



When Lightning Strikes

What to do during a Thunderstorm





When Lightning Strikes

Thunderstorm Safety Rules by the Lightning Protection Expert DEHN



Intensive sunshine and severe thunderstorms during hot summers, extended rainfall during mild winters – this is what to expect when the effects of climate change become evident.

About 2 million lightning strikes are registered in Germany each year, and the tendency is rising. Severe thunderstorms pose a threat to human lives and cause damage to buildings and infrastructure: Hail destroys roofs, winter gardens and cars, lightning strikes cause fire or surge damage to electrical devices and systems. Surges may occur even if lightning does not strike in the immediate vicinity.

This brochure provides information on the physical basics of lightning: the formation and types of lightning strikes. It gives tips on how to estimate how far the lightning flash is from your location and on what to do in a thunderstorm to protect human lives and property from this destructive force of nature.



Let's review our physics lessons

What does lightning look like?

A lightning flash is only centimetres thick, however, every metre shines as bright as 1 million 100 watt light bulbs since the lightning flash is electrically charged. It may come as a surprise that a lightning flash, with few exceptions, travels from the ground to the clouds! Fractions of a second before the actual lightning flash there is a downward leader, however, this is hardly visible to the human eye.

What causes lightning?

Lightning originates from thunder cells which may have a diameter of several kilometres. Positively and negatively charged areas are created due to an uneven distribution of ice and water as well as updraft and downdraft winds in the cloud. If the voltage differences become too high, an electrical discharge occurs (lightning flash). The thunder cells only last about 30 minutes and cause two to three lightning flashes per minute during this time.



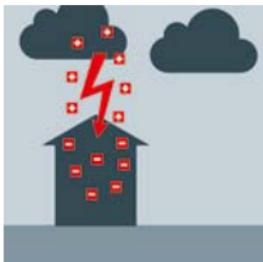
What types of lightning are there?

There are cloud-to-ground flashes, ground-to-cloud flashes and cloud-to-cloud flashes.

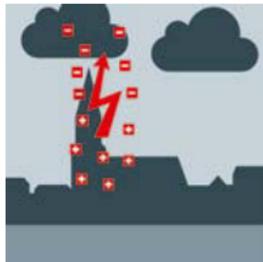
In case of a **cloud-to-ground flash**, the electrically charged clouds equalise with the ground below. The lightning discharge is initiated by downward leaders from the cloud to the ground. They frequently hit flat ground and low buildings. Branching to the ground is characteristic of cloud-to-ground flashes.

Ground-to-cloud flashes, also referred to as upward flashes, may strike very high, exposed objects such as steeples, radio masts or mountain peaks. Upward branching is characteristic of ground-to-cloud flashes.

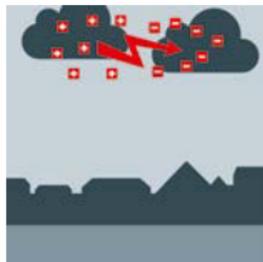
Cloud-to-cloud flashes occur within a cloud or between two clouds, however, they do not occur between clouds and the ground.



Cloud-to-ground flashes



Ground-to-cloud flashes



Cloud-to-cloud flashes



How to identify a thunderstorm?

Outdoors is the most dangerous place to be during a thunderstorm. Therefore always keep an eye on the weather: Look for cumulus clouds with a typical „cauliflower“ or “candyfloss” shape that may form towering clouds. Muggy weather with increasing wind, rolls of thunder, sheet lightning and falling air pressure are all signs that a thunderstorm is approaching.

How often does lightning strike?

Each lightning strike may consist of several partial lightning strikes. During the summer months, Germany experiences more than one million partial lightning strikes each month. On a day with a high thunderstorm activity, more than 200,000 partial lightning strikes may occur. Annually, more than 95% of all lightning flashes occur during the thunderstorm months May to September. In Germany the number of thunderstorm days and lightning strikes per square kilometre – also referred to as ground flash density – increases from the North to the South.



Lightning Photo by Michael Bath, www.lightningphotography.com

How fast does lightning approach?

If you do not hear thunder 30 seconds after you saw a lightning flash you are on the safe side as the thunderstorm is far enough away. If you hear thunder 15 seconds after a lightning flash, it is only about 5 km away. You are at high risk if you hear thunder less than 5 seconds after a lightning flash. A lightning flash travels at about 300,000 km/s and is approximately 900,000 times faster than the relatively slow sound wave which has a speed of “only” about 330 m/s. This is why you see the flash quite a while before you hear the thunder.

