

# Straight Line Wind Fact Sheet

## AM I AT RISK?

The term “straight–line” wind is used to differentiate the damage they cause from tornado damage. Strong, damaging winds can come from a number of different thunderstorm processes. Most thunderstorm winds that cause damage at the ground are a result of outflow generated by a thunderstorm downdraft. Damaging winds are classified as those exceeding 50–60 mph. A severe thunderstorm is capable of producing winds with speeds faster than 100 mph, even without a tornado.

A storm that is capable of producing consistent straight–line winds of 58 mph or more and covers an area of more than 240 miles is known as a “derecho”. A derecho is a widespread, long–lived wind storm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microbursts, downbursts, and downburst clusters. Powerful gusts can cause heavy damage to cars and buildings. The storm’s dynamic straight–line winds can also knock down trees and power lines, possibly injuring people nearby, similar to the damage caused by tornadoes.

## DID YOU KNOW?

"Derecho" is a Spanish word meaning "direct" or "straight ahead" and coined to distinguish straight–line wind damage from that produced by tornadoes.

Storms with severe straight–line winds often also have hail and tornadoes.

Straightline winds are similar to tornadoes in that they may generate a loud roaring sound at their approach.

If winds flowing out from a thunderstorm exceed 58 mph, the storm is considered severe.

## FORECASTING AND ALERTING

Forecasters may issue outlooks, watches or warnings for high winds, severe weather and thunderstorms. The best, most reliable way to ensure you’re alerted to severe weather threats is a weather alert radio. A weather alert radio is especially useful in the middle of the night or when the electricity is out. We suggest a weather alert radio with either an emergency crank or battery back–up power.

Since most thunderstorms produce some straight–line winds as a result of outflow generated by the thunderstorm downdraft, anyone living in thunderstorm–prone areas is at risk. Damage from severe thunderstorm winds account for half of all severe reports in the lower 48 states and is more common than damage from tornadoes. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles.

People living in mobile homes are especially at risk for injury and death. Even anchored mobile homes can be seriously damaged when winds gust over 80 mph.

People who are outdoors are most at risk to straight line wind. Campers or hikers in forested areas are vulnerable to being injured or killed by falling trees, and people on bodies of water risk injury or drowning from storm winds and waves that can overturn boats. Occupants of cars and trucks also are vulnerable to falling trees and utility poles. High profile vehicles such as semi–trailer trucks, buses, and sport utility vehicles may be blown over. At outside events such as fairs and festivals, people may be killed or injured by collapsing temporary structures and flying debris. Even those indoors may be at risk for death or injury. Mobile homes, in particular, may be overturned or destroyed, while barns and similar buildings can collapse. People inside homes, businesses, and schools are sometimes victims of falling trees and branches that crash through walls and roofs; they also may be injured by flying glass from broken windows. On occasion, severe structural damage to buildings (for example, the removal of a roof) poses danger to those within.

Derechos pose a special hazard to those in urban areas. It is the vulnerability of overhead electric and communication lines to high winds and falling trees that makes derecho winds especially problematic in urban areas. In addition to posing a direct hazard to anyone caught below the falling lines, derecho damage to overhead electrical facilities sometimes results in massive, long–lasting power outages that can affect hundreds of thousands of people; in the worst events, power may not be restored for days. The complex and dense networks of overhead distribution lines – and their proximity to large trees – make urban and suburban areas especially vulnerable to significant derecho–induced electrical and communication outages. In addition, unlike the localized damage produced by a tornado, derecho damage may be widespread, with repairs requiring considerably more time and effort to accomplish.

## STRAIGHT LINE WIND DO'S AND DON'TS

### Do

- Have an emergency plan and preparedness kit.
- Collect your wallet, keys, required medications and any other necessities and keep them with you.
- If you are already inside a structure, go to a pre-designated shelter area such as a safe room, basement, storm cellar or the lowest building level or interior room/hallway.
- Stay away from windows and glass doorways.
- Listen to a NOAA Weather Radio, regular radio or television for storm updates. (Battery-powered devices are best, in case the electricity goes out.)
- Keep pets on a leash or in a crate or carrier.
- Crouch as low as possible to the floor, facing down. Cover the back of your head with your hands.
- If outside immediately seek shelter, and stay away from trees or large objects that could topple over on you. If you're outside with no shelter, lie flat in a ditch or depression and cover your head with your hands.
- Watch out for flying debris. Flying debris from tornadoes causes most fatalities and injuries.

