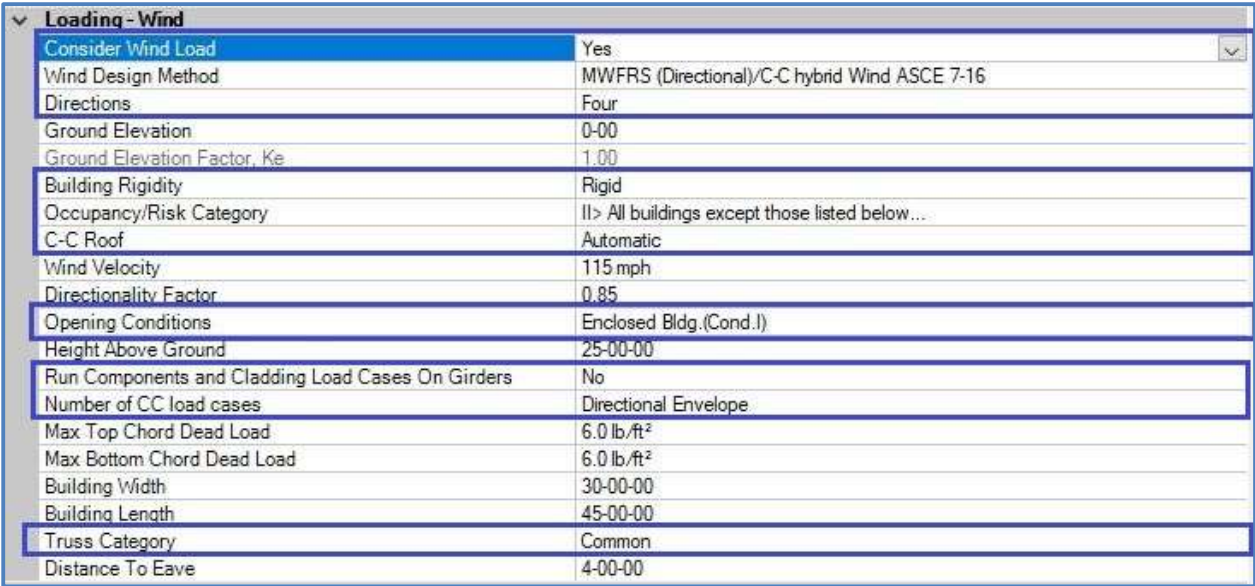


As you have come to expect, MiTek engineering software is a very powerful tool. One more example of this is the wide range of options you have available when considering wind loads and wind load cases. Magnitudes of wind loads and their application on a structure are called out in the design standard ASCE-7, Minimum Design Loads for Building and Other Structures, of which the most current edition is 2016.

It cannot be emphasized enough that the Engineer of Record (EOR) or Building Designer (BD) is responsible to provide you all the criteria you need to design a truss component that will go into the final structure. Wind loading is the most complicated of the live loads considered on a truss component design and requires the most input to get the most accurate results.

Figure 1 shows a generic input screen of the Wind Loading fields. Within this screen there are 10 fields that have drop down lists, boxed in blue. Some of which will add more input fields.



Loading - Wind	
Consider Wind Load	Yes
Wind Design Method	MWFRS (Directional)/C-C hybrid Wind ASCE 7-16
Directions	Four
Ground Elevation	0-00
Ground Elevation Factor, Ke	1.00
Building Rigidity	Rigid
Occupancy/Risk Category	II> All buildings except those listed below...
C-C Roof	Automatic
Wind Velocity	115 mph
Directionality Factor	0.85
Opening Conditions	Enclosed Bldg.(Cond.I)
Height Above Ground	25-00-00
Run Components and Cladding Load Cases On Girders	No
Number of CC load cases	Directional Envelope
Max Top Chord Dead Load	6.0 lb./ft ²
Max Bottom Chord Dead Load	6.0 lb./ft ²
Building Width	30-00-00
Building Length	45-00-00
Truss Category	Common
Distance To Eave	4-00-00

Figure 1 – General Wind Load Tab

Consider Wind Load – This field is YES or NO. This should be set to YES and only changed for the unusual condition of designing something that will not be exposed to wind loads.

Wind Design Method – See Figure 2 for options available. For your standard designing we recommend using either of the two methods that combines both MWFRS (The Main Wind Force Resisting System) and C-C (Components and Cladding). One of the MWFRS methods should be specified by the EOR or the BD. The Directional method is for buildings of all heights while the Envelope is for buildings with heights <= 60'-0".

