

FAQ*: Window Design

Question: I want to install windows in a new home. What specs. does the window have to meet?

Answer:

- Each window must meet certain criteria with respect to energy conservation and wind loading and if the new home is in a 110 mph region and within one mile of coastal mean high water then additional wind borne debris requirements apply as well.
- With respect to energy conservation and per **IECC 2006****, the window must have a U factor that does not exceed .35 BTU/(hr x ft² x °F) if compliance to the code is met by using this table for the entire new home. The other approach is to use REScheck which allows some give and take between various components of the building envelope.
- With respect to wind loading the DP for the window must be determined. All windows that are sold in MA contain a listing of its U-factor and DP. To determine the DP for each window in the new home you may use the following slides as a guide.

*Answers to FAQs are opinions of the BBRS Staff and do not reflect official positions or code interpretations of the BBRS

****This change made on 2-3-09 to reflect the new energy requirements.**

Window Design Pressure (DP)

- Step 1:
Determine
Wind
Speed from
Figure
5301.2(4)

780053a.pdf - Adobe Reader

File Edit View Document Tools Window Help

780 CMR: STATE BOARD OF BUILDING REGULATIONS AND STANDARDS
BUILDING PLANNING FOR SINGLE- AND TWO-FAMILY DWELLINGS

TABLE 5301.2(4)
MASSACHUSETTS BASIC WIND SPEEDS

CITIES AND TOWNS HAVING A BASIC WIND SPEED OF 90 MPH		
Adams	Lanesborough	Richmond
Alford	Lee	Sandisfield
Becket	Lenox	Savoy
Cheshire	Monterey	Sheffield
Clarksburg	Mount Washington	Stockbridge
Dalton	New Ashford	Tyringham
Egremont	New Marlborough	Washington
Florida	North Adams	West Stockbridge
Great Barrington	Otis	Williamstown
Hancock	Peru	Windsor
Hinsdale	Pittsfield	

CITIES AND TOWNS HAVING A BASIC WIND SPEED OF 100 MPH		
Acton	Groton	Philipston
Agawam	Hadley	Plainfield
Amherst	Hampden	Plainville
Ashburnham	Hardwick	Princeton
Ashby	Harvard	Rowe
Ashfield	Hatfield	Royalston
Ashland	Hawley	Russell
Athol	Heath	Rutland
Auburn	Holden	Sharon
Avon	Holliston	Shelburne
Ayer	Holland	Sherborn
Barre	Holyoke	Shirley
Bedford	Hopedale	Shrewsbury
Belchertown	Hopkinton	Shutesbury
Bellingham	Hubbardston	Southampton
Berlin	Hudson	Southborough
Bernardston	Huntington	Southbridge
Billerica	Lancaster	South Hadley
Blackstone	Leicester	Southwick
Blandford	Leominster	Spencer
Bolton	Leverett	Springfield
Boylston	Leyden	Sterling
Boxborough	Lincoln	Stoughton

CITIES AND TOWNS HAVING A BASIC WIND SPEED OF 100 MPH - continued		
Foxborough	Northampton	Weston
Framingham	Norwood	West Springfield
Franklin	Oakham	Westwood
Gardner	Orange	Whately
Gill	Oxford	Winchendon
Goshen	Palmer	Wilbraham
Grafton	Paxton	Williamsburg
Granby	Pelham	Worcester
Granville	Pepperell	Worthington
Greenfield	Petersham	Wrentham

