



## Frequently asked questions

### **1. What exactly can the ABS do?**

The ABS can keep you at the surface during an avalanche, or at least reduce the burial depth. It prevents you sinking down into the snow. The avalanches that Alpine skiers are caught up in are almost all flowing avalanches. Flowing avalanches are mostly triggered by the skiers themselves. Virtually all avalanche victims survive the initial slide with the snow. However, around half of them end up completely buried. Three out of four victims who are completely buried – in other words 75% – either have blocked airways or can hardly breathe because of the enormous pressure on their chest. In this situation, buried victims can only survive for a few minutes. After a maximum of 15 minutes, the chances of survival tail off rapidly. The ABS avalanche airbag prevents burial or at least reduces the burial depth. It cannot stop you being caught up in the avalanche, but it can keep you at the surface, maximizing your chances of survival.

### **2. How does the ABS work?**

Think of an avalanche as a mass in motion. It consists of vast quantities of tiny snow crystals, which start rotating as they slide downhill. As a result of this rotation, all objects with a volume greater than the individual snow crystal are automatically pushed up towards the surface. This is called the "segregation process". Close to the surface, however, the force of rotation declines and with it the lift. Here it is important for the skier's volume to be at least equal (for the same mass) to the volume of the snow in the avalanche. The snow in a loose snow avalanche in the middle of winter has a volume that is 2.5 times greater per kilogram than the volume of a human being. In hard figures, one kilogram of loose snow has a volume of about 2.5 liters. One kilogram of human being has a volume of 1.03 liters, in other words just over a liter. So if a person weighs a total of 100 kilograms, he or she would have a volume of 103 liters. 100 kilograms of avalanche snow in the middle of winter, however, has a volume of 250 liters. To ensure that a person will float on top of the avalanche snow, an extra volume of at least 150 liters is required.

The ABS avalanche airbag is designed for these extreme conditions. It has a volume of about 170 liters, more than enough to make up the difference for a skier weighing 100 kilograms. This prevents the skier being buried/reduces the burial depth, multiplying the



chances of survival. Put simply: the lift generated by the rotation of the snow crystals brings the avalanche victim up to the surface. The airbag provides the missing volume and prevents the victim sinking back down into the snow.

(For information: The lift generated by the rotation of the snow particles is also the reason why only about half of all avalanche victims are buried. Through sheer good luck, at the moment they are raised to the surface, they happen to be pushed out of the avalanche flow because of the terrain or for some other reason, avoiding burial in that way.

### **3. What's so special about the ABS TwinBag system?**

The ABS TwinBag system is the successor to the mono airbag. There are two 85-liter airbags, one on each side, and the system has three critical advantages compared with mono airbags:

1. The two airbags are positioned at the side of the body, keeping the victim as flat as possible on top of the avalanche. A vertical position creates an anchoring effect, and minimizing this effect is the key to reducing the risk of being buried in the snow during the avalanche run-out. Otherwise, the snow would start passing over the victim, who now cannot move, resulting in burial. The risk of anchoring is particularly high if mono airbags are positioned close to the head.
2. As any airbag descends with the snow, there is a risk of damage. If a mono airbag tears, the entire system fails. The ABS TwinBag system has two independent 85-liter airbags, giving it a life-and-death advantage over mono airbags.
3. Avalanche victims are dragged downhill with a vast quantity of snow. Reducing the turbulence suffered by the victim helps to keep injuries as minor as possible. The two airbags at the side have a stabilizing effect, in most cases preventing major turbulence. The data collected from real-life experiences are unambiguous – in about 300 reported ABS TwinBag activations there have been no serious head, neck or back injuries from collisions.

TwinBags are obviously more expensive to manufacture than mono airbags – there are after all two airbags and two trigger mechanisms. In return, however, they provide twice the reliability and much greater effectiveness than mono airbags, as has been shown many times in practice. And in an avalanche situation, that can mean the difference between life and death.



