formats

- Cascadia self-declared NAFS-08 label example
- Can be combined with NFRC and Energy Star Labeling

CASCADIA WINDOWS LTD.
400 FIXED
NFRC - CWL - K - 1

Permanent label




Temporary label

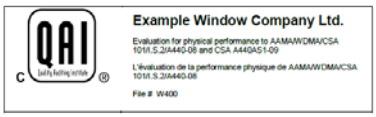
## Sample QAI NAFS-08 label

- Example of Certification Agency Label

AAMA/WDMA/CSA 101/I.S.2/A440-08 and CSA A440AS1-09
Class R – PG1440 (Metric) – Size Tested 800 x 1600mm Type C

| | |
|---|---|
| Positive Design Pressure (DP) | 1440 Pa |
| Negative Design Pressure (DP) | -1440 Pa |
| Water Penetration Resistance Test Pressure | 330 Pa |
| Canadian Air Infiltration/Exfiltration | A3 Level |

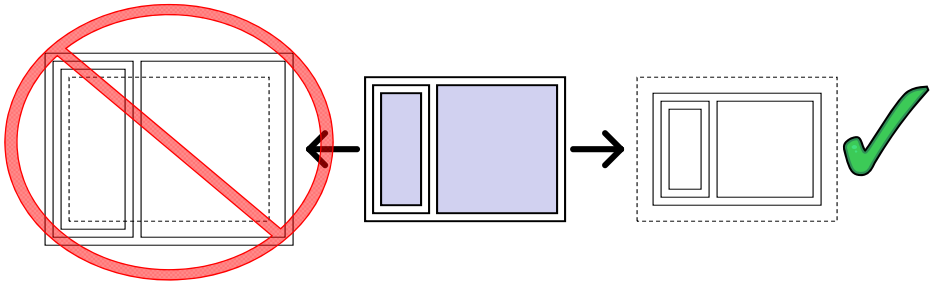
Temporary label




Permanent label

## NAFS-08 labeling of windows

- NAFS and Canadian Supplement **ratings apply only to tested size or smaller**

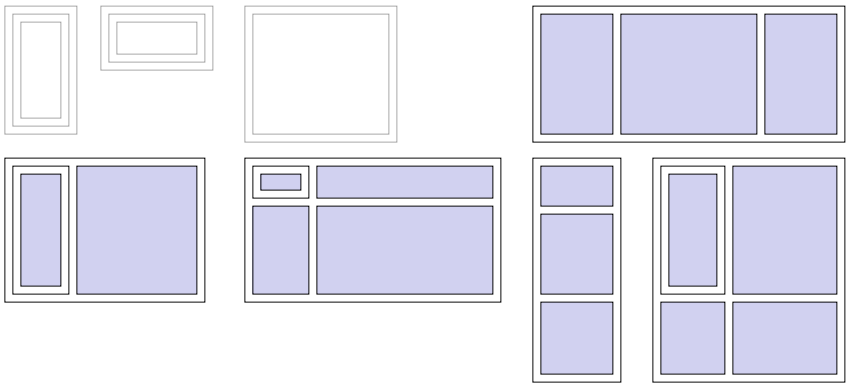


Larger than tested size | Tested size | NAFS-08

Once a product is tested by a third party testing agency, the manufacturer may produce the same product configuration repetitively in smaller sizes and declare its conformance with the testing by self declaring through the process of product labelling.

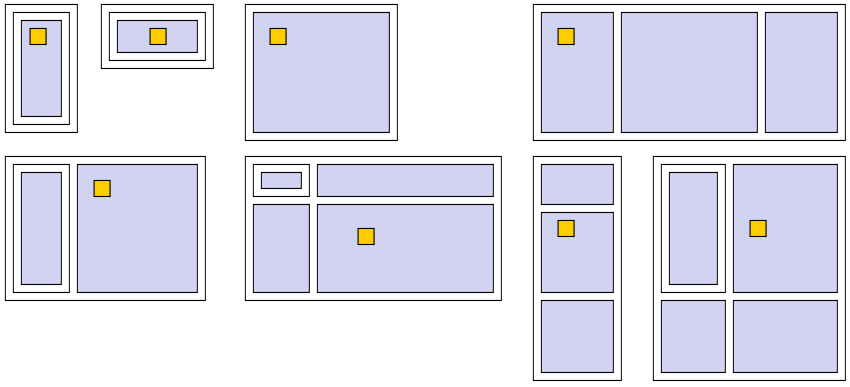
## NAFS-08 and mullions - Composite Units

- **Composite unit**: two or more sashes, leaves, lites, or sliding panels within a single frame and utilizing integral mullions – **must be tested as one unit**