Estimating the distance from a thunderstorm

A common rule of thumb for roughly estimating the distance from a thunderstorm is to count the number of seconds between a flash of lightning and the next clap of thunder. Divide this number by 3 to get the number of kilometres.



The European Cooperation for Lightning Detection (EUCLID) is a collaboration among national lightning detecting networks with the aim to identify and detect lightning all over the European area.

www.euclid.org

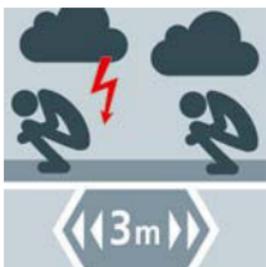
Make life-saving decisions at lightning speed

In open terrain

If caught outdoors, there are two main dangers: First and foremost, being the highest point around. And secondly, when lightning strikes near you. In this case, the current is conducted to the ground and quickly spreads out in all directions, forming a dangerous potential gradient.

For this reason, never lie flat on the ground if you are caught in the open during a thunderstorm. Crouch down immediately, put your feet as close together as possible and wrap your arms around your legs.

Put down bicycles, golf bags or golf clubs and keep a distance of at least 1 m, or even better 3 m, from these objects. Hollows, beds of stone pits or protruding rocks may provide shelter. If you are in a group of people, spread out. It is vital to keep a distance of at least 1 m, or even better 3 m, to walls, metal fences, etc.



Avoid trees, groves, edges of the forest and wood poles of overhead lines since they are particularly vulnerable to lightning. The risk of being hit by a lightning strike inside a forest with trees of uniform height is considerably lower, however, keep a distance from all trees and limbs of 10 m.

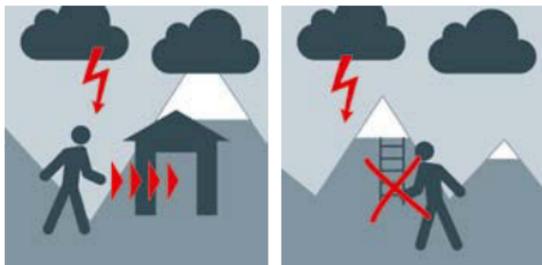
Note!

Immediately crouch down if the time period between a flash and thunder is less than five seconds! Put your feet as close together as possible, wrap your arms around your legs and tuck your head in. Keep a distance of 3 m to the next person.



In the mountains

A thunderstorm in the mountains is extremely dangerous because it appears surprisingly quickly. Have a close look at the weather forecast when planning your tour. Check the barometer when stopping at shelter huts and strictly follow the instructions of hut personnel or your mountain guide. If you do not reach the next lightning-protected shelter hut in time, a cave or protruding rock may provide shelter. Do not touch moist rock walls and any ladders or metal objects, for example along fixed rope routes. Wait until the last thunder or lightning has ended.



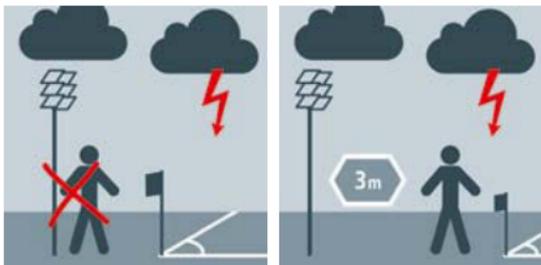
Note!

In the mountains: Keep off the peak, avoid being the highest point around. Keep a distance of at least 1 m, or even better 3 m, from other people and metal objects such as hooks, ladders and ropes.



On a playing field

Sportsmen and sportswomen as well as spectators are highly at risk during a thunderstorm if they stand on the playing field, uncovered stands or next to poles or flagpoles. Keep at least 1 m, or even better 3 m away from poles. Covered stands need a lightning protection system on the roof to provide safety.



Note!

Keep at least 3 m away from radio masts and flagpoles. Put down flags, umbrellas and golf clubs.

During fishing or hunting

Fishermen on the water are highly at risk during a thunderstorm. If you have just caught a fish, take it off the hook immediately, lay down your fishing rod and seek shelter on land! Hunters should immediately leave open tree stands at the first sign of lightning and thunder.

During camping

Never erect your tent directly next to poles or pylons, at the edge of the forest or next to isolated trees. Use an insulating mattress and do not touch the tent poles during a thunderstorm. As with cars, caravans are protected by the Faraday principle. Attention: If your tent or caravan has no metal structure, it is equally dangerous to stay there than in the open field.



Note!