- Be aware that tall trees near a building can be uprooted by straight-line winds – that trees can come crashing through the roof of a home and crush a person to death.
- Put on sturdy shoes.
- Stay away from power lines, broken glass, nails and other dangerous objects.
- Wait for information and instructions from emergency crews or local officials.

### Do Not

- Underestimate the power of strong thunderstorm winds known as straight-line winds – they can reach speeds of 100 to 150 mph.
- Attempt to approach or drive over a downed power line.
- Do not use elevators because the power may fail, leaving you trapped.
- Do not light candles or use open flames, even after the storm has passed. Ruptured gas lines can create a fire hazard so it's better to use flashlights.

## QUICK FACTS YOU SHOULD KNOW ABOUT STRAIGHT LINE WINDS

Derechos in the United States are most common in the late spring and summer (May through August), with more than 75% occurring between April and August. As might be expected, the seasonal variation of derechos corresponds rather closely with the incidence of thunderstorms.

While hail and straight-line winds generally do not garner the same attention or respect as tornadoes, they can be just as deadly! Hail can exceed the size of softballs and fall at speeds of over 100 mph, seriously injuring or killing anyone in its path. Straight-line winds can topple trees onto cars, houses, and power lines. Many deaths from straight-line winds are the result of trees falling onto the person, whether they are outside, in their house, or driving in their car. Strong straight-line wind events can even destroy buildings, especially mobile homes and manufactured homes.

## WEB SITES and LINKS

Information on strong straight-line wind events and preparedness

### Web site:

<http://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm>

### National Weather Service

<http://www.nws.noaa.gov/om/severeweather/index.shtml>  
<http://www.nws.noaa.gov/om/brochures.shtml>

### The Weather Channel

<https://weather.com/safety>

### American Red Cross

<http://redcrosshelps.org/severeweather/>

### Federal Emergency Management Agency Ready. gov

<https://www.ready.gov>

**Before**

- Build an emergency kit and make a family emergency plan and communications plan
- Listen to NOAA Weather Radio or to commercial radio or television newscasts for the latest information. In any emergency, always listen to the instructions given by local emergency management officials.
- Be alert to changing weather conditions.
- If planning to be outdoors for a significant length of time, be aware of the weather forecast—especially if you will be well-removed from sturdy shelter.
- To reduce the damage from straight-line wind secure objects that can be blown by the wind.
- Keep trees well pruned. Tree branches falling on cars or houses produce a significant amount of damage in high wind events.

**After**

- If power outage use your preparedness kit. Follow power outage safety rules: unplug sensitive appliances, protect food (food safety), keep warm
- Watch local TV news or listen to NOAA radio for updated information and instructions
- Do not bring grills or generators inside. Running them indoors could be a deadly mistake, as both emit carbon monoxide that could poison you in a confined space.
- If you venture outside after the storm has passed, wear sturdy footwear, be alert for and report downed power lines. Do not touch any downed wires or anything in contact with the wires.
- Watch for broken glass, upstanding nails, partially fallen tree limbs, and other hazardous debris.
- If your home has been damaged, walk carefully around the outside and check for things like loose power lines, gas leaks, and general structural damage. Leave the premises if you smell gas.
- Text, don't talk. Unless there is a life-threatening situation, if you have a cell phone, send a text so that you don't tie up phone lines needed by emergency workers. Plus, texting may work even if cell service is down.
- Stay away from storm-damaged areas.
- Help people who may require assistance, including infants, children, the elderly and disabled.

