NAFS Labeling and Part 5 Compliance for Commercial Glazing Products — A Guide for Architects

An informational resource from the Fenestration Association of BC

Executive summary

NAFS labeling requirements apply only to factory glazed window, door and skylight products within the scope of the NAFS standard. Most commercial fenestration products are outside the scope of the NAFS standard, and are not subject to a performance labeling requirement. Labeling of site glazed products, even those within the scope of NAFS, is not recognized by certification organizations and is not practiced by the fenestration industry.

To qualify the Part 5 structural, air tightness and water penetration resistance of commercial fenestration products outside the scope of NAFS—and of site-glazed products within the scope of NAFS—construction specifications often rely on measures such as: submittal of pre-existing test reports, post-award mockup testing, jobsite testing, and on the services of specialist registered professionals for project-specific structural design of glass, framing, and product anchoring.

The Revision 8 update to the BCBC (December 2015) now recognizes that testing to NAFS and the Canadian Supplement is one of two compliance paths for structural-air-water performance in both Part 5 and Part 9 of the code, and allows products within the scope of NAFS to utilize either path for compliance.

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Products that can be labeled with NAFS[1] performance ratings

Only factory-glazed, factory-finished products within the scope of the NAFS standard can be expected to have NAFS labels.

Project specifications sometimes call for NAFS performance ratings to be reported on product labels. Architects should be aware that the performance rating labels required by the Canadian Supplement[2] and referred to in the code are no more than a manufacturer's self-declaration of a product's tested performance ratings. There is no requirement in NAFS, in the Canadian Supplement, or in the code, for product performance labels to be verified by an independent entity such as a Standards Council of Canada accredited certification organization.

NAFS labels are the logical way for windows and doors to demonstrate NAFS conformance on small buildings where no architect is involved. They are less useful on larger projects designed and constructed with the participation of an architect or a coordinating registered professional. Given that NAFS labels are no more authoritative than any other form of documentation, it has become customary for fenestration manufacturers to report NAFS ratings on project shop drawings. While product labels are impermanent and are rarely reviewed by architects and project consultants, NAFS ratings on reviewed shop drawings are permanently archived with other contract documents.

The practices of certification organizations do however define the labeling paradigm for the fenestration industry. Certification organizations restrict the application of labels to fully assembled, finished products at specifically approved locations, typically the manufacturing facility.

The application of labels is intended to confirm the conformance of factory finished products with tested performance ratings. Neither manufacturers nor certifiers recognize labeling applied at the jobsite, or the labeling of site glazed products.

Products within the scope of the NAFS standard

The December 2015 Revision 8 of the BCBC was notable in articulating more clearly the code intent to distinguish between two categories of fenestration products. It uses the term "Windows, doors and skylights" to refer to products within the scope of NAFS, and the term "Other glazed products" to refer to products outside the scope of the standard.[3]

Revision 8 also provides two distinct compliance paths that can be followed to demonstrate structural-air-water performance. It is therefore important for specifiers to be clear about products that are within, and outside the scope of the standard.

[1] In this paper, the acronym "NAFS" refers to the 2008 document "AAMA/WDMA/CSA 101/I.S.2/A440-08, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights", or to the 2011 document "AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS 2011—North American Fenestration Standard/Specification for windows, doors and skylights".

[2] In this paper, the term "Canadian Supplement" refers to "CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-08, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights".

[3] 2012 BCBC Rev. 8, A-5.10.2.2.(2).

"Windows, doors and skylights"

Clause 1.1 of the 2008 edition of NAFS states that it applies to "windows, doors, TDDs [tubular daylighting devices], and unit skylights installed into exterior building envelopes". These are the products the code regards as being within the scope of NAFS and the Canadian Supplement, and they include the following product types:

- Fixed and operable windows of many operating modes
- Side hinged doors, dual action "tilt and turn" doors, and terrace doors, (but note excluded door types below)
- Door transoms and sidelights
- Sliding doors
- Unit skylights (single lite, fixed and operable products), tubular daylighting devices (TDDs), and roof windows

For the most part, these products are supplied through the fenestration industry's "residential" supply chain.