#### 4. How can avalanche airbag systems be differentiated?

##### Avalanche airbag systems in comparison

	ABS Vario	Mammut RAS	Snowpulse	BCA
<b>Survival Rate</b>	97%	N/S	N/S	N/S
<b>Double airbags / Multi-chamber system</b>	yes	no	no	no
<b>Activation</b>	pneumatic	Bowden cables	Bowden cables	Bowden cables
<b>Unobstructed view and unrestricted movement</b>	yes	yes	no	yes
<b>Prevent supine position</b>	yes	dangerous supine position	dangerous supine position	N/S
<b>Most probable position when avalanche stops</b>	horizontal	vertical	vertical	vertical
<b>Easy pack and use after activation</b>	yes	complex	complex	complex
<b>Weight including cartridge</b>	3,0 kg (Vario 25)	2,9 kg (22 Liter)	N/S	3,7 (Float 30)
<b>Carbon cartridge</b>	yes (280 g)	no (Steel 504g)	no (Steel 504g)	no (Steel 660g)
<b>Exchangeable pack system</b>	yes	no	no	no
<b>Suitability for left-handers</b>	yes	no	no	no
<b>Airbag volume</b>	170l	150l	150l	150l

#### 5. Can avalanche airbags prevent injury from collisions?

See point 3 above for ABS TwinBags. Mono airbags, especially if they are designed to create a snug fit around the head and upper body, are much less effective at their main purpose – keeping the avalanche victim out of the snow. (See also point 3 and point 7). These avalanche airbags – in fact most mono airbags – are not very good at reducing turbulence during the descent. Yet it is precisely this turbulence within the avalanche that often causes serious injury. Helmets and back protectors provide effective, tried and tested protection for the head and spine.



## **6. OK, so maybe the ABS works in light powder snow, but do I also stand a chance in heavy snow?**

In fact, the opposite is true. The heavier the snow, the greater the density and therefore the lower its volume. Late-season wet snow typically weighs 500 or 600 grams per liter. That means it has around twice the volume of a human being. Less extra volume is required, so the airbag can be smaller. Heavy, wet late-season snow is therefore much less of a problem than dry cold powder snow in the middle of winter. On the other hand, heavy late-season snow increases the risk of injury. But remember that virtually all avalanches are triggered by the skiers themselves, so the descending snow tends not to hit the victim with too much force. The dangerous mechanical pressure of a wet snow avalanche can be as much as several tons, but victims are not impacted as long as they stay at the surface. This is why a wet snow avalanche is usually less dangerous for the ABS user.

## **7. What if I get caught up in an avalanche in the valley or at the end of a slope?**

If a skier is at the bottom of the valley, with the full weight of the avalanche above, the chances of survival are very slim indeed, even with an avalanche airbag. The skier is hit by the full impact, and burial is inevitable. Even at 30 to 40 meters above the bottom of the valley, victims without an airbag do not stand much chance in an avalanche starting at 200 to 300 meters. With an airbag, the chances of survival are only slightly higher if there is a run-out zone at the bottom of the valley and the victim is carried along with the avalanche.

Remember, however, that these situations are very unusual. Most avalanches are triggered when the victims themselves cause the slab to come loose – which means they start quite high up in the avalanche.

## **8. What about secondary avalanches?**

Genuine secondary avalanches are actually quite rare. Nevertheless, in the types of avalanches usually affecting skiers and snowboarders, there is some subsequent movement of the avalanche snow. With an airbag, the victim is almost always carried downhill at the front of the avalanche. This is because the victim has usually triggered the



avalanche, but also because the rate of flow in the upper layers is faster than it is close to the ground. When the avalanche runs out, the victim with an airbag finally comes to a standstill when the first mass of snow settles. If the airbag is a mono airbag fitted close to the head, the victim will be more or less vertical in the snow. It is at this point that any extra snow becomes an extreme hazard. With the victim now stuck, successive snow movements are unable to carry him or her further forwards on the surface. Depending on the volume of extra snow, the victim may be completely buried. An ABS TwinBag, on the other hand, keeps the victim flat on the surface of the snow. As each mass of snow settles, the victim is carried forward and is usually able to free him/herself from the snow without assistance.

