



1300 Sumner Avenue  
Cleveland, Ohio 44115-2851  
Phone: 216-241-7333 • Fax: 216-241-0105  
E-mail: [dasma@dasma.com](mailto:dasma@dasma.com)

## Garage Door and Commercial Door Wind Load Guide for ASCE 7-10 and the 2012 & 2015 International Building Code

DASMA (the Door & Access Systems Manufacturers Association) has created this Garage Door and Commercial Door Wind Load Guide based on **ASCE 7-10** wind load requirements which are also contained in the **2012 and 2015 editions of the International Building Code (IBC)**. This Guide is intended to be used by code officials, engineers, architects, builders, building owners, insurance companies and other interested parties.

Determination of design wind pressure for vehicle access doors in ASCE 7-10 and the 2012 & 2015 IBC is based on basic wind speed<sup>1</sup>, exposure category<sup>2</sup>, allowable stress load factor<sup>3</sup>, mean roof height<sup>4</sup>, door location on the building,<sup>5</sup> wind directionality factor<sup>6</sup>, topographic effects<sup>7</sup>, roof pitch<sup>8</sup>, enclosure category<sup>9</sup>, and door area<sup>10</sup>. This Guide covers the most common scenarios, and shows results for basic wind speeds from 100 to 200 mph.

Basic wind speed for a particular structure is determined by its Risk Category and location. ASCE 7-10 and the 2012 & 2015 IBC include the same four basic wind speed maps, one for each Risk Category. Risk Categories are defined as follows:

<sup>1</sup> Figures 26.5-1A, 26.5-1B, and 26.5-1C, basic wind speed maps for Risk Categories II, III & IV, and I.

<sup>2</sup> Section 26.7.3, Exposure Categories.

<sup>3</sup> Section 2.4.1, Allowable Stress Load Combinations. The worst case is  $D + 0.6W$ . Dead load (D) is negligible.

<sup>4</sup> Section 26.2. Mean Roof Height is defined as the average of the roof eave height and the height to the highest point on the roof surface, except that, for roof angles less than or equal to 10 degrees, the mean roof height is permitted to be taken as the roof eave height.

<sup>5</sup> Figure 30.4-1, External Pressure Coefficients.

<sup>6</sup> Wind Directionality Factor,  $K_d$ , is taken as 0.85 in this Guide in accordance with ASCE 7-22 Table 26.6-1.

<sup>7</sup> Topographic Factor,  $K_{zt}$ , is taken as 1.00 in this Guide. Increase  $K_{zt}$  in accordance with ASCE 7-22 Section 26.8 if the topographic conditions of Section 26.8 apply.

<sup>8</sup> Figure 30.4-1. External pressure coefficients. See notes under each chart in this Guide for roof pitch factor.

<sup>9</sup> Section 26.10. Enclosure category. All pressures in this Guide are based on enclosed construction.

<sup>10</sup> Figure 30.4-1 and Section C26.2. Effective wind area is taken as door area (width x height).

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- I – Buildings and other structures that represent low risk to human life in the event of failure.
- II – All buildings and other structures except those listed in Risk Categories I, III, and IV.
- III – Buildings and other structures, the failure of which could pose a substantial risk to human life. See ASCE 7-10 Table 1.5-1 for full definition.
- IV – Buildings and other structures designated as Essential Facilities. See ASCE 7-10 Table 1.5-1 for full definition.

The DASMA members believe the *Garage Door and Commercial Door Wind Load Guide for ASCE 7-10 and the 2012 & 2015 International Building Code* will improve understanding of the issues related to vehicle access doors and wind loads. DASMA continues to monitor developments regarding wind loads and the building codes in general, and continues to develop solutions to problems which affect the vehicle access door industry. Please contact DASMA with any questions or comments.

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**The following notes apply to all charts in this Guide:**

1. Building envelope products that have been tested to air pressure standards are typically rated for an allowable stress design (ASD) wind pressure rather than a strength design pressure (aka load resistance factor design, LRFD). Design wind pressures in this Guide have been calculated using an ASD load factor of 0.6 in accordance with ASCE 7-10 Section 2.4.1. **Do not multiply the values in this Guide by 0.6.**
2. This Guide applies only to the building types and conditions within the scope (Section 30.1) of Chapter 30 of ASCE 7-10.
3. This Guide is for doors on enclosed buildings. For doors attached to partially enclosed, open, or partially open structures, calculate design wind pressures in accordance with ASCE 7-10.
4. Design pressures shown are “components and cladding” design wind pressures in accordance with ASCE 7-10 Chapter 30.
5. Basic wind speeds are three-second gust values. Basic wind speed maps are included in ASCE 7-10 Section 26.5. Basic wind speed for a given location may be obtained at [www.ascehazardtool.org](http://www.ascehazardtool.org).