"Other glazed products"

A number of fenestration products are specifically excluded from the scope of the standard. The 2008 edition lists the following products as being outside its scope[4]:

> Fenestration products not intended to be tested to this Standard/Specification include:
>
> (a) interior windows and doors;
>
> (b) vehicular-access doors (garage doors) (see ANSI/DASMA 105, ANSI/DASMA 108, ANSI/DASMA 109, ANSI/DASMA 115, or other applicable DASMA Specifications);
>
> (c) sloped glazing (other than unit skylights or roof windows) (see AAMA TIR A7);
>
> (d) curtain wall and storefront (see AAMA MCWM-1);
>
> (e) storm windows and doors (except when incorporated in dual windows and dual doors) (see AAMA 1002.10, AAMA 1003, and AAMA 1102.7);
>
> (f) commercial entrance systems (see AAMA SFM-1);
>
> (g) sunrooms (see AAMA/NPEA/NSA 2100);
>
> (h) revolving doors;
>
> (i) site-built door systems; and
>
> (j) commercial steel doors rated per SDI A250.8.

Many of the products excluded from the standard are what the industry refers to as "commercial" glazing products: sloped glazing systems (multiple-lite skylight systems supported on metal framing), curtain wall systems (site glazed or factory glazed), storefront framing systems, commercial entrances, revolving doors, and "site-built door systems" (which could include balanced doors, center pivot doors,

[4] AAMA/WDMA/CSA 101/I.S.2/A440-08, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights, Clause 1.1, pp. 6–7.

automatic sliding door systems, sliding mall doors, and so on). Because they are outside the scope of the NAFS standard, the suppliers of these products do not test them to NAFS.

To the fenestration industry, the term “products” refers to framing systems purpose-designed for applications such as storefront or curtain wall, and not to the end-use application of these products. An architect can specify that a curtain wall framing system be used to construct individual unit windows, for example. However, the architect cannot assume that the glazing contractor supplying such window frames and glazing them at the jobsite will have prior NAFS testing for any particular curtain wall frame used as a window. Should post-award NAFS testing be desired, the specifications and project schedule must clearly allow for that, and must accept that the outcome will be a test report. There is no precedent in the industry for the site glazed windows to be labeled with tested ratings.

Specialty products

NAFS also allows for the testing of “specialty products” that are not named within the standard, but that are not explicitly excluded from its scope. Products that could legitimately fall into this category include window wall systems, folding (bi-folding) door and window systems, and “lift and slide” doors. One cannot require such products to be prequalified by NAFS testing, but it is legitimate for manufacturers of these products to test them as specialty products under NAFS.[5]

NAFS testing expectations for residential and commercial products

While the distinction between the residential and commercial sectors of the fenestration industry is not explicitly recognized in the code, it is relevant to any discussion related to qualifying fenestration product performance.

The residential product sector supplies factory-finished products primarily to low-rise wood framed residential buildings. Residential products are supplied by manufacturers but are most typically installed by other parties, usually the builder’s forces.

The commercial product sector supplies and installs products primarily to large buildings, and includes both factory-finished and site glazed products. Commercial products are supplied primarily through glazing contractors who supply, fabricate, install and glaze the finished products. Factory-glazed products supplied to large buildings are typically installed under the supervision of the manufacturer and are also considered to belong to the commercial sector.

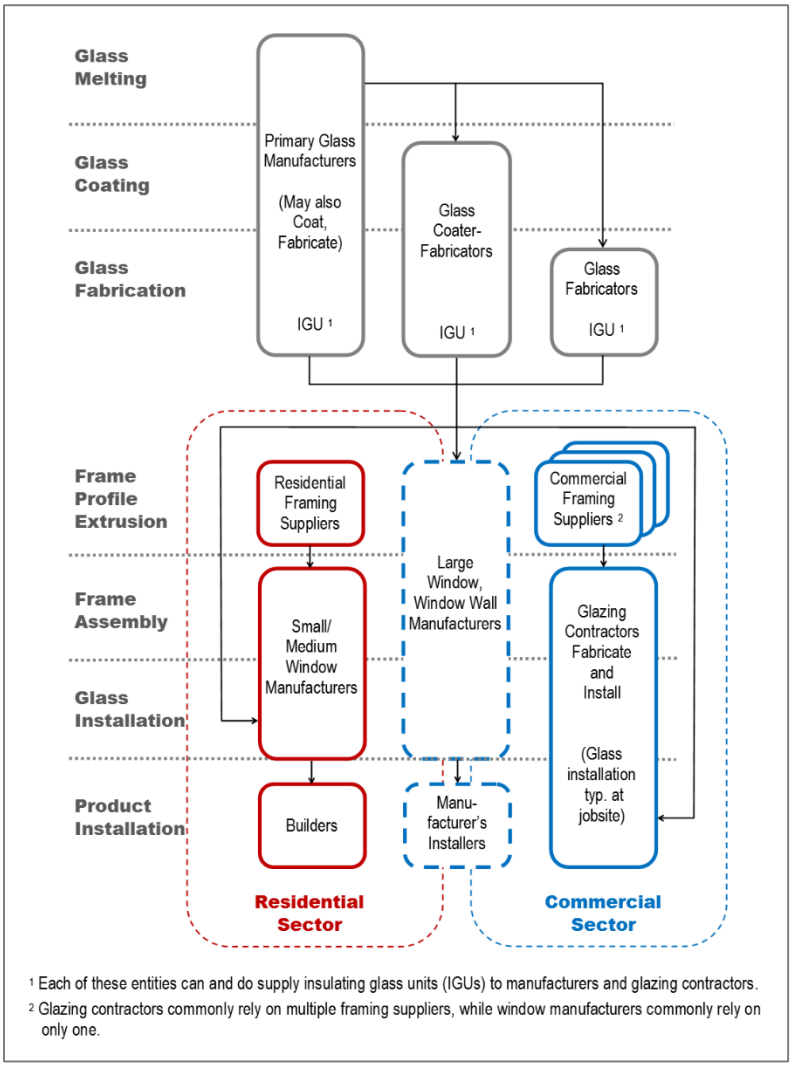
The residential and commercial sectors of the fenestration industry are illustrated in Figure 1. Significant differences between the commercial and residential supply chains are summarized in the table appended to this paper.

