

If the air conditioning system repeatedly fails for a few minutes and then suddenly starts working again, it is an indication of an iced-up evaporator. In most cases, this problem is caused by a defective expansion valve.

Foreign objects and contamination caused by abrasion or corrosion can mechanically block the thermostat in the expansion valve. If it stays open permanently, too much refrigerant can enter the evaporator. This can cause the temperature to fall below the specified minimum temperature of $+0.5^{\circ}\text{C}$. If a temperature sensor, which some vehicle manufacturers attach to the evaporator, detaches from the bracket, or if the cabin filter is clogged, the evaporator temperature can also fall below 0°C .

Why the evaporator ices up

Condensation takes place as the warm air is cooled by the evaporator, and most of this condensation runs off the exterior. However, some of it also collects between the pipes at the lower end of the evaporator. If the temperature drops below 0°C , the condensation

water freezes and expands by approx. 10%. This results in the pipes being deformed from the outside inwards (see Fig. 2). If this process recurs, the deformation gets worse and worse until a crack finally appears (see Fig. 3), causing refrigerant to escape. Since the evaporator is located under the dashboard, leaks are more difficult to detect there than in the engine compartment, for example. And even when the component is removed, the cracks are often not visible to the naked eye and can only be detected using forming gas and a sniffer.

Protecting the air conditioning system from moisture

The filter-drier or accumulator should always be replaced every time the air conditioning system is opened. These components absorb the moisture in the refrigerant system and protect the expansion valve from corrosion. The water-absorbing granulate in the old filter-drier or accumulator may be saturated, so if they are not replaced, they may not absorb the moisture fully or at all. This moisture can then react with the PAG oil and form aggressive acids that attack the copper alloys in the expansion valve.

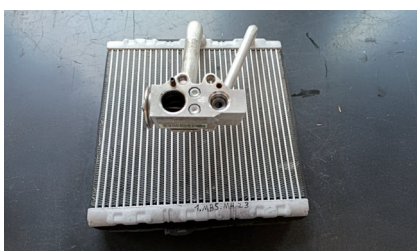


Figure 1: No damage can be seen from the outside



Figure 2: Deformation due to ice droplets on the evaporator pipe

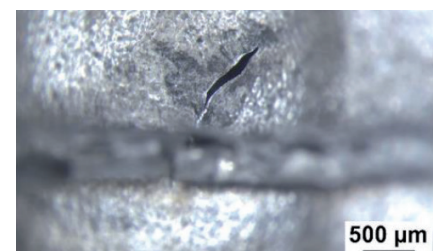


Figure 3: The crack is only visible under a microscope

Important!

To ensure reliable operation and to prevent damage, MAHLE recommends an annual air conditioning check and an air conditioning service every two years. The filter-drier or accumulator should always be replaced every time the air conditioning system is opened. When filling the system, the vacuum time of 30 minutes should always be observed. checking whether the manufacturer has approved a conversion to an antifreeze with silicate additives (e.g. G12evo).