Keep a distance of at least 3 m from other tents and caravans. Crouch down in your tent on an insulating, dry mattress. Keep sufficient distance from the tent wall!



On a golf course

The golf course is one of the most dangerous places to be during a thunderstorm. Avoid isolated trees, open terrain and the edge of the forest. Shelters are only safe when equipped with a lightning protection system in conformity with the relevant standards.

If the time period between a flash and thunder is less than 30 seconds, go straight to a club house, shelter or car. To get there do not walk in groups of people, avoid physical contact with each other and leave your golf equipment behind.



Note!

If the time period between a flash and thunder is less than 30 seconds, get inside a club house or shelter.



Lightning Photo by Michael Bath, www.lightningphotography.com

If the time period between a flash and thunder is only 5 seconds, crouch down immediately – preferably in a hollow. Put your feet as close together as possible and tuck your head in. Stay in shelters for about 30 minutes after you hear the last rumble of thunder.



Note!

If the time period between a flash and thunder is shorter than 5 seconds, crouch down, preferably in a hollow.

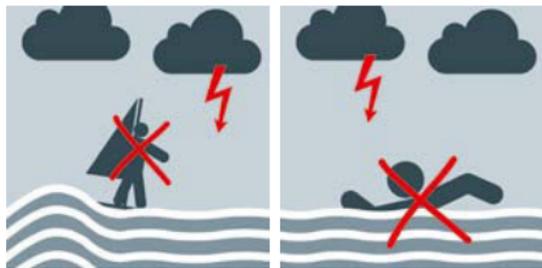


While wind surfing

There is absolutely no protection on a surfboard. Head for the shore at the first sign of an imminent thunderstorm and seek shelter. If there is no time left, put down the mast and crouch down on the surfboard. This does not eliminate the danger, however, it is considerably reduced.

In open water

Swimming or wading through water during a thunderstorm means you are placing your life at risk. A strike into the water may be deadly or may paralyse up to 10 metres from the point of strike. Therefore leave the water right away and take cover at the first sign of lightning and thunder.



Note!

Surfing and swimming during a thunderstorm means you are placing your life at risk!

Onboard a boat

Boats are vulnerable to lightning strikes since they present exposed points on the plain water surface. Keep off the deck and do not fish during a thunderstorm. Go into the boat, crouch down and do not touch the rig or any other metal objects.

Riding a bicycle

If on a bicycle or motorcycle, stop riding, seek shelter (for example under a bridge) or crouch down at a distance of 1 m, or even better 3 m, from your vehicle.



Note!

Install a lightning protection system on your boat. For more detailed information, please do not hesitate to contact us: info@dehn.de

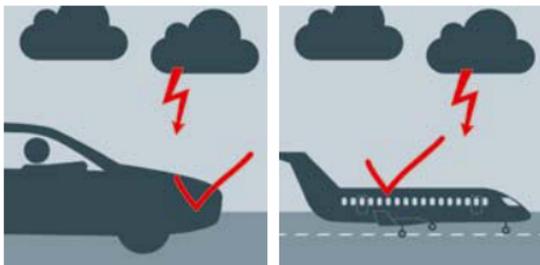


Inside a car

Representing a Faraday cage, metal car bodies provide entire protection. In case of heavy rain or rolls of thunder, it is advisable to stop at the next possible place or wait until the thunderstorm has disappeared to avoid being blinded by the light and therefore lose control.

Inside an airplane

Normally nothing happens if an aircraft is struck by lightning on the ground or even in the air since an aircraft also is a Faraday cage. However, the occurring turbulences are much more dangerous than the lightning flash itself which is why experienced pilots try to avoid to fly through thunderstorm cells.



Note!

Do not leave your car between seeing the flash and hearing the thunder is less than 15 seconds!