Prior to BCBC Revision 8, the code used the term “manufactured and preassembled” to describe window, door and skylight products that are fully assembled at the factory, including the installation of glass. These products are from the residential supply chain. Unlike glazing contractors, manufacturers have complete control over the finished product lines they offer to the market: control over product design, materials, components, insulating glass spacer and edge seals, glazing methods and materials,

[5] Because specialty products do not have defined Performance Class attributes in the standard, their NAFS ratings will exclude any reference to a Performance Class.

available options and product configurations. Manufacturers are therefore in a position to prequalify the performance of finished products by means of testing to an extent not possible for glazing contractors.

Figure 1: Supply Side Fenestration Market Entities



Glazing contractors, on the other hand, rarely possess their own proprietary framing systems. They generally assemble framing systems, glass and hardware components specified by others, and therefore have limited control over the components making up the finished product. Construction specifications, and not the glazing contractor, dictate features such as the framing system, type of hardware, the insulating glass makeup, and, for specific products, even the glazing method to be used. They do not have a product to test until they procure and assemble the specified components.

Glazing contractors rely primarily on their training and experience to assemble specified components with the objective of meeting specified performance objectives, as few framing system suppliers provide glazing contractors with detailed fabrication or glazing instructions. Glazing contractors are not typically in a position to have pretested any given framing system to NAFS or to any other standard. Laboratory

test results for commercial framing systems, when available, are limited in scope, are performed by framing system suppliers, and do not represent the finished work of any particular glazing contractor.

Two compliance paths for Part 5 Structural-Air-Water requirements

In addition to distinguishing between the terms “Windows, doors and skylights” (products within the scope of NAFS) and “Other glazed products” (products outside the scope of NAFS), the December 2015 Revision 8 of the BCBC provides two distinct compliance paths for structural-air-water performance requirements[6]. These are set forth in Article 5.10.2.2, Design and Construction:

5.10.2.2.(1)(a) Design and construction in accordance with Subsection 5.1.4 (Resistance to Loads and Deterioration), Section 5.4 (Air Leakage), and Section 5.6 (Precipitation)

5.10.2.2.(1)(b) Design and construction to NAFS and the Canadian Supplement

It is notable that “other glazing products” must comply with path 5.10.2.2.(1)(a), while either path may be used for products in the scope of NAFS.

The Part 5 responsibility to “design and construct” refers to the obligation of building designers to specify building-specific design performance requirements, to select appropriate product types, to design the interface between products and the building enclosure, and to take all necessary measures to ensure the installed fenestration products provide an effective barrier to air infiltration, water penetration, and are able to resist all structural loads and the effects of those loads. In the course of doing so they may rely on some evidence of prior lab testing to qualify the air tightness, water penetration resistance and structural performance of the specified products, and may supplement that with post-award mockup testing, jobsite testing, and field review. Whatever pre-award or post-award testing is deemed necessary, in British Columbia it is also customary to require the fenestration supplier to engage a registered professional to design the glass, framing and anchorage of the fenestration systems to resist all applicable code loads.

For fenestration products within the scope of NAFS, the code permits building designers to rely on testing to NAFS and the Canadian Supplement alone to qualify the structural-air-water performance attributes. It should be noted, however, that NAFS testing specifically excludes the installation joint between the product and the wall, does not test the anchoring of the product to the building structure[7], and does not qualify the wind load resistance of the glass, which must be designed to the applicable standard to suit project conditions.[8] In practice, in British Columbia, qualifying products within the scope of NAFS is essentially the same as qualifying products outside the scope of NAFS, in that only the lab testing standards differ.

