

***AAMA/WDMA/CSA
101/I.S.2/A440-11***

**NAFS – North American Fenestration
Standard/Specification for windows, doors, and
skylights**

EXCERPT EDITION

**Preface, General Requirements, Gateway
Requirements, Performance Grades, Product
Designations, Primary Designator, Product Types,
and Gateway Performance Requirements**



Note: Excerpt Editions do not reflect Updates that were issued after the initial publication of the Standard/Specification. Updates may be obtained from the Publication Store on our website (www.aamanet.org).

Preface

This is the third edition of AAMA/WDMA/CSA 101/I.S.2/A440, NAFS — *North American Fenestration Standard/Specification for windows, doors, and skylights*. It supersedes the previous edition, published in 2008 under the same title and published in 2005 under the title *Standard/Specification for windows, doors, and unit skylights*. It is jointly published by the American Architectural Manufacturers Association (AAMA), the Window & Door Manufacturers Association (WDMA), and the Canadian Standards Association (CSA).

The following significant changes from the previous edition of this Standard/Specification have been made:

- (a) A thorough restructuring of the Standard/Specification, with separate sections for products and materials and components;
- (b) Reorganized mullion provisions, with new ratings and designations;
- (c) Addition of parallel opening windows;
- (d) Expansion of TDD products to include closed ceiling and open ceiling options;
- (e) Updated tables; and
- (f) Addition of criteria for Secondary Storm Products (SSP) throughout the document

0.2.1 General

This Standard/Specification defines requirements for four Performance Classes. The Performance Classes are designated R, LC, CW, and AW for windows, doors, and secondary storm products (SSPs). Skylights, roof windows, and TDDs are not identified with a Performance Class, but are treated in a way similar to specialty products. This classification system provides for several levels of performance. It is important to note that although general suggestions for use are specified in Items (a) to (d), product selection is always based on the performance requirements of the particular project and not solely on these suggestions. The Performance Class ratings should be regarded as an indication of the level of performance, with the least stringent requirements established for the R Performance Class and the most stringent for the AW Performance Class. The following descriptions can be used as a general guide in helping to determine which class is likely best suited for a particular application:

- (a) R: commonly used in one- and two-family dwellings.
- (b) LC: commonly used in low-rise and mid-rise multi-family dwellings and other buildings where larger sizes and higher loading requirements are expected.
- (c) CW: commonly used in low-rise and mid-rise buildings where larger sizes, higher loading requirements, limits on deflection, and heavy use are expected.
- (d) AW: commonly used in high-rise and mid-rise buildings to meet increased loading requirements and limits on deflection, and in buildings where frequent and extreme use of the fenestration products is expected.

4 General requirements

4.1 General

This voluntary Standard/Specification covers requirements for primary and dual windows, primary and dual side-hinged door systems, sliding doors, secondary storm products (SSPs), tubular daylighting devices (TDDs), roof windows, and unit skylights for new construction and replacement applications. All products rated in accordance with this Standard/Specification shall conform to all the applicable requirements of this Standard/Specification. All products covered by this Standard/Specification shall be installed in full accordance with the manufacturer's documented instructions. Process control requirements, component interchangeability, and requirements for retesting to this Standard/Specification shall be addressed by independent certification programs.

4.2 Gateway performance requirements

Each product type has a defined "gateway" set of primary requirements for the applicable product type

(see Table 12.2). Gateway performance requirements are the minimum allowable performance levels that a gateway test specimen shall achieve. Once achieved, a product will be rated with the applicable Performance Class (R, LC, CW, or AW), except for roof windows, unit skylights, and TDDs. The gateway test specimen size shall be equal to or larger than the specified minimum test size, in both height and width, as specified in Table 12.2, unless the product is being qualified for Performance Class R in accordance with Clause 5.3.3. Typically, the minimum allowable performance levels and the gateway size change as the Performance Class changes. All gateway test specimens shall achieve certain minimum Performance Grades (PG) with corresponding performance levels for air leakage resistance, water penetration resistance, uniform load resistance, and, where required, forced-entry resistance and operating force. Also, all gateway test specimens shall achieve certain additional minimum performance levels for auxiliary (durability) and material tests specific to the product operator type. See Clause 9 for additional details. For additional details related to roof windows, unit skylights, and TDDs, see Clause 8.

TABLE 1 - GATEWAY REQUIREMENTS

Performance Class	Minimum Performance Grade (PG)	Minimum design pressure (DP)		Minimum structural test pressure (STP)		Minimum water penetration resistance test pressure	
		Pa	(~psf)	Pa	(~psf)	Pa	(~psf)
R	15	720	(15.04)	1080	(22.56)	140	(2.92)
LC	25	1200	(25.06)	1800	(37.59)	180	(3.76)
CW	30	1440	(30.08)	2160	(45.11)	220	(4.59)
AW	40	1920	(40.10)	2880	(60.15)	390	(8.15)

Note: The IP equivalents identified are for approximate reference only and do not in any way imply accuracy of the measurement or the equipment. See Clause 1.3. Precision and bias statements are provided in the applicable test methods referenced in this Standard/Specification.