Indoors

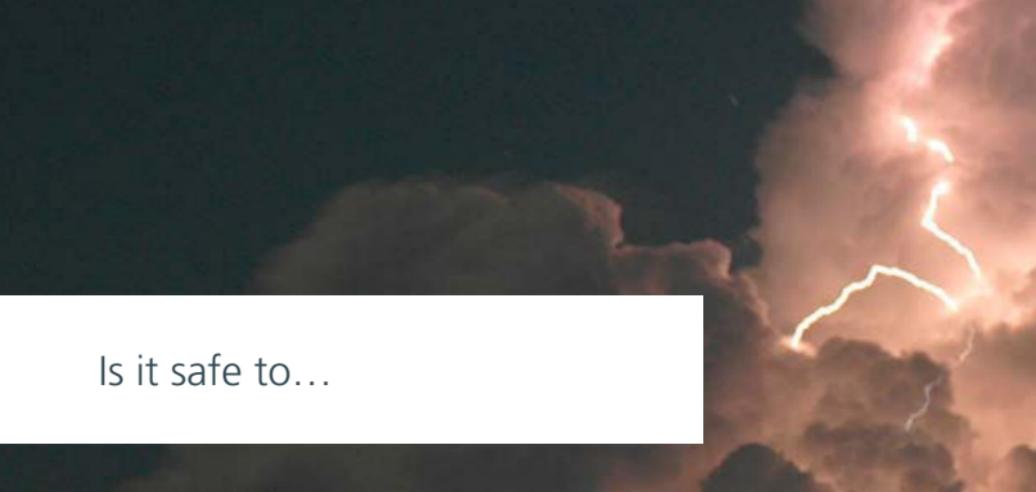
In the event of a lightning strike, the external lightning protection system safely discharges the lightning current to the ground and protects your home from fire. Lightning protection systems must be installed by qualified personnel to make sure that only tested and approved DEHN components are used and installed in conformity with the latest standards. Reliable lightning protection is only ensured if the external lightning protection system is combined with an equipotential bonding system and surge protective devices to form a comprehensive protection system.

Surge protective devices from DEHN prevent electrical devices and electronic systems from being damaged or destroyed by lightning.



Note!

If you require detailed information on lightning and surge protection, please do not hesitate to contact us: info@dehn.de



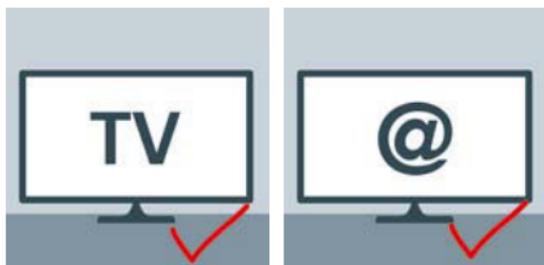
Is it safe to...

Watch TV during a thunderstorm?

If your home is equipped with an external and internal lightning protection system and surge protective devices such as DEHNprotector and DEHNgate, you can watch your favourite TV show without risk.

Surf the Internet during a thunderstorm?

DEHN surge protective devices for the power supply and data lines protect your PC against negative effects of surges caused by remote lightning strikes. However, a complete lightning protection system must be installed to protect your home in case of a direct lightning strike.

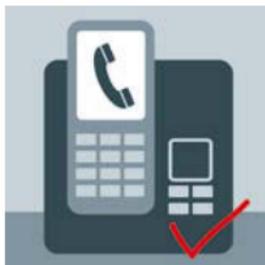


Use the telephone during a thunderstorm?

If the telephone system is connected to the equipotential bonding structure and is protected by surge protective devices it is safe to do so. You may also safely use telephones with mobile handsets.

Take a shower or a bath during a thunderstorm?

It is safe to do so if the metal supply lines are properly integrated in the equipotential bonding structure.





First aid

What to do if someone is struck by lightning

Common injuries from being struck by lightning can be nerve and muscle paralysis, impaired eyesight and hearing as well as raised blood pressure. If unconscious and convulsing, the victim might be in a cardiac arrest. Gasping breath, lack of a pulse and dilated pupils are further signs of a cardiac arrest. Quick action can save lives.



Note!

Immediately call your local emergency number and start to give first aid. Please be aware that your local emergency call number may differ!



Try to calm the lightning victim if he/she is conscious. Softly talk to the victim until help arrives. If the victim is unconscious, put him/her in the recovery position. Check the victim's pulse and breathing. If the lightning victim has no pulse or heartbeat, lay him/her on his/her back and immediately begin cardiopulmonary resuscitation (heart massage and resuscitation). Do not stop until the victim starts to move, his/her chest begins to rise and fall or help arrives to take over.

Recovery position



Heart massage



Resuscitation





DEHN protects.

Our key objective is to protect lives and material assets from lightning and surge damage. In view of the increasing lightning activity, this objective is more relevant than ever before.

It was our pioneering spirit and innovative ideas that have defined our company for more than 100 years and made us a market leader in surge protection, lightning protection and safety equipment with more than 1,500 employees. Our products and developments reflect our market feasibility, commitment and ideas.

The Bavarian town of Neumarkt is the heart of our activities where product managers and developers advance our protection technologies. Here we manufacture our high-quality safety products.

**Surge Protection
Lightning Protection
Safety Equipment
DEHN protects.**

**DEHN + SÖHNE
GmbH + Co.KG.**

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