When using one of these combined methods the design will be checked for both the MWFRS and C-C load conditions. The reactions reported will be from the MWFRS method, lower wind pressures, while the truss members and joints will be checked using the heavier C-C loads.

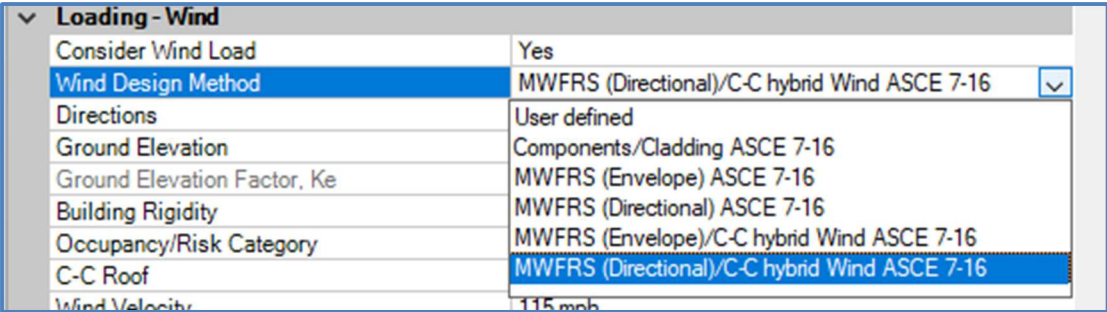


Figure 2 – Options for Wind Design Method

The following will break out each input field for the **MWFRS (Directional)/C-C hybrid Wind ASCE 7-16** method.

- **Directions** - There are two options either “4” or “8” directions. Unless stated by EOR or BD we recommend using the “4” direction option.
- **Ground Elevation** – Within ASCE 7-16 a new Ground Elevation factor has been added. This is the elevation above sea level for the job site location. Leaving this set zero is slightly conservative.
- **Building Rigidity** – There are two options here “Rigid” or “Flexible”. Unless stated by EOR or BD we recommend using “Flexible” for buildings under 60’-0” tall.
- **Occupancy/Risk Category** – There are four options, see Figure 3, Category II is the typical selection. Category I for agricultural structures. Category III and or IV will be specified by the EOR.

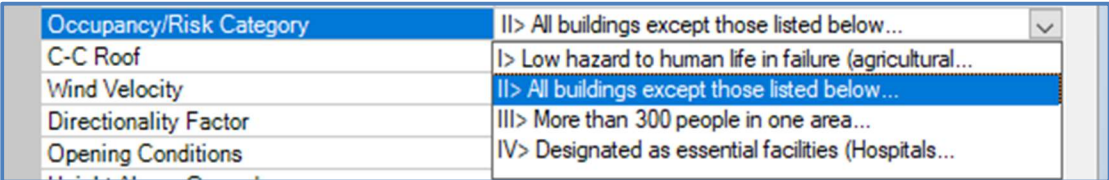


Figure 3 – Occupancy/Risk Category

- **C-C Roof** – There are three options, see Figure 4. The location of the truss component within the roof system will dictate the winds loads that need to be considered. “Automatic” will load the truss based on the additional information seen in Figure 5. Both Gable and Hip will load truss accordingly.

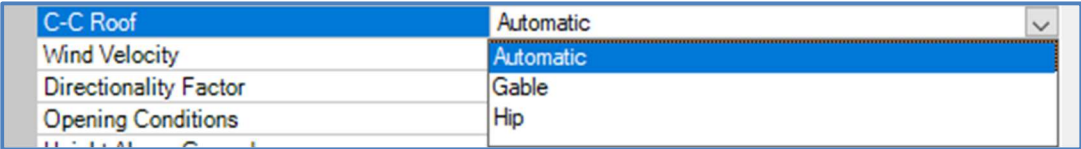


Figure 4 – C-C Roof Options

Building Width	30-00-00
Truss Category	Common
Distance To Eave	4-00-00

Figure 5 - C-C Extra Input for Automatic Roof

- **Wind Velocity** – The Design Wind Speed (mph) should be called out on the plans. With ASCE7-16 the wind speed provided will be the “Ultimate” wind speed and the software will adjust this to the “Allowable” wind speed used with the Allowable Stress Design method we use today.
- **Directionality Factor** – For Buildings, this factor is 0.85 per ASCE 7-16 and the program defaults to 0.85, use caution if you are changing this.
- **Opening Conditions** – There three options here, see Figure 6. The typical choice will be “Partially Enclosed”. “Open” buildings are like picnic pavilions, while “Partially Open” are like an airplane hangar where one entire side is open.