### **9. It is up to the victim to activate avalanche airbags. But is that realistic in an avalanche situation?**

Yes, it is certainly realistic in most cases. But it is essential to commit to activation immediately and without hesitation. As the speed increases after falling, it can be difficult if not impossible even to reach the activation handle. Make sure that the activation handle is easily accessible. Something else that happens quite often is that the skier does not realize that he/she has loosened a slab or is falling – believing instead that he/she made a mistake and consciously deciding not to activate the airbag. People are also sometimes immobilized by fear for a moment. Self-activation must be practiced regularly to improve reaction times and movements. But don't worry – even these imponderables can largely be ruled out by ABS Wireless Activation (remote activation by companions), the perfect complement to ABS TwinBag self-activation. See point 23.

### **10. How can I avoid activating the airbag by accident?**

By only ever attaching the activation handle to the system when you are out on the mountain. When you are not skiing/snowboarding, we strongly recommend removing the activation handle and keeping it in the pocket on the hip strap. With the handle attached, you can use the red Velcro fastener for extra protection.

### **11. Can I move the activation handle to the right if I'm left handed?**

Absolutely, and it's very important to do so. If you're left handed, it is difficult to reach the activation handle if it is on the left, so your valuable reflexes go to waste. You can move



the activation mechanism from the left to the right on all ABS Base Units (Vario and Powder). All you need to do is change the handle plate.

### **12. Are there any problems with ice build-up on the activation handle when attaching to the pressure tube or at the time of activation?**

Not unless you cause an ice build-up through your own carelessness. Make sure that the Velcro covers adequately protect the pressure tube adapter whether the activation handle is attached or not. It is also important to take care with the activation handle itself, keeping the pin and the pin opening completely clean. If the activation handle does get dirty, never attempt to clean it yourself – instead, replace the handle. Otherwise the system might activate accidentally, possibly causing injury. Replacing the handle is not expensive – all you pay for is the refill charge. It is also essential never to attach the activation handle unless a charged cartridge is screwed in. If you trigger the system without a cartridge by mistake, you might damage the piercing mechanism, potentially causing the entire system to fail. If this happens to you, there is no alternative but to send the ABS backpack for service.

### **13. Are the extra safety strap and the leg straps really necessary?**

These straps should be used according to the operating instructions. If the hip strap is not pulled tight, the backpack might be pulled over your head in an avalanche. The extra safety strap and the leg straps (which must also be pulled tight) prevent this happening. In most cases, however, a hip strap (if it is pulled really tight) and a buckled chest strap should be sufficient.

### **14. Taking ABS on flights – Heliskiing**

Since January 1, 2003, it has been possible to check in an ABS backpack as passenger luggage. The arrangements are set out in IATA Regulation DGR. Tab. 2.3.A. However, you must declare the ABS backpack at the time of booking, or during check-in at the latest, to make sure there are no problems when the bag passes through the security scanner. Follow this link to read the relevant section from the IATA Regulation, and details of how to register your ABS backpack and what do to at check-in: [abs-airbag.de/us/service/abs-im-flugzeug/](http://abs-airbag.de/us/service/abs-im-flugzeug/) For the ABS TwinBag, the cartridge should be screwed in, but it is essential for the activation handle to be kept separately in the strap



pocket. One spare activation unit may be carried with each ABS backpack. Heliski operators in Europe, Asia, North America and South America still apply different rules for carrying and using avalanche airbags. However, an increasing number are recognizing how important and necessary it is to use or at least permit the use of airbags, which are easily the most efficient emergency equipment for avalanches. If heliski operators refuse to allow avalanche airbags, the reasons, frankly, are selfish, financial and administrative. All national clubs and associations recommend airbags for heliskiing. You should think twice before booking with a heliski operator that will not let you use avalanche airbags. Follow this link [abs-airbag.de/us/community/partner/](https://abs-airbag.de/us/community/partner/) for a list of heliski operators that work with ABS.

