

Function principle of the air conditioning system

The automotive air conditioning system is a combination of heater and refrigerant circuit. This allows the generation of the desired indoor air conditions, completely independent of the outside conditions. Thus the air conditioning is an essential factor for safety and travelling comfort.

The refrigerant circuit

The individual components of the refrigerant circuit are connected through hoses and form a closed system. Within the system the refrigerant circulates, driven by the compressor. The circuit is divided into two sides:

The part between compressor and expansion valve is called the high pressure side (yellow/red).

The part between expansion valve and compressor is designated as low pressure side (blue).

The gaseous refrigerant is compressed in the compressor and thus heated up considerably. It is pressed into the condenser under high pressure. This results in heat to be withdrawn from the heated up refrigerant, which leads to its condensation, i. e. its state changes from gaseous to liquid.

The drier, the next station, separates pollutants and air inclusions from the now liquid refrigerant. This ensures the effectiveness of the system and protects the components from damages caused by pollutants

From the drier the circuit continues to the expansion valve. This valve can be compared to a barrage. In front of the barrage it maintains the consistent pressure, whereas this pressure is allowed to relieve behind the barrage, due to its change in volume. Since the expansion valve is located directly in front of the evaporator, the refrigerant relief passes into the evaporator. During evaporation, i. e. when changing the state of aggregation from liquid to gaseous, latent heat (evaporated cold) is released.

Just like the condenser the evaporator is similar to a heat exchanger. It possesses an enormously large surface, which transfers the latent heat to the environment. This evaporative cold is now blown into the vehicle's interior by the ventilation system, where it is responsible for the passengers' comfort. At the low pressure side the refrigerant - which is now gaseous again - flows back to the compressor, where the circuit starts from the beginning.

Refrigerant circuit

