

# AIR WORLDWIDE U.S. Natural Catastrophe Reference Chart

## SAFFIR–SIMPSON HURRICANE WIND SCALE

CATEGORY	SUSTAINED WINDS (MPH)	TYPES OF DAMAGE DUE TO HURRICANE WINDS
1	74-95	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 or higher	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: NOAA



- The Atlantic hurricane season runs from June 1 through November 30. August and September are peak months.
- On average, 11 named tropical cyclones develop in the North Atlantic each year, but 19 developed in 2010, 2011, and 2012; and a record 28 named storms developed in 2005.
- In general, a Category 4 hurricane can be expected to cause 100 times more damage than a Category 1 storm.
- The names Irene and Sandy have been retired from the official list of Atlantic Basin tropical storm names. They are the 76th and 77th names to be retired since 1954. They have been replaced by the names Irma and Sara. The same storm names are normally used every six years.
- The costliest hurricane *were it to recur today* is the 1926 Miami Hurricane. This Category 4 storm made a direct hit on Miami. Today, such a storm would likely result in insured losses of about USD 126 billion.
- The deadliest hurricane to hit the U.S. coast was the Galveston, Texas, hurricane of September 8, 1900. Between 8,000 and 12,000 people died when a 20-foot storm surge inundated Galveston Island.

## MODIFIED MERCALLI INTENSITY (MMI) SCALE

MMI	PERCEIVED SHAKING	POTENTIAL DAMAGE	PGA (%G)
I	Not felt	None	<.17
II–III	Weak	None	0.17–1.4
IV	Light	None	1.4–3.9
V	Moderate	Very light. Some dishes and windows broken.	3.9–9.2
VI	Strong	Slight damage in poorly built buildings; no structural damage. Some dishes and windows broken; unstable objects overturned.	9.2–18
VII	Very strong	Slight damage in well-built buildings; considerable in poorly built buildings. Books off shelves; some heavy furniture moved or overturned.	18–34
VIII	Severe	Slight damage in specially designed structures; considerable in ordinary well-built buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys and factory stacks.	34–65
IX	Violent	Considerable in specially designed structures, well designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.	65–124
X	Extreme	Most masonry and frame structures destroyed with foundation. Some bridges destroyed; rails bent slightly.	>124
XI–XII	Extreme	Disastrous to catastrophic damage. Few, if any structures remain standing. Bridges destroyed. Rails bent greatly.	>124

Source: Adapted from USGS

Before the use of seismographs, the Modified Mercalli Intensity (MMI) Scale was used to assess the severity of earthquake ground shaking based on human reaction and observed damage. Today, Peak Ground Acceleration (PGA) is measured in real time and MMI (therefore expected damage) is predicted from PGA—even before observers can reach the site to assess actual damage.



- One of the largest earthquakes to strike the continental U.S. occurred on December 16, 1811, in the New Madrid Seismic Zone located in the Mississippi River Valley. This earthquake, with an estimated magnitude of between 7.2 and 8.0, was felt as far away as Boston, Massachusetts. *If it were to recur today*, the New Madrid quake would likely result in insured losses of USD 112 billion.
- Alaska is the most earthquake-prone state. The magnitude 9.2 earthquake that struck Prince William Sound, Alaska, on March 28, 1964, is the largest recorded U.S. earthquake.
- The Loma Prieta, or “World Series,” earthquake that struck on October 17, 1989, was the first major U.S. earthquake ever to be broadcast live on television. The game is widely credited with preventing more loss of life, as many people who would have been driving on Interstate 880 when it collapsed after the rupture had either left work early or stayed out late to watch it.
- On August 23, 2011, the largest Virginia earthquake (M5.8) in more than a century struck 83 miles southwest of Washington, D.C. Ground shaking was felt as far north as Toronto and as far south as North Carolina. Both the Washington Monument and the National Cathedral suffered damage.

## FEMA FLOOD ZONES

ZONE	DESCRIPTION
<b>HIGH RISK AREAS</b> In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones:	
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.
<b>HIGH RISK - COASTAL AREAS</b> In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones:	
V	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.
VE, V1-30	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Source: FEMA

## ENHANCED FUJITA SCALE

EF NUMBER	3 SECOND GUST (MPH)	The Enhanced F-scale is still a set of wind estimates (not measurements) based on damage. It uses three-second gusts estimated at the point of damage based on a judgment of 8 levels of damage to 28 indicators (listed at: <a href="http://www.spc.noaa.gov/efscale/ef-scale.html">www.spc.noaa.gov/efscale/ef-scale.html</a> ). These estimates vary with height and exposure.
0	65-85	
1	86-110	
2	111-135	
3	136-165	
4	166-200	
5	OVER 200	

Source: NOAA

Because the lifetime of a tornado is generally brief and because tornadoes can occur out of the range of weather stations due to their relatively small size, measured wind speeds are rarely available. Also, instruments that are in the path of the storm are often destroyed by the intensity of tornadic winds. The Fujita Scale was developed as an indirect method for classifying tornado intensity based on observed damage.

### Did you know?

- Around 1,300 tornadoes hit the U.S. yearly, give or take a few hundred per year.
- The average first-tornado date in the U.S. is January 11, for the entire 1950-2011 time frame. The latest first tornado was on February 15, 2003, in Marengo County, Alabama, meaning that the U.S. had 45 days of tornado-free weather to start that year.
- Tornadoes can happen any time of year. The peak period for tornadoes in the southern plains is May to early June; on the Gulf Coast, it is earlier during the spring; in the northern plains and upper Midwest, it is June or July.
- Tornadoes can last from several seconds to more than an hour; most tornadoes last less than 10 minutes.
- On average, tornadoes kill about 60 people a year.
- The EF-5 Newcastle/Moore-South OKC tornado that occurred on May 20, 2013, killed 24 people and followed a path similar to that of the EF-5 Oklahoma City tornado, which occurred May 3-4, 1999, and killed 36 people, destroyed 8,000 homes and was one of the most expensive single tornadoes in U.S. history, causing approximately a half billion dollars in insured property damage in Oklahoma in 1999 dollars.
- The costliest severe thunderstorm system on record occurred April 22-28, 2011, causing USD 7.3 billion in damage to 13 states (AL, AR, GA, IL, KY, LA, MO, MS, OH, OK, TN, TX, VA).