

# WIND

A Publication of ACE USA Risk Control Services

**Introduction**

Wind is the second only to fire in loss severity for builders risk, accounting for almost 20% of all lost dollars. Most commonly, wind losses deal with blown off roof or roof work, and collapse of inadequately braced or unbraced freestanding walls.

**Wall Bracing**

Per OSHA 1926.706(b) and ANSI A10.9, freestanding masonry walls over 8' should be braced until permanent tied into the structure. Per ANSI A41.1 Section 11.9.1, "Masonry walls in locations where they may be exposed to high winds during erection shall not be built higher than 10 times their thickness unless adequately braced or until provision is made for the prompt installation of permanent bracing at the floor or roof level immediately above the story under construction. Back fill shall not be placed against foundation walls until they have been braced to withstand the horizontal pressure."

Below is a guide for selecting the maximum horizontal spacing (in feet) of vertical bracing members for hollow non-reinforced concrete masonry walls subject to winds ranging in speed from 30 to 100 mph:

Nominal Wall Thickness (in.)	MAXIMUM WIND SPEED (MPH)							
	30	40	50	60	70	80	90	100
6	19.0	15.5	12.0	10.1	8.7	7.8	6.8	6.2
8	25.0	20.4	15.8	13.4	11.5	10.2	9.0	8.1
10	30.4	24.8	19.2	16.3	14.0	12.4	10.9	9.9
12	35.3	28.8	22.3	18.9	16.2	14.4	12.7	11.5

*It is strongly recommended that all wall bracing systems be designed by a licensed, professional, or otherwise qualified engineer[.]*

Reinforced Concrete Bracing

Reinforced concrete requires temporary support while curing, until it reaches its final strength. Factors which influence the speed of curing are time, temperature, and moisture. Forms into which concrete is placed must be supported. Concrete must be reshored after form stripping as specified by a scheduled provided by the designer of the structure. Reshoring is critical to ensure structural integrity in supporting the additional loads imposed during the course of construction, such as heavy equipment, subsequent floors, personnel, and stored materials.

Steel Bracing

Steel in the course of construction also needs to be temporarily supported. This is typically done by using wire rope connected between stationary objects and the installed structural frame. This process is called guying. Guying should be multi-directional to provide stability for the structure (to avoid forces in any one direction from collapsing the structure).

While guying need not render the structure rigid, it should restrain and limit movement until final alignment and permanent connections (i.e. bolting and welding) are made.

#### Non-Steel Structure Bracing (Masonry, Frame, Concrete)

In non-steel structures, walls are generally self-supporting. However, lateral motion needs to be restrained until the top of the wall is secured. This is done by means of bracing. (Cast In Place reinforced concrete on which forms have been stripped need not be braced)

#### Frame Wall Bracing

Bracing for frame construction is usually accomplished by nailing back 2" X 4" braces to the floor to support framed out walls. This is needed until all the walls are tied together. In non-steel structures, walls are generally self-supporting. However, lateral motion needs to be restrained until the top of the wall is secured. This is usually accomplished by nailing back 2" X 4" braces to the floor to support framed out walls, until all the walls are tied together.

#### Masonry Wall Bracing

Bracing for masonry construction is generally achieved by placing 2" x 10" against the wall with a 2" X 10" strut from the wall to the floor at defined intervals. This is needed until the mortar has cured. Freezing weather is of great concern to masonry construction, since damage freezes the mortar. When this occurs, the mortar becomes crumbled and the wall loses integrity.

Controlling the temperature during the curing process is essential, and can be achieved by the use of a blanket and/or temporary heating. Generally, mortar can cure in a day.

#### Concrete Form Bracing

Bracing of concrete forms is achieved by placing struts between the ground or elevated floors and the form to provide proper vertical alignment and stability.

### **Trailers & Materials**

Mobile offices and storage trailers must be strapped to substantial anchors to prevent severe winds from blowing such items into stored materials. This includes precautions to prevent lightweight materials, such as rigid styrofoam insulation panels from being blown away.

### **Securing Roof/Siding**

Monitor and ensure that roofing and siding contractors adequately secure their work at the end of each shift, and prior to severe weather.

### **Roof Snow Loading**

Excessive snow accumulations should be removed from roofs. A late winter or early spring storm of major proportions is of greater concern since this snow is usually wetter and consequently heavier. For extensive information and handout on this subject, see the ACE USA RCS fact sheet entitled Severe Winter Weather: Snow Loading.

### **Protection from Freezing**

The contractor should have a plan on the provision of heating, protection from freezing, and other winter weather precautions prior to the start of the cold season. Lines should be pressure tested with water and drained to prevent damage. Any low points in lines should be blown out instead of just gravity drained. All water lines should be situated to avoid the potential for freezing, or protected against this hazard. Also see the ACE USA fact sheet entitled Severe Winter Weather: Pipe Freeze.

### **Preparation for A Storm**

Preparation for a heavy windstorm for a building under construction should include:

- Declare the project an emergency with all union stewards. This removes obstacles regarding job responsibilities and limitations by trade, and allows manpower to be better allocated.
- Ask for volunteers to stay through the storm, but be sensitive, since people may have their own families to safeguard.
- Build teams to tie down and sandbag, where necessary. Start at the highest levels of the project and work down. This is important since materials and equipment blown down from elevated areas are more likely to cause damage when wind force and gravity are combined. Also, once the wind starts, this avoids putting employees at elevated positions.

PLEASE READ CAREFULLY The information contained herein is not intended as a substitute for advice from a safety expert or legal counsel you may retain for your own purposes.