### **15. What are ABS Base Units, ABS Powder Base Units and the ABS Vario system?**

The Base Unit and Powder Base Unit are frameworks carrying the integrated, complete ABS system including TwinBags (double airbag). This is all you need to get going on the mountain - it is the "engine and chassis". There are also packs – the "bodywork" – which you are free to choose and zip on as you please. The packed volumes range from 5 liters to 40 liters, and you can select from a range of colors and features. This is the ABS Vario system. The Base Unit and the Vario system have many benefits and they have been tried and tested many thousands of times.

1. You can choose a packed volume to fit your particular excursion.
2. Because they are used to carry skis, the sides of the packs (Zip-Ons) are subject to wear over time. It is much cheaper to replace the Zip-On than the entire backpack.

### **16. Are the new Zip-Ons (packs) also compatible with the older version of the ABS Base Units?**

Yes, and we can guarantee it. The zips are always manufactured to the same dimensions, which means a new Zip-On can be zipped straight onto, say, a five-year-old Base Unit.



### **17. How do I know if the cartridge or activation handle is filled?**

For the cartridge, you can have a look to find out. Unscrew the protective cap and check the seal. It will be obvious if the cartridge has been pierced. However, you can never be 100% certain of a perfect seal. The cartridge is under immense pressure. A hairline fracture or a defective seal or thread, etc. could cause a leak and a loss of pressure. This would prevent the system working properly. That is why it is essential to check the cartridge regularly before using it. The only way to do this is by comparing weights. The net weight without the cap is printed on each cartridge. It is very easy to check the weight. If there is a discrepancy of more than 5 grams, you should not use the cartridge. Simply ask us for a free replacement. In the activation handle, the pin used for attaching to the pressure tube must be securely fixed. You can check this by pulling gently with your fingers. Above all, make sure that none of the red band is visible on the pin – the red band appears when the handle has been activated. Important! Never force the pin out using pliers or your teeth. This could cause serious injury.

### **18. Can I leave the cartridge screwed in at all times?**

Yes, if this is more convenient. You just need to check the weight of the cartridge regularly to make certain it is completely filled. It is best to get into the habit of doing this before every use. You can screw the cartridge in and out whenever you like without having to fiddle with a pretensioning mechanism, as in manual Bowden cable systems.

### **19. Is it advisable to carry a second cartridge and activation handle?**

Definitely. You should never delay activation until you are already being carried by the avalanche – instead you need to pull the activation handle the instant you suspect you might have dislodged a slab. If no avalanche materializes, so much the better. It's good to err on the side of caution, and although you now have an empty cartridge, there's no harm done. To get the system working again, you need a second cartridge with activation handle. The cartridge and activation handle form a single unit – you cannot trigger the cartridge without a charged activation handle, and a charged activation handle cannot deploy the airbags without a filled cartridge.



## **20. Does the ABS need maintenance? If so, after how long?**

The ABS is a piece of emergency kit that can make the difference between life and death. The manufacturer recommends returning the equipment for a general check every three years. Before every season you are also recommended to practice a real activation with a filled cartridge. You should monitor the activation as it happens, check that the airbag is airtight, and inspect the general condition of the equipment and the backpack. The manufacturer's maintenance involves testing the function, replacing seals and checking the general condition. Sports retailers usually hold special test weeks at the start of the winter season. Our newsletter contains details of the retailers taking part. Subscribe to our [Newsletter](#) on the ABS web site.

## **21. The cartridges and activation handles can be refilled. Can I get cartridges from camping gas retailers?**

The cartridges and activation handles can only be refilled by the manufacturer. Replacement cartridges and handles are only available from ABS dealers. The same rules apply in all countries.

## **23. Do the activation units have an expiry date?**

Yes – the cartridge as well as the activation handle. For cartridges, the expiry date is expressed as the number of refills. The maximum number of refills is 20. A record is kept of each refill. When you send us an expired cartridge to refill, we will keep it and automatically send you a replacement free of charge.

## **24. Can ABS cartridges – steel or carbon – also be used in other avalanche airbag systems?**

No!! The closure of ABS cartridges is only designed to work with the ABS filling system. Only ABS filling systems can be used to open ABS cartridges without damage. Other manufacturers try to copy the ABS system and claim that ABS cartridges can also be used to activate their airbags, but these claims are definitely false. The certification body TÜV has issued a warning about this.