The same two compliance paths are available under Part 9. In BCBC Revision 8, Subsection 9.7.4 is also titled Design and Construction, and allows windows, doors, and skylights to conform to either NAFS and the Canadian Supplement, or to “Part 5”. There is no longer any formal distinction between products within or outside the scope of NAFS, as products outside the scope of NAFS, or any product for which there is no NAFS testing, as in the case of a custom-built or an imported product, may follow the 5.10.2.2.(1)(a) compliance path. And for products within the scope of NAFS, buildings up to 10 m in

[6] 2012 BCBC Rev. 8, 5.10.2.2.(1) and A-5.10.2.2.(1).
[7] AAMA/WDMA/CSA 101/I.S.2/A440-08, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights, Clause 5.2.5, p. 47.
[8] Ibid, Clause 6.2, p. 77.

height may conform to the design pressure, performance grade and water resistance values in Table C-4 of Appendix C instead of the higher values calculated using the Canadian Supplement.

Conclusion

The introduction of NAFS has not fundamentally changed the process of qualifying the structural-air-water performance of fenestration products. For the fenestration products within its scope, it merely provides a different standard for testing structural-air-water performance attributes than was the case under the 2006 BCBC. For the commercial fenestration products outside the scope of the NAFS standard, we continue to specify structural-air-water performance as we did before.

Fenestration product manufacturers are able to qualify the performance of a substantial proportion of their factory glazed product offerings by means of NAFS testing and labeling, though it is unlikely that any manufacturer is able to qualify all possible product configurations on this basis. This is why the code permits the use of “Part 5” as an alternative to NAFS: to allow professional judgment to be used when building designs have product configurations not previously tested. In practice this is addressed through the requirement that all project configurations be addressed on shop drawings submitted under seal of a registered professional, and by limited jobsite testing for water penetration supplemented with field review.

This is not the case for site glazed commercial products, most of which are outside the scope of the NAFS standard. While framing system suppliers advertise NAFS Performance Class and Performance Grade ratings for commercial products within the scope of NAFS—such as windows, sliding and swing doors, and terrace doors—glazing contractors supplying these products do not ordinarily have access to those test reports or to detailed fabrication instructions, and cannot be expected to supply NAFS-tested or NAFS-labeled products unless those products are supplied to the jobsite fully fabricated by the NAFS-testing manufacturer.

When evidence of NAFS or other laboratory testing is required for commercial fenestration products outside the scope of the standard, or for imported products not tested to NAFS and the Canadian Supplement, specifications must clearly describe the post-award testing requirements, including the specific configuration(s) and sizes that are to be tested.

While product labeling is the preferred way to report the tested performance attributes of factory glazed windows, doors and skylights on one and two family dwellings, for all other buildings there is no reason for specifiers to prefer labeling over other forms of documentation, such as reporting NAFS ratings on fenestration product shop drawings.

Performance Qualification of Commercial and Residential Fenestration Products

Attribute	Commercial glazing contractor	Residential product manufacturer
Who determines product attributes that affect installed product performance?	Specifiers select and specify the framing system, glass options, finishes, and often the components, such as hardware, glass makeup, and, only where the framing system allows, the glazing method.	Manufacturer has control over every aspect of product design: materials, components, hardware, available finishes, and glass options. Specifiers select from available options, but do not dictate the product design.
Who "owns" the product line?	Framing system suppliers own the framing product lines only. All other components of the finished products are specified by others. Few glazing contractors have own proprietary product lines.	Manufacturer has control over the framing systems and all product options it offers for sale. Specifiers have no say over components that could affect NAFS or energy performance.
Where is the product manufactured?	Glazing contractors fabricate frames in shop and glaze products on site. Exception: unitized curtain wall products are shop glazed.	Manufacturers fabricate and glaze products in shop.
Extent of pre-award testing	None by the glazing contractor unless supplying own system. Limited or no pre-existing testing available from framing suppliers.	Manufacturers pretest many product configurations, typically to NAFS.
Who determines the extent of post-award testing?	The architect. The extent of post-award testing must be indicated in project specifications.	
Labeling of pretested performance attributes	None. No labeling requirements exist for products outside scope of NAFS. No precedent to label site glazed products in scope of NAFS.	Common for one and two family homes. Other measures (site labels, shop drawings) commonly used for large buildings.