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**GARAGE DOOR WIND LOAD GUIDE**  
**ASCE 7-10 AND THE 2012 & 2015 INTERNATIONAL BUILDING CODE, EXPOSURE B, 100 – 140 MPH**

Mean Roof Height	Door Size	Basic Wind Speed, mph						
		100	105	110	115	120	130	140
Up to 30 Feet	9' x 7'	9.6	10.5	11.5	12.6	13.7	16.0	18.6
		-10.7	-11.8	-13.0	-14.2	-15.5	-18.1	-21.0
	16' x 7'	9.6	10.0	11.0	12.0	13.1	15.4	17.8
		-10.1	-11.2	-12.3	-13.4	-14.6	-17.1	-19.9

Design pressures above are in Pounds per Square Foot (psf)

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**NOTES:**

1. This Guide displays ASD (Allowable Stress Design) wind pressures, and thus uses the 0.6 factor in accordance with ASCE 7-10 Section 2.4.1. **Do not multiply the values shown by 0.6.**
2. Negative pressures assume door width overlaps building's end zone by 2 ft.
3. Interpolation of loads between wind speeds, mean roof heights, and door areas is permitted. For doors larger (width x height) than 112 ft<sup>2</sup>, use the 16' x 7' loads. For mean roof heights less than 15 ft, use the 15 ft values.
4. Topographic Factor,  $K_{zt}$ , is taken as 1.00.
5. Roof pitch is conservatively taken as > 10 degrees. Credit for lower pitches where applicable may be taken in accordance with ASCE 7-10 Figure 30.4-1.
6. In the following cases, design wind pressure should be determined in accordance with ASCE 7-10, and **the values in the above chart should not be used:** (1) Where the topographic conditions of Section 26.8 apply; (2) Where the door width overlaps the building's end zone more than 2 ft; (3) Where the door area (width x height) is less than 63 ft<sup>2</sup>; (4) Where the mean roof height is over 25 ft. Also, see Notes 2, 3, and 4 on page 2 of this Technical Data Sheet (TDS 155s).
7. The minimum value charted above is 9.6 psf (16 x 0.6) in accordance with ASCE 7-10 Sections 30.2.2 and 2.4.1.

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**GARAGE DOOR WIND LOAD GUIDE**  
**ASCE 7-10 AND THE 2012 & 2015 INTERNATIONAL BUILDING CODE, EXPOSURE B, 140 – 200 MPH**

Mean Roof Height	Door Size	Basic Wind Speed, mph						
		140	150	160	170	180	190	200
Up to 30 Feet	9' x 7'	18.6	21.4	24.3	27.4	30.8	34.3	38.0
		-21.0	-24.1	-27.5	-31.0	-34.8	-38.7	-42.9
	16' x 7'	17.8	20.5	23.3	26.3	29.5	32.8	36.4
		-19.9	-22.8	-25.9	-29.3	-32.8	-36.6	-40.5

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**GARAGE DOOR WIND LOAD GUIDE**

ASCE 7-10 AND THE 2012 & 2015 INTERNATIONAL BUILDING CODE, EXPOSURE C, 100 – 200 MPH

Mean Roof Height	Door Size	Basic Wind Speed, mph	
		100	105 to 200
15 Feet	9' x 7'	11.5	Multiply Exposure B values by 1.22.
		-13.0	
	16' x 7'	11.0	
		-12.3	
25 Feet	9' x 7'	12.7	Multiply Exposure B values by 1.35.
		-14.4	
	16' x 7'	12.2	
		-13.6	

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4. Topographic Factor,  $K_{zt}$ , is taken as 1.00.
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7. The 1.22 and 1.35 factors in the chart above are obtained through comparison of the charted values for velocity pressure exposure coefficient,  $K_z$ , at the respective mean roof heights. See ASCE 7-10 Table 30.3-1.

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ASCE 7-10 AND THE 2012 & 2015 INTERNATIONAL BUILDING CODE, EXPOSURE D, 100 – 200 MPH

Mean Roof Height	Door Size	Basic Wind Speed, mph	
		100	105 to 200
15 Feet	9' x 7'	14.0	Multiply Exposure B values by 1.48.
		-15.8	
	16' x 7'	13.4	
		-14.9	
25 Feet	9' x 7'	15.2	Multiply Exposure B values by 1.60.
		-17.2	
	16' x 7'	14.5	
		-16.2	

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7. The 1.48 and 1.60 factors in the chart above are obtained through comparison of the charted values for velocity pressure exposure coefficient,  $K_z$ , at the respective mean roof heights. See ASCE 7-10 Table 30.3-1.

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**COMMERCIAL DOOR WIND LOAD GUIDE**

ASCE 7-10 AND THE 2012 & 2015 INTERNATIONAL BUILDING CODE, EXPOSURE B, 100 – 140 MPH

Mean Roof Height	Door Size	Basic Wind Speed, mph						
		100	105	110	115	120	130	140
Up to 30 Feet	8' x 8'	9.6	9.6	10.5	11.5	12.5	14.7	17.1
		-9.8	-10.9	-11.9	-13.0	-14.2	-16.6	-19.3
	10' x 10'	9.6	9.6	10.2	11.1	12.1	14.2	16.5
		-9.6	-10.4	-11.4	-12.5	-13.6	-16.0	-18.5
	14' x 14'	9.6	9.6	9.7	10.6	11.5	13.5	15.7
		-9.6	-9.8	-10.8	-11.8	-12.8	-15.0	-17.4