**During**

- Inside of a well-built home or building: Move to the lowest floor and stay away from windows. Taking shelter in a basement is strongly encouraged, especially if you are surrounded by trees that could fall onto the building or house.
- In a mobile home or manufactured home. Move to a stronger building or storm cellar if one is nearby Mobile and manufactured homes can usually withstand low-end straight-line wind storms, but as winds reach or exceed 70 mph, the risk of these homes being blown apart or struck by falling trees increases greatly.
- Driving:
  - Keep both hands on the wheel and slow down.
  - Pull over to the shoulder and stop, making sure you are away from trees or other tall objects that could fall onto your vehicle. DO NOT stop in the middle of a lane under an overpass. This could lead to an accident.
  - Take extra care in a high-profile vehicle such as a truck, van, SUV, or when towing a trailer. These are more prone to being pushed or even flipped by straight-line winds
  - If possible, orient your vehicle so that it points into the wind
  - Stay in the car and turn on the hazard lights until the wind subsides.
- Caught outside:
  - Take cover in a well-built building, or use this building to block the wind if you cannot get inside.
  - If no building is nearby, find the lowest spot and lie flat and face-down on low ground, protecting the back of your head with your arms. If possible, avoid trees; even relatively small branches can become lethal when blown by storm winds.
  - Stay away from trees or power lines, since these are easily felled by straight-line winds. If you are in the middle of a forest, move to the lowest/smallest stand of trees.
  - Stay clear of roadways or train tracks, as the winds may blow you into the path of an oncoming vehicle.
  - Watch for flying debris. Tree limbs, street signs, and other objects may break and become flying projectiles in the wind.

## WORDS TO KNOW

**Straight-line wind.** Any thunderstorm wind that is not associated with rotation, and is used mainly to differentiate from tornadic winds.

**Downdraft.** A small-scale column of air that rapidly sinks toward the ground.

**Downburst.** A strong downdraft with horizontal dimensions larger than 4 km (2.5 mi) resulting in an outward burst of damaging winds on or near the ground. (Imagine the way water comes out of a faucet and hits the bottom of the sink.) Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.

**Microburst.** A small concentrated downburst that produces an outward burst of damaging winds at the surface. Microburst's are generally small (less than 4km across) and short-lived, lasting only 5–10 minutes, with maximum wind speeds up to 168 mph. There are two kinds of microburst's: wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microburst's, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.

**Gust front.** The leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.

**Derecho.** A widespread, long-lived wind storm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microburst's, downbursts, and downburst clusters.

**Haboob.** A wall of dust that is pushed out along the ground from a thunderstorm downdraft at high speeds.

## OUTDOOR WARNING SIRENS

Sirens are owned by Minneapolis and are activated by Hennepin County at the recommendation of the National Weather Service. Sirens are used for severe weather warnings, as well as for other situations when people should take shelter. Weather-related sirens are triggered when the National Weather Service has issued a tornado warning, and/or if there are reports of sustained straight-line winds in excess of 70 mph.

Outdoor warning sirens are meant to be heard outside. The system is not designed to provide notification inside your home or business. When sirens sound, residents should always seek shelter and tune to local weather information on radio, television, or NOAA Weather Radio for more information.

Hennepin County does not issue an "all-clear" tone from the outdoor sirens. The threat of severe weather does not stop when the sirens stop. Continue to shelter and stay tuned to local weather information on radio, television or NOAA Weather Radios for the duration of the warning period.

If the siren sounds while you are in your vehicle, seek shelter immediately. The safest place to be is in a sturdy building, on the lowest level away from windows. If there is not a building nearby, and the tornado is approaching quickly, get as far away from the road and cars as possible and lie in a low area covering your head with your arms. Do not go under an overpass; the bridge could collapse or become a wind tunnel with flying debris.

Note: Per Minnesota policy, the sheriff's communication division tests/activates all sirens in Hennepin County at 1 p.m. on the first Wednesday of each month.

## RECEIVE ALERTS

How will you receive alerts, warnings and official information and instructions?

- The National Weather Service issues watches and warnings that are distributed via NOAA All-Hazards Radio alerts and through radio and television stations.
- The Wireless Emergency Alert (WEA) system which will send warnings directly to WEA capable cell phones in affected areas. These short messages are like a text message, and will be broadcast to all mobile phones within range of designated cell towers.
- The alerts will tell you the type of warning, the affected area, and the expected duration of the event.