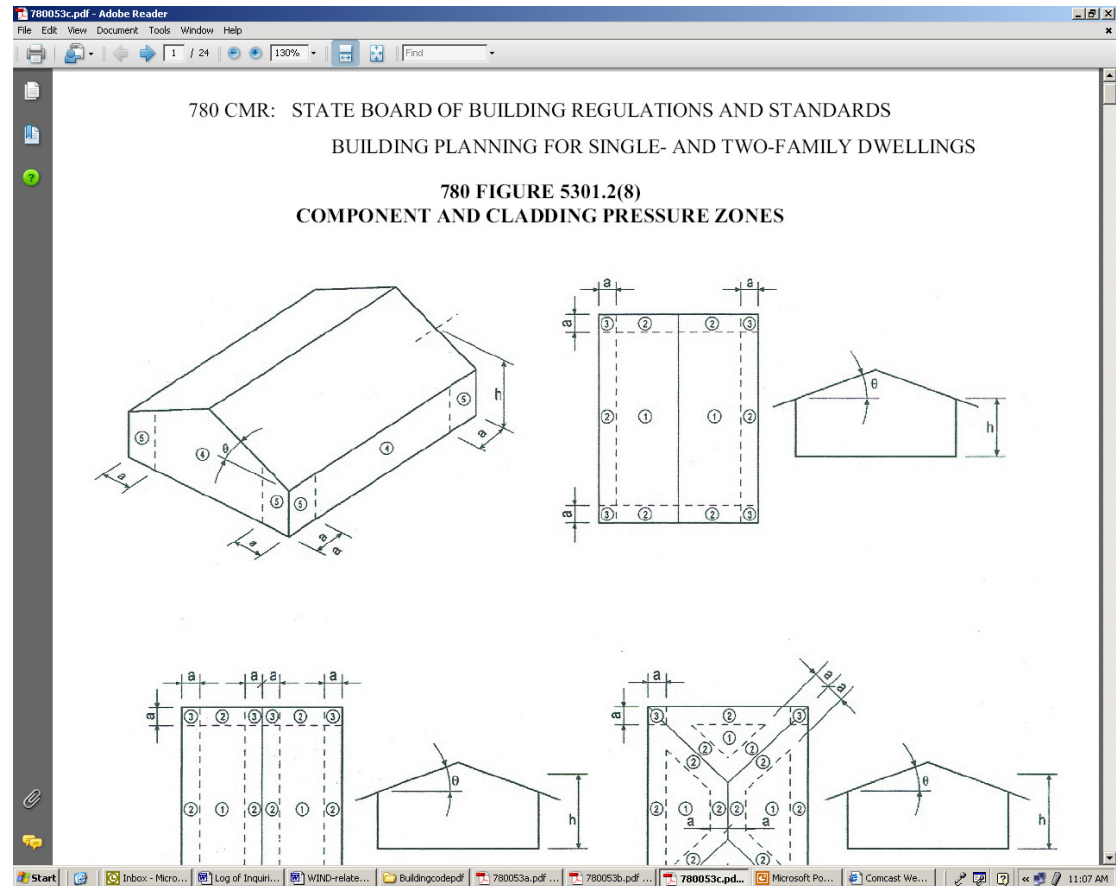
CITIES AND TOWNS HAVING A BASIC WIND SPEED OF 105 MPH		
Arlington	Malden	Stoneham
Belmont	Medford	Wakefield
Boston	Melrose	Waltham
Braintree	Milton	Watertown
Brookline	Newton	Weymouth
Burlington	North Reading	Wilmington
Cambridge	Quincy	Winchester
Chelsea	Randolph	Winthrop
Everett	Reading	Woburn
Holbrook	Revere	
Lexington	Somerville	

CITIES AND TOWNS HAVING A BASIC WIND SPEED OF 110 MPH (Portions of the North Shore)		
Amesbury	Lawrence	Peabody
Andover	Lynn	Rockport
Beverly	Lynnfield	Rowley
Boxford	Manchester by the sea	Salem
Danvers	Marblehead	Salisbury
Essex	Merrimac	Saugus
Georgetown	Methuen	Swampscott
Gloucester	Middleton	Topsfield
Groveland	Nahant	Wenham

Start | Inbox - Microsoft O... | Log of Inquiries - Mi... | WIND-related slides... | Buildingcodepdf | 780053a.pdf - Ad... | Microsoft PowerPol... | Comcast Webmail - ... | 10:59 AM

Window Design Pressure (cont.)

- Locate the Opening in the Zones shown in Figure 5301.2(8). Determine the Zone #



Window Design Pressure (cont.)

- With the:
 - Opening Size,
 - Wind Speed, and
 - Zone #...
- Determine the DP* (+,-)

*This table, 5301.2(2), is based on Exposure B and a Mean Roof Height of 30 ft. See next slide for Exposure C and other Mean Roof Heights.

For Effective Wind Area either interpolate, or use the smaller wind area shown in the table. For example, if the Effective Wind Area (which the window manufacturer provides for each unit) is 15 sq ft then this will round down to 10 sq ft. in the Table.