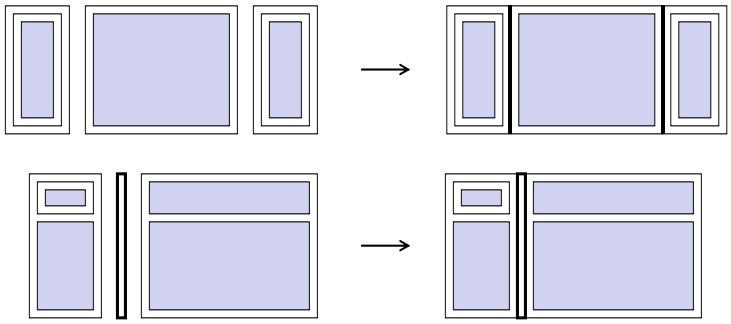
## NAFS-08 vs. CSA A440-00

- NAFS explicitly requires all configurations with mullions to be tested, and only one valid label per product
- “No member may be longer in any dimension than tested”



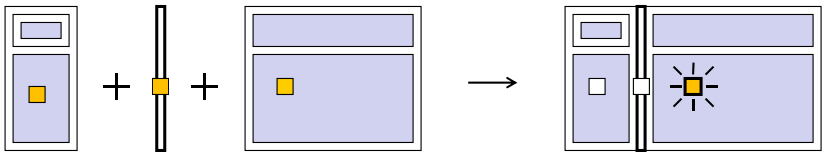
## NAFS-08 and mullions - Combination Assembly

- **Combination assembly**: two or more separate fenestration products joined with mullion or clips
- Can test as an assembly, or each test each component separately.
- Mullion PG ratings may be determined by licensed structural engineer using AAMA 450



## Combination Assembly allows mullion ratings

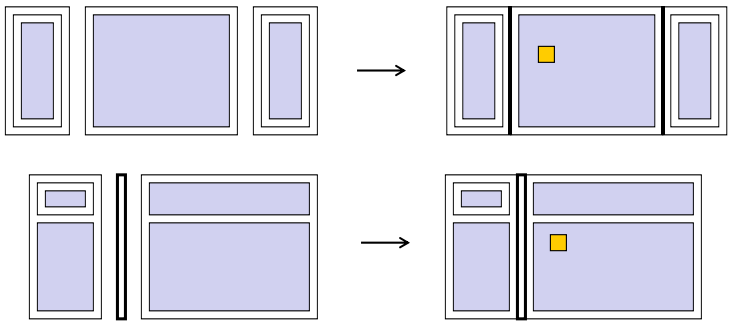
- **When tested as separate components,** can have separate labels for each of the mulled components, including the mullion connector.
- The **Performance Grade of the weakest element is the Performance Grade of the assembly** for code compliance.




**Labels must show air, water and structural performance!**

## NAFS-08 Combination Assembly – in BC

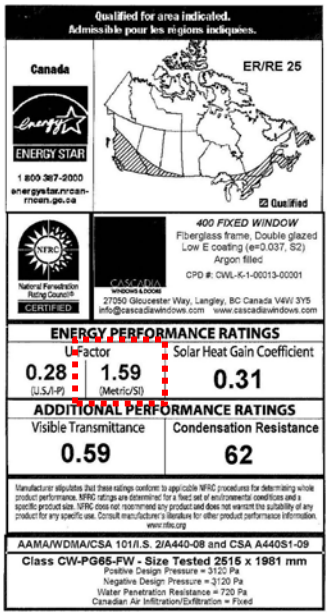
- Local test labs / certification agencies such as Intertek and QAI do not do AAMA 450 mullion ratings
- They test Combination products same as Composite products
- One sticker ok for combination assemblies as long as lowest performance ratings are shown



## BCBC 9.36 Maximum U-value Calculator

- BCBC 9.36 Energy Efficiency – Required Thermal Characteristics of Fenestration and Doors becomes effective December 19th, 2014
- These values are shown on the Cascadia Calculator now as well.

http://www.cascadiawindows.com/nafs



## NAFS Information Resources – Fenestration West

- Guidelines on the Use of CSA A440S1-09
- NAFS Labeling Guidelines
- NAFS Quick Reference Guide
- Rain Exposure Nomograph for BC Municipalities
  - http://www.fen-bc.org/content/view/resources-technicaldocs

## Workshop Time Continued!

- Using the **CSA A440S1-09** Canadian Supplement to determine the appropriate Performance Grade and Water Penetration Resistance Test Pressure.
- Determine the performance requirements for a **9m** high SFD building located in **open terrain** with large casement windows
  - Campbell River
  - West Vancouver
- Confirm:
  - Performance Grade
  - Water resistance test pressure
  - Differences between the climatic data sets

www.cascadiawindows.com