## 25. ABS Wireless Activation by companions

Every avalanche situation is different, and it is not easy to act consistently and correctly at a time of great stress. Our practical experience suggests that up to one fifth of all avalanche victims with an airbag

- did not activate the airbag
  - they did not perceive the avalanche
- were unable to activate the airbag
  - they reacted too slowly and could not reach the activation handle as they were falling
- were restricted in their movements
  - their hands were in the pole straps and their arms were pulled back by the avalanche.

ABS Wireless Activation by companions is an effective and practical solution to these problems. A wireless activation handle is attached instead of the standard white activation handle. This means that all ABS TwinBag systems can be retrofitted. To form an activation alliance with your companions, everyone briefly closes the handles at the same time. If one member of the group activates the avalanche airbag, everyone else's airbag deploys in the group. Different settings can be used to customize the way the airbags are deployed. Click here to find out more about [Wireless Activation](#).

## 26. What is more important – an ABS backpack or an avalanche transceiver?

This is impossible to answer because you are not comparing like with like.

The ABS system is designed to prevent the victim being buried.

The purpose of an avalanche transceiver is to quickly locate someone who has been buried.

An ABS backpack is no good at locating victims, and avalanche transceivers are no use in preventing burial. Apart from the deadly effects of the fall itself, burial is the cause of all avalanche deaths. An avalanche transceiver is necessary because even an ABS avalanche airbag cannot prevent burial in all conceivable situations. This means that the best emergency kit for avalanches includes an ABS avalanche airbag, an avalanche transceiver, a shovel and a probe.



**27. The "standard kit" is an avalanche transceiver, shovel and probe. Isn't that enough?**

As is so often the case, the standard kit represents the bare minimum. If the avalanche transceiver is working, a buried victim is always found, but in many cases too late. The options for rescuing victims alive depend largely on factors that have nothing to do with the avalanche transceiver, shovel and probe:

1. Burial depth
2. Unblocked airways
3. Air pocket

If you are only buried to a depth of 50 cm, have unblocked airways and are in an air pocket, your chances of being rescued alive are high if an experienced rescue team is looking for you. However, the average burial depth is about a meter, and three quarters of buried victims have blocked airways. It is asking a lot of the rescue team to find you within 15-20 minutes and dig you out so that your airways can be cleared. For easily the best chance of survival, it is best to avoid being buried in the first place. That is why we strongly recommend going one better than the standard kit and using the ABS avalanche airbag to make the standard kit superfluous in practice.

**28. Modern avalanche transceivers claim to be easy to use and to locate victims quickly. In that case, is being buried really such a major risk?**

As the manufacturers themselves freely admit, when modern avalanche transceivers are correctly operated by trained users, the process of locating the victim is just a small part of the overall time required for rescue and if necessary resuscitation. Most of the rescue time is taken up by probing, shoveling, clearing the airways and resuscitating the victim. For the average burial depth of one meter, for example, about two cubic meters of compacted avalanche snow needs to be removed to rescue the victim.

Even for people who are used to doing this, it can take 10-15 minutes. With 2-3 minutes for locating the victim, even if everything goes as well as possible, this **always** adds up to 15 minutes – the absolute maximum length of time that is generally considered to be survivable without an air pocket. The odds are worse than Russian roulette. Accepting burial as an occupational hazard is playing a dangerous game of life and death.



## **29. How does Avalung work?**

Even if it is compacted, avalanche snow contains a certain amount of air for breathing. Provided your airways are clear, you can breathe this air. However, after a short time, your warm breath forms an airtight cavity in front of your mouth, preventing the carbon dioxide escaping into the surrounding snow. CO<sub>2</sub> poisoning quickly follows, ultimately resulting in suffocation.

