

# NATIONAL BUILDING CODE REFERENCES – WINDOWS AND SKYLIGHTS

(For NBC References for Glass Doors and Sidelights see Nov. 2006 Newsletter)

Information contained below is provided by Hollander to answer some of the most frequently asked questions from our customers regarding building standards for architectural glass applications for glass windows and skylights. For your convenience, we have researched and summarized and referenced some of the relevant Ontario Building Code Guidelines, which are based, in large measure, on the National Building Code of Canada, and therefore are similar to the guidelines for other provinces across Canada.

This material should be used as a general guide for planning purposes only and the application and installation of glass should be based on the National Standards of Canada, published by the Canadian General Standards Board (CGSB).

Of particular relevance to the glass business of our customers are the standards referenced below which can be purchased from CGSB PUBLICATIONS by telephone (819) 956-0425 or (800) 665-CGSB (2274), Canada only; or through the website: <http://www.pwgsc.gc.ca/cgsb>

The following material is taken from the publication *Ontario Building Code and Supplementary Guidelines*, June 30, 2005 (the “Building Code”) which provides a consolidated version of the 1997 Ontario Building Code which became effective April 6, 1998 and contains amendments made through June 22, 2005.

## Part 9 Housing and Small Buildings Section 9.7 Windows and Skylights

(See also Sections 9.10. and 9.32. of the Building Code for fire protection and ventilation.)

### 9.7.3.1. Glass Standards

- (1) Glass shall conform to the following standards which may be purchased as separate reference documents:
- (a) CAN/CGSB-12.1-M, “Tempered or Laminated Safety Glass”,
  - (b) CAN/CGSB-12.2-M, “Flat, Clear Sheet Glass”,
  - (c) CAN/CGSB-12.3-M, “Flat, Clear Float Glass”,
  - (d) CAN/CGSB-12.4-M, “Heat-Absorbing Glass”,
  - (e) CAN/CGSB-12.8-M, “Insulating Glass Units”,
  - (f) CAN/CGSB-12.10, “Glass, Light and Heat/Reflecting”,
  - (g) CAN/CGSB-12.11-M, “Wired Safety Glass”,
  - (h) CAN/CGSB-12.20-M, “Structural Design of Glass for Buildings”, or
  - (i) CAN/CGSB-63.14-M, “Plastic Skylights” (also applies to Glass Skylights).

### 9.7.3.2 Structural Design of Glass

(1) Glass in windows, sloped glazing and skylights shall be designed in conformance with standard CAN/CGSB-12.20-M, “Structural Design of Glass for Buildings”.

**A-9.7.3.2.(1) Maximum Glass Area.** Table A-9.7.3.2.A may be used to select glass thickness in areas for which the 1-in-10 wind pressure is less than 0.40 kPa for windows subject to the following restrictions:

- The building has essentially uniform distribution of openings, i.e., no large opening, such as a loading door.
- The building height is 12 m (39 ft 4 in) or less from grade to the uppermost roof.

The building is not in an exposed location such as a hilltop or the shore of a large body of water. This table is based on Standard CAN/CGSB-12.20-M. In many cases, glass design based on this table will be conservative due to conservative assumptions on which the table is based. More exact design using the Standard directly could result in reduced glass thickness.

**Table A-9.7.3.2.A.**

**Maximum Glass Area for Windows in Areas for which the 1-in-10 Wind Pressure (Q10)<sup>(1)</sup> is less than 0.40 kPa<sup>(2)</sup>**

Type of Glass	Maximum Glass Area, m <sup>2</sup> Glass Thickness, mm							
	2.5	3	4	5	6	8	10	12
Annealed	0.67	1.09	1.65	2.25	3.09	4.91	6.78	9.87
Factory-sealed IG units	1.20	1.98	2.97	4.05	5.56	8.04	10.06	13.96
Heat Strengthened or tempered	1.47	2.08	2.73	3.34	4.13	5.69	7.12	9.87
Wired	0.31	0.49	0.76	1.04	1.44	2.26	3.13	5.00