Opening Conditions	Enclosed Bldg.(Cond.I)
Height Above Ground	Partially Enclosed (Cond.II)
Run Components and Cladding Load Cases	Enclosed Bldg.(Cond.I)
Number of CC load cases	Partially Open (Cond.IV)

Figure 6 – Opening Conditions

- **Height of Above Ground** – This is the Mean Height of the building. The height from the ground to the middle of the attic.
- **Run Component and Cladding Load Cases on Girders** – It is recommended that this option be used only when the building designer specifies it. **Exception** all girder trusses with parapet(s) need to be checked with these CC wind load cases.
- **Number of CC Load Cases** – There are two options, Single Envelope and Directional Envelope. Always use the Directional Envelope option.
- **Max Top and Bottom Dead Load** – For Occupancies Category II, III and IV, the magnitude of dead load shall be reduced by a factor of 0.6. These two fields will default to a maximum of the dead loads input under the “Loading General – Roof Load” section multiplied by 0.6. For Category I (i.e., AG) trusses, the actual dead loads are permitted to be used and can match those from the “General Loading” tab, if the dead load does not exceed 4 psf per chord.
- **Building Width and Length** – Input, accordingly, Building Width is parallel with the truss and Building Length is perpendicular to the truss.
- **Truss Category** – See Figure 7 for the options and select accordingly.

Truss Category	Common
▼ Loading - Rain	Common
Consider Rain Load	Hip Truss
▼ Seismic Load	End Jack
Consider Seismic	Comer
▼ Loading Advanced - Limited Access Loads	

Figure 7 – Truss Category Options

- **Distance To Eave** – This dimension defines where the truss component is in relation to the closest end wall measured perpendicular to the truss.

Load Duration Factors - Wind load cases are permitted to use duration of load factor of 1.6 for both lumber and plate grip per the National Design Specification 2018.

Load Duration Factors	
Dead Only DOL	Dry Lumber: 0.9 Plate Grip: 0.9 Plate Metal: 0.9
Construction DOL	Dry Lumber: 1.15 Plate Grip: 1.15 Plate Metal: 1
Floor DOL	Dry Lumber: 1 Plate Grip: 1 Plate Metal: 1
Snow DOL	Dry Lumber: 1.15 Plate Grip: 1.15 Plate Metal: 1
Wind DOL	Dry Lumber: 1.6 Plate Grip: 1.6 Plate Metal: 1

Figure 8 – Load Duration Factors

The following will discuss the additional specific input fields required by each of the other five Wind Design Methods.

- **User Defined** - This wind design method allows you to enter and design a truss component with a specific magnitude of load that the EOR or BD specifies.

Loading - Wind	
Consider Wind Load	Yes
Wind Design Method	User defined
Directions	Four
Ground Elevation	0-00
Ground Elevation Factor, Ke	1.00
Building Rigidity	Rigid
External Wind Pressure	0.0 lb/ft ²
Internal Wind Pressure	0.0 lb/ft ²
Max Top Chord Dead Load	6.0 lb/ft ²
Max Bottom Chord Dead Load	6.0 lb/ft ²
Truss Category	Common

Figure 9 – User Defined Inputs

- **External Wind Pressure** – Enter the wind pressure given the EOR or the BD.
- **Internal Wind Pressure** – If given enter the wind pressure given by the EOR or the BD for the internal pressure.

- Component / Cladding ASCE 7-16 -

Loading - Wind	
Consider Wind Load	Yes
Wind Design Method	Components/Cladding ASCE 7-16
Directions	Four
Ground Elevation	0-00
Ground Elevation Factor, K_e	1.00
Building Rigidity	Rigid
Occupancy/Risk Category	II> All buildings except those listed below...
C-C Roof	Automatic
Wind Velocity	115 mph
Directionality Factor	0.85
Opening Conditions	Enclosed Bldg.(Cond.I)
Height Above Ground	25-00-00
Number of CC load cases	Directional Envelope
Max Top Chord Dead Load	6.0 lb/ft ²
Max Bottom Chord Dead Load	6.0 lb/ft ²
Building Width	30-00-00
Truss Category	Common
Distance To Eave	4-00-00