Product type	Minimum Performance Grade (PG)	Minimum design pressure (DP)		Minimum structural test pressure (STP) (+200% / -150%)		Minimum water penetration resistance test pressure	
		Pa	(~psf)	Pa	(~psf)	Pa	(~psf)
TDDs, roof windows, and skylights	30	1440	(30.08)	+2880	(+60.15)	220	(4.59)
				(-2160)	(-45.11)		

Note: The IP equivalents identified are for approximate reference only and do not in any way imply accuracy of the measurement or the equipment. See Clause 1.3. Precision and bias statements are provided in the applicable test methods referenced in this Standard/Specification.

4.3 Performance Grades (PG)

4.3.1 Assignment of Performance Grade (PG)

Performance Grade (PG) shall be achieved only upon successful completion of all applicable tests specified in Clause 9.

4.4 Product designations

4.4.2 Primary designator

4.4.2.1 General

The primary designator in this Standard/Specification is a three- or four-part code, which includes Performance Class, Performance Grade (PG), maximum size tested to achieve this rating, and (optionally) product type. When used, the product type shall be presented in full or represented by abbreviations as shown in Figures 4.1, 4.2, 6.1, 6.2, 7.1, and 8.1. The abbreviations shall be as indicated in Table 4.1.

Primary designators shall only be permitted in the format indicated in the following examples.

<p>Casement Window:</p> <p>Class R — PG25: Size tested 760 × 1520 mm (~30 × 60 in)</p> <p>Class R — PG25: Size tested 29.9 × 59.8 in</p> <p>Class R — PG1200 (SI): Size tested 760 × 1520 mm</p> <p>For all designators, there is an option to add the product type at the end of the designator at the manufacturer's discretion.</p> <p>Examples:</p> <p>Class R — PG25: Size tested 760 × 1520 mm (~30 × 60 in) — Casement</p> <p>or</p> <p>Class R — PG25: Size tested 760 × 1520 mm (~30 × 60 in) — Type C</p>
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Legend:

Class R	— Performance Class (see Clauses 0.2.1 and 4.4.2.3)
PG25	— Performance Grade (PG) (IP) (see Clauses 0.2.3 and 4.4.2.4)
PG1200 (SI)	— Performance Grade (PG) (SI) (see Clauses 0.2.3 and 4.4.2.4)
Size tested 760 × 1520 mm	— maximum size tested (SI) (see Clause 4.4.2.5)
Size tested 29.92 × 59.84 in	— maximum size tested (IP) (see Clause 4.4.2.5)
Casement or Type C	— product type (see Clause 4.4.2.2)

Figure 4.1

Primary designator (Example 1)

(See Clause 4.4.2.1.)

An asterisk (*) added to the primary designator indicates that the tested specimen size was smaller, in either width or height, than the gateway test size specified in Table 12.2 for the product type and Performance Class. An asterisk shall be added to the primary designator when a smaller specimen was tested to achieve an optional Performance Grade (PG) as specified in Clause 4.3.2 or the alternative minimum test size option was used as specified in Clause 5.3.3. An example of asterisk use is shown in Figure 4.2.

4.4.2.2 Product type

Product type designations shall be as specified in Table 4.1 for the window, door, SSP, TDD, roof window, and unit skylight product types covered in this Standard/Specification. The depictions in Figure 4.3 are general in nature and are not all-inclusive.

Table 4.1
Product types

(See Clauses 4.4.2.1, 4.4.2.2, 12.1, and 12.3.2.)

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

4.4.2.3 Performance class

Window and door products included in this Standard/Specification shall be classified according to one or more of the four Performance Classes (R, LC, CW, and AW) as described in Clause 0.2.1 and Table 8.5. A single product may qualify for multiple Performance Classes provided that all requirements are met for each Performance Class.