Avalung is an emergency device intended to help victims breathe under snow. The mouth piece must be inserted into the mouth during the descent. Avalung uses a system of valves to take breathable air from the front of the body, while expelling poisonous CO<sub>2</sub> to the back. The idea is to keep the victim breathing in the avalanche and extend the survival time – assuming (a) you have managed to insert the mouthpiece, (b) the enormous weight of snow does not make it impossible to expand the rib cage, and (c) your airways are clear. If your mouth, nose or throat are blocked with snow, it will be virtually impossible to breathe through the snorkel. The Avalung is worn over the clothing with a support system. However, Avalung does not prevent burial and cannot reduce the burial depth. In other words you will still need your companions to rescue you.

## **30. Is the avalanche ball just a different kind of avalanche airbag?**

Absolutely not. An avalanche ball is just an old-fashioned avalanche cord with a kind of Chinese lantern attached to the end. The device is worn over the clothing or on the backpack, and the avalanche victim has to trigger the spring mechanism him/herself. The avalanche ball is no help to the victim while the avalanche is descending or when it comes to a stop. In particular, far from preventing burial, the device cannot have the slightest influence on whether the victim is buried or not. If the system works as it should, the ball will be about 5 meters downhill from the victim when the avalanche stops. The rescuers can pull the avalanche cord tight to locate the victim and start digging him/her out.

## **31. Is an avalanche transceiver necessary if an avalanche ball is used?**

None of the major organizations or manufacturers recommend doing without an avalanche transceiver. The avalanche ball has to be triggered manually, and there are situations in which this does not happen or is not possible. Sometimes, the avalanche ball is itself buried. If the victim is not carrying a working avalanche transceiver, precious time is wasted locating him or her and the chances of survival are low. The avalanche



ball is useless when it comes to providing help such as locating victims and digging them out.

### **32. How does the avalanche ball behave in a secondary avalanche?**

Genuine secondary avalanches are actually quite rare. But subsequent snow movements can be a real problem. The ball normally comes to rest on the surface, downhill from the victim and attached with a tight avalanche cord. With a small amount of additional snow, the ball may move to the side and upwards slightly. But once the cord has been covered with snow, the ball becomes a point of fixed resistance for the new snow, so with enough snow, it will be buried.

### **33. Are Recco reflectors enough as emergency equipment?**

Recco is an avalanche rescue system that uses passive reflectors and active search devices. The reflectors require no power supply and can therefore be inexpensively included in winter sports apparel and equipment. Unlike avalanche transceivers, mountain rescue services can only search for avalanche victims if they are equipped with Recco search devices, usually from a helicopter. Radio signals are transmitted from the search device and are returned by reflectors in the victim's clothing. Although the deployment times of the rescue teams are getting shorter, a lot of time is wasted bringing the search system to the avalanche. For this reason, Recco reflectors can only be classed as an extra tool.

### **34. Recommendations**

- Fact: every avalanche is a matter of life and death, and no emergency equipment can prevent the avalanche occurring.
- Fact: burial is by far the biggest cause of death among avalanche victims.
- Fact: buried victims only stand a chance of survival if they are dug out and if necessary resuscitated quickly (within 15-20 minutes).

### **Summary**

1. Whenever skiers or snowboarders go off piste, they must expect to be buried if they are caught up in an avalanche.



2. If you avoid being buried, you will almost always survive the avalanche.
3. To prevent burial in all phases of the descent of an avalanche, especially in the critical run-out phase, the victim must be kept as horizontal as possible. Mono airbags provide extra volume but only near the head, so they force the victim into a vertical position. In a vertical position, the victim is at serious risk of being buried by subsequent snow movements.
4. Some slab avalanches start quite small but can easily develop into massive, fast-running avalanches. During the descent there is a real risk that an airbag might be damaged by rocks on the ground, bushes, trees, etc. Only double airbags or similar designs provide sufficient safety.

**We therefore recommend the following priorities**

<b>Objective</b>	<b>Actions/equipment</b>
1. Avoid avalanche defensive behavior	- Training, professional guides,
2. Prevent burial	- Consistent use of ABS TwinBag system
3. Locate victims reliably	- Avalanche transceiver, Recco reflectors
4. Help your companions and probe	- Rescue equipment, shovel