Figure 10 – Component Cladding Input Options

- MWFRS (Envelope) ASCE 7-16 –

Loading - Wind	
Consider Wind Load	Yes
Wind Design Method	MWFRS (Envelope) ASCE 7-16
Directions	Four
Ground Elevation	0-00
Ground Elevation Factor, K_e	1.00
Building Rigidity	Rigid
Occupancy/Risk Category	II> All buildings except those listed below...
MWFRS Roof Zone	Exterior
Wind Velocity	115 mph
Directionality Factor	0.85
Opening Conditions	Enclosed Bldg.(Cond.I)
Height Above Ground	25-00-00
Max Top Chord Dead Load	6.0 lb/ft ²
Max Bottom Chord Dead Load	6.0 lb/ft ²
Building Width	30-00-00
Truss Category	Common

Figure 11 – MWFRS Envelope Input

- MWFRS Roof Zone** – There are three options. “Exterior” is the recommended option to use as a default. If you know that the design you have, based on all 4 directions, is not in the “Exterior” area you could change to the “Interior” area.

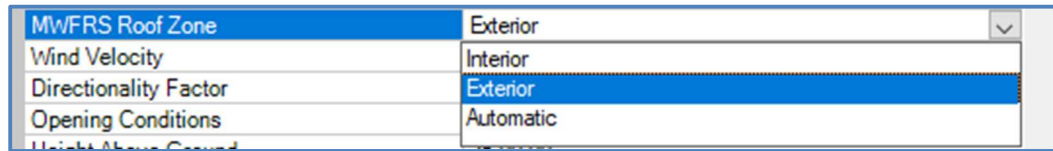


Figure 12 – MWFRS Roof Zones

- MWFRS (Directional) ASCE 7-16** –

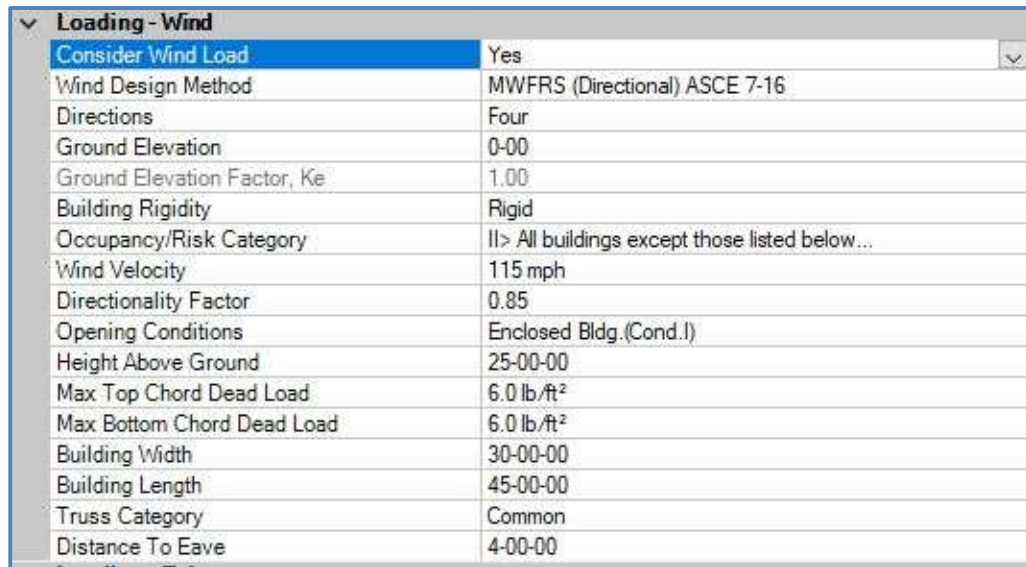


Figure 13 – MWFRS Directional Input

- MWFRS (Envelope)/C-C hybrid Wind ASCE 7-16

Loading - Wind	
Consider Wind Load	Yes
Wind Design Method	MWFRS (Envelope)/C-C hybrid Wind ASCE 7-16
Directions	Four
Ground Elevation	0-00
Ground Elevation Factor, K _e	1.00
Building Rigidity	Rigid
Occupancy/Risk Category	II> All buildings except those listed below...
MWFRS Roof Zone	Exterior
C-C Roof	Automatic
Wind Velocity	115 mph
Directionality Factor	0.85
Opening Conditions	Enclosed Bldg. (Cond. I)
Height Above Ground	25-00-00
Run Components and Cladding Load Cases On Girders	No
Number of CC load cases	Directional Envelope
Max Top Chord Dead Load	6.0 lb./ft ²
Max Bottom Chord Dead Load	6.0 lb./ft ²
Building Width	30-00-00
Truss Category	Common

Figure 14 – MWFRS Envelope / CC hybrid Input

For additional information or if you have questions, please contact the MiTek Engineering department.