

Technical Advisory Bulletin

Tornado safety

March 2018

With wind speeds that can exceed 300 mph, tornadoes can cause massive devastation and loss of life. There is no such thing as guaranteed safety in the event of a tornado. Freak accidents happen; and the most violent tornadoes can level and blow away almost any house and its occupants. Although there are more tornadoes in the Midwest, Southeast and South areas of the U.S., they can occur anywhere.

Tornado danger signs

- Strong, persistent rotation in the cloud base.
- Whirling dust or debris on the ground under a cloud base – sometimes tornadoes have no funnel!
- Hail or heavy rain followed by either dead calm or a fast, intense wind shift. Many tornadoes are obscured by heavy precipitation and can't be seen.
- Loud, continuous roar or rumble which doesn't fade in a few seconds.
- Bright blue-green to white flashes at ground level near a thunderstorm (as opposed to silvery lightning up in the clouds). These mean power lines are being snapped by very strong winds or a tornado.
- *Persistent* lowering from the cloud base, illuminated or silhouetted by lightning, especially if it is on the ground or there is a blue-green-white power flash underneath.

What to do prior to a tornado

Preplanning

- Identify the safest areas in a building so employees know where to go.
- The safest shelter areas typically include basements, hallways, interior stairwells and small internal first-floor rooms. For businesses in tornado-prone areas, consider constructing a tornado-hardened safe room.
- Post signs to direct employees and visitors to safe areas.
- Designate the roles and responsibilities of supervisors and employees.
- Practice tornado drills.
- Most injuries and much of the damage are caused by debris hurled by the storm rather than direct damage from high winds.
 - Secure outdoor equipment and outbuildings to prevent them from becoming airborne missiles.
 - Reinforce vulnerable areas of a building, such as adding supports to garage doors, attaching walls securely to the foundation, and bracing and strapping the roof.
 - Locate servers and other vital equipment in protected areas of a building, preferably in tornado-resistant server rooms.
 - For new construction, work with an architect or contractor to incorporate wind mitigation techniques and high wind-rated products.

Monitoring threatening weather

Sometimes we know days in advance that severe weather will occur. If severe weather is expected, monitor weather forecasts to stay abreast of changing weather conditions via NOAA, weather radios, smart phones, TV or radio. Complete optional errands prior to severe weather arriving or defer them until after the severe weather passes. Know the difference between weather warnings and watches.

- A **tornado watch** is issued when tornadoes and other kinds of severe weather are possible in the next several hours. It does not mean tornadoes are imminent, just that you need to be alert, and to be prepared to go to safe shelter if tornadoes do happen or a warning is issued.
- A **particularly dangerous situation** (pds) tornado watch is issued when it is likely that multiple strong or violent tornadoes will occur in the watch area.
- A **tornado warning** means that a tornado has been spotted, or that Doppler radar indicates a thunderstorm circulation which can spawn a tornado. When a tornado warning is issued for your town or county, take immediate safety precautions

What to do during a tornado

If in a house with a basement

Avoid windows. Close and lock exterior doors and windows if there is enough time to do this safely. Get in the basement and under some kind of sturdy protection (heavy table or work bench), or cover yourself with a mattress or sleeping bag. Know where very heavy objects rest on the floor above (pianos, refrigerators, waterbeds, etc.) and do not go under them. They may fall down through a weakened floor and crush you. A helmet can offer some protection against head injury.

If in a house with no basement, a dorm or an apartment

Avoid windows. Close and lock exterior doors and windows if there is enough time to do this safely. Go to the lowest floor, small center room (like a bathroom or closet), under a stairwell, or in an interior hallway with no windows. Crouch as low as possible to the floor, facing down and cover your head with your hands. A bath tub may offer partial protection. Even in an interior room, you should cover yourself with some sort of thick padding (mattress, blankets, etc.) to protect against falling debris in case the roof and ceiling fail. A helmet can offer some protection against head injury.

If in commercial or industrial building

Go directly to an enclosed, windowless area in the center of the building – away from glass and on the lowest floor possible. Then, crouch down and cover your head. Interior stairwells are usually good places to take shelter, and if not crowded, allow you to get to a lower level quickly. Stay off the elevators; you could be trapped in them if the power is lost.

