USING ASCE 7-05 TO DETERMINE FENESTRATION PRODUCT WIND LOADS

This bulletin provides a general overview of the methods used to establish window and door design wind load requirements for the state of Massachusetts using ASCE 7-05. The example used in this article provides guidance in determining a wind speed knowing the project location. The example then shows the process used to determine a conservative design wind pressure (DP) based on a certain set of assumptions.

Can You Tell Me My Wind Load?

What do you do when you get a question like, “Can you tell me my wind load?” The simple answer is no…but that will not get your customers (or ours) what they need. The professionals in our Engineering Department handle calls like this on a daily basis. The phone call goes kind of like this…“I have this job and the building inspector told me to be sure the windows meet the new code.” “He said something about meeting the wind load criteria for my area”. “I live in Massachusetts…can you tell me what my wind load needs to be?”

The last Informational Bulletin mentioned the new code in Massachusetts because many of our customers have a stake in what is going on there. You may recall the new code went into effect on January 1, 2008. (See Informational Bulletin #40). When code changes occur, we often get calls like this from people trying to catch up.

Use The Correct Standards

So how do you go about answering these questions? There is more to it than just picking a wind speed. A couple of methods can be used, but both involve using the correct standard, known as ASCE 7-05. The ASCE standard provides step-by-step guidance on how to establish a design load for a given project. Any engineer or architect who knows enough about the job will be able to establish the correct wind load based on a specific set of known factors. But what about the common guy who just needs to get a quick answer? The ASCE 7-05 standard still needs to be used,
but a simplified procedure; which incorporates a few assumptions, can be followed.

**Use Assumptions to Get a Quick Answer**

Ok, so you are not an engineer...that’s ok! There are some assumptions you can make (conservative assumptions – resulting in a higher load) to get a quick answer to this complex issue. Let’s first assume you are in the state of Massachusetts and that you are following the state code. The code says that fenestration products must meet a wind load based on the basic wind speed for your local jurisdiction. Based on knowing what township or county the project is in, one can determine the wind speed. (See Figure 2).

This map shows the various wind speeds colored on a township by township basis. Generally, whether or not these apply to your area happens to correspond to how close the building is to open water. Based on this information some additional assumptions can be used to establish the design wind load (DP) for your project.

**Practical Example for Establishing Loads**

Using an example of a residential building in a 110 mph wind speed zone, the “Simplified Method” found in ASCE 7-05 allows you to use a few other assumptions to get the DP load. The simplified method already assumes a 30 foot tall structure, defined as “h”. The “Components and Cladding” table for Method 1 is also pre-established as a residential structure in an urban setting (Exposure B).

Using this information, the table requires you to select the “Effective Wind Area” which is the square foot area (sf) of the window and the “Zone”, (i.e., mid-wall or corners area). Again, to do a quick conservative analysis let’s use the table and assume a 10 ft² window located on the corner of the building (Zone 5), since corners are the worst case. Based on these assumptions and the table provided you will find the resultant wind load to be +21.8 and -29.1 psf.

---

**Figure 2: State Map Showing the Basic Wind Speed on a Township by Township Basis**

<table>
<thead>
<tr>
<th>Basic Wind Speed</th>
<th>90 MPH</th>
<th>100 MPH</th>
<th>105 MPH</th>
<th>110 MPH (Wind-Borne Debris if 1 Mile from Coast)</th>
<th>120 MPH (Wind-Borne Debris Region)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Massachusetts Wind Zones By Township</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The highest load; typically the negative load, must be used. In this case -29.1 psf would be the highest. Rounding up to a whole number, a 30 psf wind load for both positive and negative would be appropriate for the wind load on this window.

This wind load can then be used as the “Design Pressure” or (DP) for the window and then used to compare with the wind loads (performance grades) found within the AAMA 101 standard. When comparing with the AAMA 101 standard, always round up to the nearest 5 psf increment.

Using this grade as your design load, you can then use other tables within the AAMA standard to determine other performance requirements such as air infiltration, water penetration resistance, and structural wind load criteria. Additionally, the 101-05 document will dictate the minimum test size required for the “Gateway Performance Criteria”.

**Putting It All Together**

Once you have determined the type of window (i.e. function) such as a hung window (DH) and established a design pressure (DP) you will be able to make the proper comparison between the windows you are considering for a given project.

The window selected on your given project must always meet the following rules:

- The window size on the manufacturer’s test report is larger than or equal to the size on your job, and;
- The DP rating for the window being considered is greater than or equal to the requirements for your project.

If the size on the job is larger than what is on the test report, or if the DP rating is not high enough, you may need to go to a higher class, like a Light Commercial (LC), which often includes a larger test size and/or higher test pressures.

**Just When You Thought You Understood**

This article references AAMA/WDMA/CSA 101/I.S.2/A440-05 (aka AAMA 101-05). A new version of this document has just been revised and released by AAMA in 2008. Several changes have taken place and will be the subject of the next Informational Bulletin. This is just an early warning as some of the terms such as “Light Commercial” will disappear from the standard.

**Need More Information?**

The purpose of this Informational Bulletin is to introduce a simplified process that can be used to determine wind loads and design pressures for given applications. The information contained herein is not manufacturer or product specific and is provided as advisory information to our customers.

As always, the professional staff at Architectural Testing is available to answer any questions or concerns.

Contact us if you would like to request a reprint of this article.