Product type	Product designation	Minimum test size		Minimum design pressure (DP)		Deflection at design pressure (DP)	Minimum structural pressure (STP)		Minimum water pressure		Air leakage resistance			
		mm	(~in)	Pa	(~psf)		Pa	(~psf)	Pa	(~psf)	Pa	(~psf)	L/s•m ²	(~cfm/ft ²)
Architectural terrace door	Class AW-PG40-ATD	1200 x 2430	47.24 x 95.67	1920	40.10	L/175	2880	60.15	390	8.15	300	6.27	0.5	0.10
Awning, hopper, projected window	Class R-PG15-AP	1200 x 400	47.24 x 15.75	720	15.04	Reported	1080	22.56	140	2.92	75	1.57	1.5	0.30
	Class LC-PG25-AP	1200 x 800	47.24 x 31.50	1200	25.06	Reported	1800	37.59	180	3.76	75	1.57	1.5	0.30
	Class CW-PG30-AP	1200 x 800	47.24 x 31.50	1440	30.08	L/175	2160	45.11	220	4.59	75	1.57	1.5	0.30
	Class AW-PG40-AP	1500 x 900	59.06 x 35.43	1920	40.10	L/175	2880	60.15	390	8.15	300	6.27	0.5	0.10
Basement window	Class R-PG15-BW	800 x 360	31.50 x 14.17	720	15.04	Reported	1080	22.56	140	2.92	75	1.57	1.5	0.30
Casement window	Class R-PG15-C	600 x 1500	23.62 x 59.06	720	15.04	Reported	1080	22.56	140	2.92	75	1.57	1.5	0.30
	Class LC-PG25-C	800 x 1500	31.50 x 59.06	1200	25.06	Reported	1800	37.59	180	3.76	75	1.57	1.5	0.30
	Class CW-PG30-C	800 x 1500	31.50 x 59.06	1440	30.08	L/175	2160	45.11	220	4.59	75	1.57	1.5	0.30
	Class AW-PG40-C	900 x 1500	35.43 x 59.06	1920	40.10	L/175	2880	60.15	390	8.15	300	6.27	0.5	0.10
Dual-action side-hinged door	Class R-PG15-DASHD	900 x 2000	35.43 x 78.74	720	15.04	Reported	1080	22.56	140	2.92	75	1.57	1.5	0.30
	Class LC-PG25-DASHD	900 x 2100	35.43 x 82.68	1200	25.06	Reported	1800	37.59	180	3.76	75	1.57	1.5	0.30
	Class CW-PG30-DASHD	1000 x 2100	39.37 x 82.68	1440	30.08	L/175	2160	45.11	220	4.59	75	1.57	1.5	0.30
Dual-action window	Class R-PG15-DAW	1100 x 1500	43.31 x 59.06	720	15.04	Reported	1080	22.56	140	2.92	75	1.57	1.5	0.30
	Class LC-PG25-DAW	1200 x 1500	47.24 x 59.06	1200	25.06	Reported	1800	37.59	180	3.76	75	1.57	1.5	0.30
	Class CW-PG30-DAW	1200 x 1800	47.24 x 70.87	1440	30.08	L/175	2160	45.11	220	4.59	75	1.57	1.5	0.30
	Class AW-PG40-DAW	1500 x 2500	59.06 x 98.43	1920	40.10	L/175	2880	60.15	390	8.15	300	6.27	0.5	0.10

Product type	Product designation	Operating force test 9.3.1	Force to latch test (for latch) 6.4.5.1	Force to engage test (for deadbolt) 6.4.5.2	Forced-entry resistance test - 9.3.5	Thermoplastic corner weld test - 9.3.6.2	Deglazing test 9.3.6.3	Sash/leaf torsion test - 7.3.4.2	Sash vertical deflection test 9.3.6.4.2	Sash/leaf concentrated load test on latch rail- 9.3.6.4.3	Vertical concentrated load test - 7.3.4.3	Vert. concentrated load test on interm. frame rails - 7.3.4.4	Sash and hardware load test – 9.3.6.5.2	Stabilizing arm load test - 9.3.6.5.3	Hold-open arm/stay bar test - 7.3.4.5	Hinge test 9.3.6.5.4	Awning, hopper, projected hardware load test - 9.3.6.5.5	Safety drop test 5.3.6	Unit dead load test 5.3.7	Life cycle testing 7.3.5	Operation/cycling-slam test performance - 6.4.7 and 7.3.6	Vertical loading resistance - 6.4.8
Architectural terrace door	Class AW-PG40-ATD		X	X	X	X														X	X	X
Awning, hopper, projected window	Class R-PG15-AP	X			X	X											X					
	Class LC-PG25-AP	X			X	X											X					
	Class CW-PG30-AP	X			X	X											X					
	Class AW-PG40-AP	X			X	X		X		X		X								X		
Basement window	Class R-PG15-BW				X	X																
Casement window	Class R-PG15-C	X			X	X			X				X									
	Class LC-PG25-C	X			X	X			X				X									
	Class CW-PG30-C	X			X	X			X				X									
	Class AW-PG40-C	X			X	X		X	X				X							X		
Dual-action side-hinged door	Class R-PG15-DASHD		X	X	X	X				X				X							X	X
	Class LC-PG25- DASHD		X	X	X	X				X				X							X	X
	Class CW-PG30- DASHD		X	X	X	X				X				X								

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