If in a mobile home

Get out! Even if your home is tied down, it is not as safe as an underground shelter or permanent, sturdy building. Go to one of those shelters, or to a nearby permanent structure, using your tornado evacuation plan. Most tornadoes can destroy even tied-down mobile homes; and it is best not to play the low odds that yours will make it. Additional information is available at: <https://www.youtube.com/watch?v=HeOsOxecOaw>

If outdoors

If possible, seek shelter in a sturdy building or in a culvert. If not, lie flat and face-down on low ground, protecting the back of your head with your arms. Get as far away from trees and vehicles as you can; they may be blown onto you in a tornado. Be aware of the potential for flooding, especially if you take shelter in a culvert.

If in a vehicle

Vehicles are extremely risky in a tornado. There is no safe option when caught in a tornado in a vehicle, just slightly less dangerous ones. Tornadoes may move at speeds of up to 70 mph (112 kph). If the tornado is visible, far away, and traffic is light, you may be able to drive out of its path by moving at right angles to the tornado. Seek shelter in a sturdy building or underground if possible. If you are caught by extreme winds or flying debris, park the vehicle as quickly and safely as possible out of the traffic lanes. Stay in the vehicle with the seat belt on. Put your head down below the windows; cover your head with your hands and a blanket, coat or other cushion if possible. If you can safely get noticeably lower than the level of the roadway, leave your car and lie in that area as far from the road as possible (to avoid flying vehicles), covering your head with your hands. Avoid seeking shelter under bridges, which can create deadly traffic hazards while offering little protection against flying debris.

Tornado safety myths and tips

- Forget about the old notion of opening windows to equalize pressure; the winds and wind borne debris will blast the windows open.
- The “safe southwest corner” is an old myth based on the belief that, since tornadoes usually come from the SW, debris will preferentially fall into the NE side of the basement. The problems with this concept include: tornadoes are mostly circular, so the damaging wind may blow from any direction and tornadoes may arrive from any direction.
- If you have time locking doors, including locking the garage doors in their tracks, can be helpful.
- The area beneath a staircase may be the best shelter location in some instances.
- Make trees more wind resistant by removing diseased or damaged limbs, then strategically remove branches so that wind can blow through.
- Consider installing wind-resistant shutters that can be closed quickly to provide protection for windows.
- Avoid seeking shelter under bridges, which can create deadly traffic hazards while offering little protection against flying debris.

Avoiding injury after a tornado

- Be careful when entering any structure that has been damaged.
- Wear sturdy shoes or boots, long sleeves and gloves when handling or walking on or near debris.
- Do not use matches, candles or lighters in case of nearby leaking gas pipes or fuel tanks.
- Be aware of hazards from exposed nails and broken glass.
- Do not drive over or touch downed power lines or objects in contact with downed lines. There is a good chance they are live. Most power lines carry 7,200 volts or more and many are not insulated! Do not move power lines with a branch or other object since they may conduct electricity. Report electrical hazards to the police and the utility company.
- Use battery-powered lanterns, if possible, rather than candles to light homes without electrical power. If you use candles, make sure there are no gas leaks and they are in safe holders away from curtains, paper, wood or other flammable items.
- Hang up telephone receivers that may have been knocked off during the tornado, but stay off the telephone, except to report an emergency.
- Cooperate with public safety officials. Respond to requests for volunteer assistance by police, fire fighters, emergency management and relief organizations

Additional Resources

Storm Prediction Center: <http://www.spc.noaa.gov/faq/tornado/#Safety>

Selecting Best Available Storm Shelters: <https://dps.mn.gov/divisions/hsem/weather-awareness-preparedness/Documents/TornadoShelterAreaDetermination.pdf>

FEMA P-431: Tornado Protection – Selecting Refuge Areas in Buildings: <http://www.fema.gov/media-library/assets/documents/2246?id=1563>

The July 13, 2004 Roanoke, IL Tornado Event: http://www.crh.noaa.gov/Image/ilx/pdf/Miller_Abstract.pdf

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