**Note (1):** The maximum hourly wind pressure with one chance in ten of being exceeded in any one year.

**Note (2):** Meteorologists in Canada use kilopascals (kPa) to measure atmospheric pressure. One kilopascal corresponds to about 1% of atmospheric pressure (pressure near sea level). Standard atmospheric pressure is 101.325 kPa. For wind pressure, pressure is measured not as an absolute pressure, but relative to atmospheric pressure. Wind pressure is the pressure produced by the wind on an object in its path. It is proportional to the square of the wind speed.

(For more complete information, see tables in Appendix A of the Building Code which present maximum area for each of 8 glass thicknesses for four types of glass – Annealed; Factory-sealed IG units; Heat strengthened or tempered; and Wired – for three ranges of wind pressures: less than 0.40 kPa, less than 0.60 kPa, and less than 0.80 kPa.)

## Subsection 9.7.7. Skylights

### 9.7.7.2. Glass Skylights

(1) Factory-built glass skylights shall meet the performance requirements of standard CAN/CGSB-63.14-M, “Plastic Skylights”.

## Subsection 9.7.7. Skylights

### 9.7.7.2. Glass Skylights

(1) Factory-built glass skylights shall meet the performance requirements of national standard CAN/CGSB-63.14-M89, “Plastic Skylights”.

The following material is selected from national standard CAN/CGSB-63.14-M89, “Plastic Skylights” (also applies to glass skylights).

#### 1. SCOPE

**1.1** This national standard applies to plastic skylights intended for use on buildings. Also applies to glass skylights.

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### 3. TERMINOLOGY

**3.1 Skylights** – Skylights are constructed essentially of two components, as follows:

- (a) Plastic glazing materials to provide natural light transmission. Also applies to glass.
- (b) A frame to hold the glazing material and to provide means for mounting the skylight unit.

### 4. CLASSIFICATION

4.1 Skylights shall be supplied in the following types and classes.

#### 4.1.1 Types Formed for Flat Glazing

(Note: Skylights with any flat glazing shall be used on minimum 10° slope only.)

- Type 1 – Single glazed
- Type 2 – Double glazed
- Type 3 – Triple glazed.

#### 4.1.2 Classes

- Class A – Aluminum frame
- Class B – Vinyl covered aluminum frame
- Class C – Rigid vinyl frame
- Class D – Combination aluminum vinyl frame.

### 6. DETAILED REQUIREMENTS

#### 6.1 Glazing

**6.1.3 Thickness** – The glazing material used in skylights shall have a thickness adequate to meet the performance requirements specified in para. 6.6.

**6.3 Assembly** – A thermal break shall be an integral feature of Type 2 and Type 3 skylights.

#### 6.6 Performance Requirements

**6.6.3 Uniform Structural Load** – The skylight unit, when tested at a pressure of 2kPa in accordance with the procedure described in para. 7.2.5, shall show no permanent deformation of any frame members nor any breakage of glazing material. Glazing material shall remain firmly in place. The National Building Code of Canada should be consulted for the calculation of design pressures when specific site conditions are known.

**6.6.4 Snow Load** – The skylight unit shall show no permanent deformation of any frame members nor any breakage of glazing material when a uniform test pressure of 2kPa is applied to the outer glazing layer in accordance with the test procedure described in para. 7.2.6.

**6.6.6 Thermal Performance** – For skylights of Types 2 and 3, Classes A, B and D, the calculated temperature difference when tested in accordance with para. 7.2.7 shall not exceed 8°C.

### 7. INSPECTION

#### 7.2 Testing

(Testing procedures are very detailed and are beyond the scope of this Newsletter. For detailed procedures referred to in subsection 6.6, see national standard document CAN/CGSB-63.14-M89 “Plastic Skylights” (also applies to glass skylights) paras. 7.25, 7.26 and 7.27.)