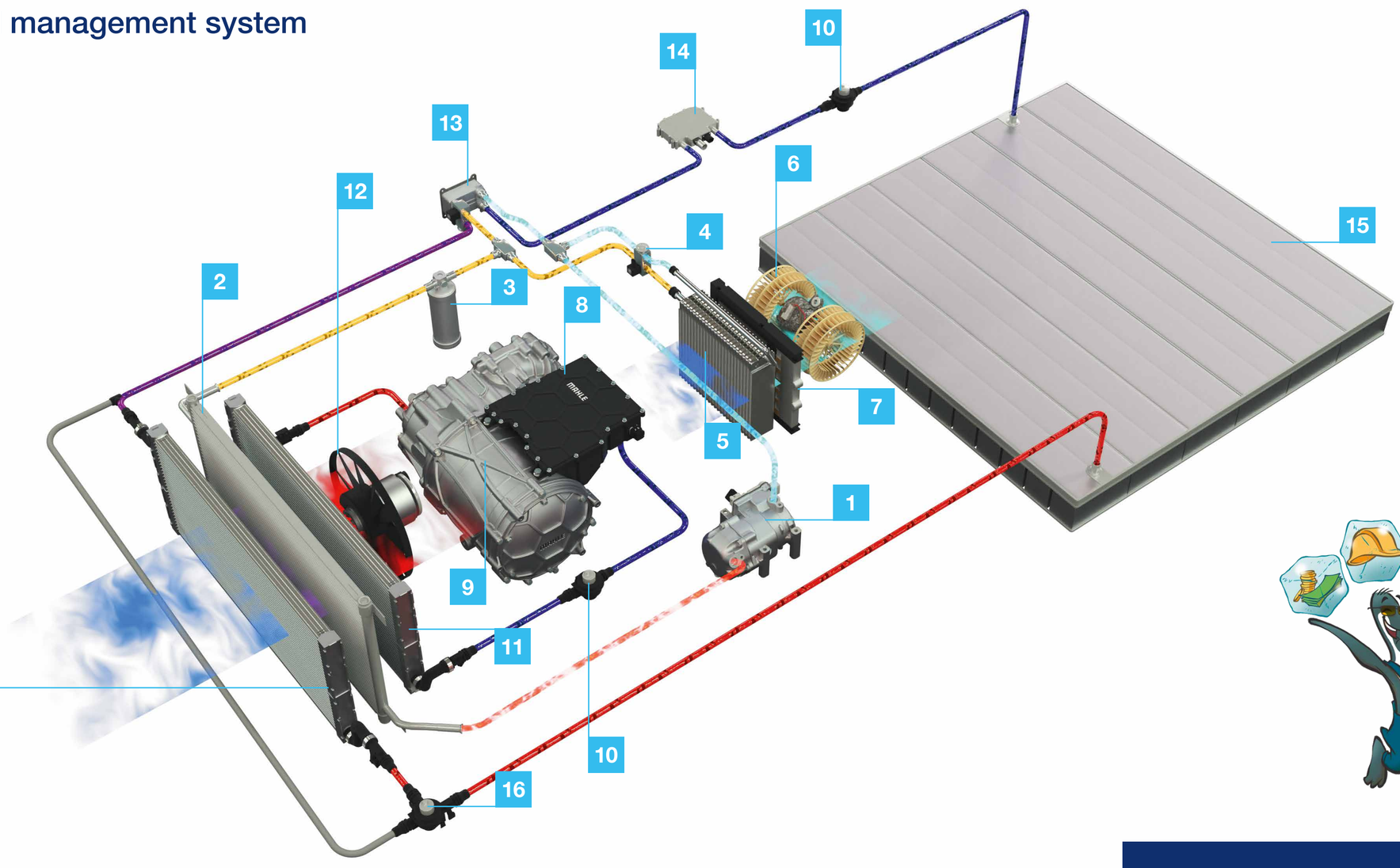
An A/C check is especially important for electric and hybrid vehicles!

Though the thermal management of combustion engines and electric drives has a similar technical structure, it is more complex in electric drives. The traction battery, electric motor, and power electronics have different temperature requirements, which must be strictly adhered to. To achieve this, several cooling and refrigerant circuits are required. Proper temperature control impacts both the service life of these components and the cruising range of electric vehicles.

So, in addition to air-conditioning the cabin, the A/C system also helps to cool the components crucial to electric drives. It's clear: a properly functioning and serviced A/C system is extremely important!

Example of a thermal management system for electric vehicles



Further details on technology & function

1 High-voltage A/C compressor
2 A/C condenser
3 Filter-drier
4 Expansion valve with solenoid valve
5 Evaporator
6 Cabin fan
7 High-voltage air heater
8 Power electronics
9 Electric motor
10 Coolant pump
11 Low-temperature radiator
12 Electric radiator fan
13 Chiller
14 High-voltage coolant auxiliary heater
15 Battery module
16 Coolant shut-off valve

An A/C check can save you money, keeps you safe, and is better for your health—no matter what type of drive you have!

You can find more useful information about A/C maintenance here.

The more powerful the batteries are, the more complex the coolant- and refrigerant-based circuits need to be.

The entire **cooling system is** divided into several circuits, each with its own low-temperature radiator, coolant pump, thermostat, and coolant shut-off valve. The refrigerant circuit of the **A/C system** is integrated via a special heat exchanger (chiller).

The coolant temperature for the electric motor and the power electronics is maintained at below 60°C inside a separate circuit (inner circuit on the figure) using a low-temperature radiator.

To achieve full performance while ensuring the longest possible service life, it is necessary to always maintain the coolant temperature of the battery between approximately 15°C and 35°C. When temperatures become too low, the coolant is heated via an auxiliary high-voltage heater. When the temperature gets too high, it is cooled via a low-temperature radiator. Should this not suffice, the chiller will further reduce the coolant temperature. The refrigerant of the **A/C system** flows through the chiller and further cools down the coolant, which also flows through the chiller (indirect battery cooling via the A/C system). The entire control is carried out via individual thermostats, sensors, pumps, and valves.

Cooling the battery during fast charging is another important function. Electric vehicles experience a charging loss of about 10 percent. Charging losses generate heat in the battery, which has to be dissipated by the cooling system. Since there is no airstream when charging, the A/C compressor is designed to provide the necessary power.

MAHLE-TK-1.2/2024-02/EN