780 CMR: STATE BOARD OF BUILDING REGULATIONS AND STANDARDS
BUILDING PLANNING FOR SINGLE- AND TWO-FAMILY DWELLING

780 CMR TABLE 5301.2(2)
COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (psf)

ZONE	EFFECTIVE WIND AREA (feet ²)	BASIC WIND SPEED (mph—3-second gust)									
		85	90	100	105	110	120	125	130	140	145
1	10	10.0-13.0	10.0-14.6	10.0-18.0	10.0-19.8	10.0-21.8					
	20	10.0-12.7	10.0-14.2	10.0-17.5	10.0-19.3	10.0-21.2					
	50	10.0-12.2	10.0-13.7	10.0-16.9	10.0-18.7	10.0-20.5					
	100	10.0-11.9	10.0-13.3	10.0-18.5	10.0-18.2	10.0-19.5					
2	10	10.0-21.8	10.0-24.4	10.0-30.2	10.0-33.3	10.0-36.5					
	20	10.0-19.5	10.0-21.8	10.0-27.0	10.0-29.7	10.0-32.4					
	50	10.0-16.4	10.0-18.4	10.0-22.7	10.0-25.1	10.0-27.5					
	100	10.0-14.1	10.0-15.8	10.0-19.5	10.0-21.5	10.0-23.4					
3	10	10.0-32.8	10.0-36.8	10.0-45.4	10.0-50.1	10.0-55.0					
	20	10.0-30.7	10.0-34.5	10.0-42.7	10.0-47.5	10.0-52.3					
	50	10.0-19.7	10.0-22.1	10.0-27.3	10.0-30.1	10.0-33.1					
	100	10.0-14.1	10.0-15.8	10.0-19.5	10.0-21.5	10.0-23.4					
Roof > 0 to 10 degrees	10	10.0-27.2	10.0-30.5	10.0-37.6	10.0-41.5	10.0-45.5					
	20	10.0-25.1	10.0-28.3	10.0-35.3	10.0-39.2	10.0-43.2					
	50	10.0-19.7	10.0-22.1	10.0-27.3	10.0-30.1	10.0-33.1					
	100	10.0-14.1	10.0-15.8	10.0-19.5	10.0-21.5	10.0-23.4					
Roof > 10 to 30 degrees	10	10.0-11.9	10.0-13.3	10.0-16.5	10.0-18.2	10.0-19.9					
	20	10.0-11.5	10.0-12.9	10.0-16.1	10.0-17.8	10.0-19.5					
	50	10.0-11.1	10.0-12.5	10.0-15.7	10.0-17.4	10.0-19.1					
	100	10.0-10.8	10.0-12.2	10.0-15.4	10.0-17.1	10.0-18.8					
Roof > 30 to 45 degrees	10	11.6-14.5	13.0-16.3	16.0-20.1	17.6-22.2	19.2-24.3	23.0-29.0	25.0-31.4	27.0-34.0	31.4-39.4	33.7-42.3
	20	11.1-13.7	12.5-15.3	15.4-18.9	17.0-20.8	18.7-22.9	22.3-27.2	24.1-29.5	26.0-32.0	30.2-37.1	32.4-39.8
	50	10.8-13.0	12.1-14.8	14.9-18.0	16.5-19.8	18.1-21.8	21.5-25.9	23.3-28.1	25.2-30.4	29.3-35.3	31.4-37.8
	100	10.8-13.0	12.1-14.8	14.9-18.0	16.5-19.8	18.1-21.8	21.5-25.9	23.3-28.1	25.2-30.4	29.3-35.3	31.4-37.8
Wall	10	13.0-17.4	14.6-19.5	18.0-24.1	19.8-26.6	21.8-29.1	25.9-34.7	28.1-37.6	30.4-40.7	35.3-47.2	37.8-50.6
	20	12.4-16.2	13.9-18.2	17.2-22.5	18.9-24.8	20.8-27.2	24.7-32.4	26.8-35.1	29.0-38.0	33.7-44.0	36.1-47.2
	50	11.6-14.7	13.0-16.5	16.1-20.3	17.8-22.4	19.5-24.6	23.2-29.3	25.2-31.8	27.2-34.3	31.6-39.8	33.9-42.7
	100	11.1-13.5	12.4-15.1	15.3-18.7	16.9-21.6	18.5-22.6	22.0-26.9	23.9-29.2	25.9-31.6	30.0-36.7	32.2-38.4

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 mile per hour = 1.609 km/h.

NOTES: For effective areas between those given above the load may be interpolated, otherwise use the load associated with the lower effective area. Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in 780 CMR Table 5301.2(3). See Figure 780 CMR 5301.2(8) for location of zones. Plus and minus signs signify pressures acting toward and away from the building surfaces.

For Example:
DP = +20.8 and -22.6*
psf for 20 sf opening in
a wall, with wind speed
110 mph, Exposure B,
zone 4.

* Take the higher of the two numbers
and round up to the nearest five, to get
the DP. In this case 22.6 = DP25

Window Design Pressure (cont.)

- If instead of Exposure B, the building is in Exposure C, then Use Table 5301.2 (3) to multiply the DP by the factor shown in the row for the mean roof height of the building*.

780 CMR: STATE BOARD OF BUILDING REGULATIONS AND STANDARDS
THE MASSACHUSETTS STATE BUILDING CODE

780 CMR TABLE 5301.2(3)
HEIGHT AND EXPOSURE ADJUSTMENT COEFFICIENTS FOR TABLE 5301.2(2)

MEAN ROOF HEIGHT	EXPOSURE		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.3	1.61
30	1.00	1.4	1.66
35	1.05	1.45	1.70
40	1.09	1.49	1.74
45	1.12	1.53	1.78
50	1.16	1.56	1.81
55	1.19	1.59	1.84
60	1.22	1.62	1.87

780 CMR [B] FIGURE 5301.2(3)
WEATHERING PROBABILITY MAP FOR CONCRETE

- *For the example on the previous slide, if the building has a mean roof height of 35 ft. and is in Exposure C then the factor is 1.45 and the resulting DP is $1.45 \times 22.6 = 32.77$ to give DP35.