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2. Negative pressures assume door width overlaps building's end zone by 2 ft.
3. Interpolation of loads between wind speeds, mean roof heights, and door areas is permitted. For doors larger (width x height) than 196 ft<sup>2</sup>, use the 14' x 14' loads. For mean roof heights less than 15 ft, use the 15 ft values.
4. Topographic Factor,  $K_{zt}$ , is taken as 1.00.
5. Roof pitch is taken as no more than 10 degrees.
6. In the following cases, design wind pressure should be determined in accordance with ASCE 7-10, and **the values in the above chart should not be used:** (1) Where the topographic conditions of Section 26.8 apply; (2) Where the door width overlaps the building's end zone more than 2 ft; (3) Where the door area (width x height) is less than 63 ft<sup>2</sup>; (4) Where the mean roof height is over 25 ft. (5) Where the roof pitch exceeds 10 degrees. Also, see Notes 2, 3, and 4 on page 2 of this Technical Data Sheet (TDS 155s).
7. The minimum value charted above is 9.6 psf (16 x 0.6) in accordance with ASCE 7-10 Sections 30.2.2 and 2.4.1.

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ASCE 7-10 AND THE 2012 & 2015 INTERNATIONAL BUILDING CODE, EXPOSURE B, 140 – 200 MPH

Mean Roof Height	Door Size	Basic Wind Speed, mph						
		140	150	160	170	180	190	200
Up to 30 Feet	8' x 8'	17.1	19.6	22.3	25.1	28.2	31.4	34.8
		-19.3	-22.2	-25.2	-28.5	-31.9	-35.5	-39.4
	10' x 10'	16.5	18.9	21.5	24.3	27.3	30.4	33.7
		-18.5	-21.2	-24.2	-27.3	-30.6	-34.1	-37.8
	14' x 14'	15.7	18.0	20.5	23.1	25.9	28.9	32.0
		-17.4	-20.0	-22.8	-25.7	-28.8	-32.1	-35.6

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ASCE 7-10 AND THE 2012 & 2015 INTERNATIONAL BUILDING CODE, EXPOSURE C, 100 – 200 MPH

Mean Roof Height	Door Size	Basic Wind Speed, mph			
		100	105	110	115 to 200
15 Feet	8' x 8'	10.6	11.6	12.8	Multiply Exposure B values by 1.22.
		-12.0	-13.2	-14.5	
	10' x 10'	10.2	11.3	12.4	
		-11.5	-12.6	-13.9	
	14' x 14'	9.7	10.7	11.7	
		-10.8	-11.9	-13.1	
25 Feet	8' x 8'	11.7	12.9	14.1	Multiply Exposure B values by 1.35.
		-13.2	-14.6	-16.0	
	10' x 10'	11.3	12.5	13.7	
		-12.7	-14.0	-15.3	
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Mean Roof Height	Door Size	Basic Wind Speed, mph			
		100	105	110	115 to 200
15 Feet	8' x 8'	12.8	14.1	15.5	Multiply Exposure B values by 1.48.
		-14.5	-16.0	-17.5	
	10' x 10'	12.4	13.7	15.0	
		-13.9	-15.3	-16.8	
	14' x 14'	11.8	13.0	14.2	
		-13.1	-14.4	-15.8	
25 Feet	8' x 8'	13.9	15.3	16.8	Multiply Exposure B values by 1.60.
		-15.8	-17.4	-19.1	
	10' x 10'	13.5	14.8	16.3	
		-15.1	-16.7	-18.3	
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5. Roof pitch is taken as no more than 10 degrees.
6. In the following cases, design wind pressure should be determined in accordance with ASCE 7-10, and **the values in the above chart should not be used:** (1) Where the topographic conditions of Section 26.8 apply; (2) Where the door width overlaps the building's end zone more than 2 ft; (3) Where the door area (width x height) is less than 63 ft<sup>2</sup>; (4) Where the mean roof height is over 25 ft. (5) Where the roof pitch exceeds 10 degrees. Also, see Notes 2, 3, and 4 on page 2 of this Technical Data Sheet (TDS 155s).
7. The 1.48 and 1.60 factors in the chart above are obtained through comparison of the equations for velocity pressure exposure coefficient,  $K_z$ , at the respective mean roof heights. See ASCE 7-10 Table 30.3-1.

**Note: Technical Data Sheets are information tools only and should not be used as substitutes for instructions from individual manufacturers. Always consult with individual manufacturers for specific recommendations for their products and check the applicable local regulations.**

This Technical Data Sheet was prepared by the members of DASMA's Commercial & Residential Garage Door Division Technical Committee. DASMA is a trade association comprising manufacturers of rolling doors, fire doors, grilles, counter shutters, sheet doors, and related products; upward-acting residential and commercial garage doors; operating devices for garage doors and gates, sensing devices, and electronic remote controls for garage doors and gate operators; as well as companies that manufacture or supply either raw materials or significant components used in the manufacture and installation of the Active Members' products.